

LEARNING FROM THE ROAD WELL
TRAVELLED: THE IMPACT OF CHRONIC
CHILDHOOD MALTREATMENT ON
BRAIN DEVELOPMENT AND FUNCTION
AS A CONTRIBUTOR TO FUTURE
CRIMINAL RECIDIVISM

Bonnie Mercedes Martin-Giles, BSW (Hons)

SCHOOL OF SOCIAL AND POLICY STUDIES
DISCIPLINE OF SOCIAL WORK
FACULTY OF BEHAVIOURAL AND SOCIAL SCIENCES
FLINDERS UNIVERSITY

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SIGNED DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACE	Adverse Childhood Experiences
ACTH	Adrenocorticotrophic Hormone
ADHD	Attention Deficit Hyperactivity Disorder
AIC	Australian Institute of Criminology
AIHW	Australian Institute of Health and Welfare
APA	American Psychiatric Association
APSC	Australian Public Service Commission
BEIP	Bucharest Early Intervention Project
CAT	Computerised Axial Tomography
CBT	Cognitive Behavioural Therapy
CREDIT	Court Referral for Eligible Defendants Into Treatment
CSA	Childhood Sexual Abuse
CSF	Cerebrospinal Fluid
CTQ	Childhood Trauma Questionnaire
DFAT	Department of Foreign Affairs and Trade
DTO	Drug Treatment Order
EEG	Electroencephalogram
fMRI	Functional Magnetic Resonance Imaging
HPA axis	Hypothalamic-pituitary-adrenal axis
HRLC	Human Rights Law Centre
ICO	Intensive Corrections Order
IQ	Intelligence Quotient
LCARC	Legal and Constitutional Affairs Reference Committee
LIV	Legal Institute of Victoria
MCV	Magistrates' Court of Victoria
MERIT	Magistrates Early Referral Into Treatment Program
MRI	Magnetic Resonance Imaging
MRPFC	Medial rostral prefrontal cortex
NACLC	National Association of Community Legal Centres
NSWLRC	New South Wales Law Reform Commission
ODD	Oppositional Defiance Disorder
PCL-R	Psychopathy Check List – Revised
PET	Positron Emission Tomography
PFC	Prefrontal Cortex
PTSD	Posttraumatic Stress Disorder
RNR	Risk-Needs-Responsibility Model
SCRGSP	Steering Committee for the Review of Government Service Provision
SNPP	Standard Non-Parole Period
UNODC	United Nations Office on Drugs and Crime

ABSTRACT

From a social work perspective, this thesis is focused on the possible contributions of neuroscience knowledge to rehabilitation interventions within Australia's criminal justice system. The dominance of neoliberalism throughout the western world has seen governments responding to criminal recidivism with increasing punity by adopting 'tough on crime' measures. Within the rehabilitation programs that exist, there can be a dominance of models such as Cognitive Behavioural Therapy (CBT). Additionally there are clear systemic barriers that impact on the availability and access to correctional rehabilitation programs, including long waiting lists for entry into available programs, relevant programs not being available in all jurisdictions across Australia, and strict eligibility requirements for entry into rehabilitation programs. As such, the relatively high rates of reoffending in Australia signal that correctional programs may not be fulfilling a primary purpose of our justice system, which is rehabilitation.

Evolution of medical and imaging technology has provided neuroscientists with the opportunity to significantly improve knowledge of the intricate workings of the human brain. Increasingly neuroscientists are uncovering not only the unique plasticity of the brain that allows it to adapt and compensate as a result of trauma or injury, but also the extreme sensitivity of the brain to external environment and experiences. However, whilst this knowledge has existed within the neuroscience field, its application to social work and social policy at a practical level appears to be limited. Is there a place for this knowledge about the brain to contribute to addressing our understanding of offending behaviour? If so, what form would it take?

The central question of this thesis is whether existing neuroscientific research evidence supports the idea that chronic childhood maltreatment has a physiological impact on the developing brain, thereby placing individuals at greater risk of engaging in recidivistic offending in adulthood. Given the high incarceration rates within Australian prisons, can extrapolating neuroscience knowledge into correctional programs better accommodate and rehabilitate these populations to reduce the human, social, and economic costs of criminal recidivism within Australia? This question has been investigated through the combination of systematic reviews of the existing research literature combined with critical discourse analysis of offender rehabilitation policies and programs in Australia.

A finding of this research is that with increased financial backing and a renewed scientific focus on understanding the complex workings of the brain, there is now a growing body of neuroscience research that provides evidence that the experience of chronic childhood maltreatment can indeed result in marked alterations in the structure and function of the

developing brain. There also exists a body of research from criminology and social work that links the experience of chronic childhood maltreatment with engaging in offending behaviour. It is apparent however that despite obvious parallels uncovered by these separate disciplines their pathways rarely intersect. There are arguments that as a discipline social work has been reluctant to incorporate advances in neuroscience knowledge into its theory and practice, in part due to continuing binary arguments between empirical science and interpretive practice, as well as the quest to avoid biological reductionism. Similar positions are evident in the field of criminology where there is a distrust of biological knowledge in explanatory theories largely as a result of the historical use of biological discourse to justify oppressive regimes.

The thesis concludes that there is a case to incorporate understandings of neuroscience within correctional programs, and that there are possibilities for incorporating new models of offender rehabilitation that acknowledge the potential existence of alterations in the structure and function of the brain for individuals who have experienced chronic childhood maltreatment, particularly in terms of difficulties in emotion and behavioural regulation and deficits in learning and cognition. There appears to be evidence that the use of CBT, which dominates current correctional rehabilitation programs in Australia, may not be effective for individuals who experience difficulties in emotion and behavioural regulation and deficits in learning and cognition as a result of chronic childhood maltreatment. These understandings inform somatic therapy as a relatively new avenue within which neuroscience can contribute to offender rehabilitation, given its focus on therapeutic activities that facilitate the regulatory processes in the brain that become disrupted by experiences of prolonged trauma.

One of the foundational principles of social work in being able to intervene at the intersecting points of individuals and their environment is that there needs to be acknowledgment that people both influence and are influenced by their surrounding environment in a bidirectional flow. Given the apparent connection between experiences of childhood maltreatment and offending behaviour, the social work profession has the capacity to advocate for stable and supportive environments for children at risk of experiencing chronic childhood maltreatment, thereby interrupting the potential maltreatment/offending cycle.

That said the contribution of neurobiology to understandings of offending behaviour does not exclude the importance of understanding the various societal, economic and social pressures that also contribute to offending behaviour. Rather, this thesis examines whether these various intersecting threads can in fact be woven together to create greater understanding of how pernicious environments and experiences interact with brain development in such a way as to predispose some individuals to engage in crime. As such, this thesis asks whether this knowledge would place social work in a stronger position to be able to implement interventions

that will be more effective in meeting the needs of clients both at an individual and structural level.

As findings in this thesis show, social work is in the unique position of being able to advocate for the sharing of knowledge between the natural sciences and the social sciences in order to positively influence the outcomes for individuals who have experienced chronic childhood maltreatment and who have subsequently become ensnared in a downward spiral of repeat offending and incarceration.

CHAPTER ONE: INTRODUCTION

Introduction

This thesis emerged from work undertaken as a social worker with participants of the Victorian Dandenong Drug Court, where common themes became evident from client histories: chronic childhood maltreatment, disconnection from school and social institutions, escalating antisocial behaviour from early adolescence, and increasing engagement with the criminal justice system throughout adulthood, which for many resulted in what appeared to be a revolving door of prison sentences. By the time these individuals were engaged in court-ordered Drug Treatment Orders a number of them had broken down any positive social or familial networks, experienced limited to no educational or employment opportunities, and had lost any form of housing options. The vicious cycle of drug addiction, offending and homelessness also appeared to coincide with childhood experiences of abuse and maltreatment. Not only were they trying to manage these current issues, they were also facing a continuous battle with their negative childhood experiences. It became apparent to me that for certain sections of the population Australia's correctional services are failing not only to reduce recidivism rates, but also to rehabilitate offenders to the point where they can live positive, engaged and productive lives.

The themes I witnessed at the Dandenong Drug Court are echoed in numerous studies from the fields of criminology, psychology and social work, which have found correlations between the experience of chronic childhood maltreatment and later engagement in offending behaviour (Burton et al., 2011; Cernkovich et al., 2008; Chu et al., 2009; Feiring et al., 2007; Gover, 2002; Grogan-Kaylor & Otis, 2003; Heck & Walsh, 2000; Hosser et al., 2007; Kenny et al., 2007; Lansford et al., 2007; Lee & White, 2012; Lemmon, 2006; Mersky & Topitzes, 2010, 2012; Mersky & Reynolds, 2007; Nyamathi et al., 2012; Reckdenwal et al., 2013; Ryan, 2006; Scudder et al., 1993; Smith, C. & Thornberry, 1995; Spaccarelli et al., 1995; Spidel et al., 2010; Stewart et al., 2005; Stewart et al., 2008; Tikkanen et al., 2009; Topitzes & Mersky, 2012; Widom et al., 2006; Widom & White, 1997). This link represents an important area for exploration as part of an analysis of Australia's criminal justice system, particularly in terms of understanding why the experience of chronic childhood maltreatment may place individuals at greater risk for later engagement in the criminal justice system.

The neurobiological functioning of the human brain has long remained a mystery, however with continuing advances in medical and neuroscience technology our knowledge of the brain is rapidly expanding to provide a plethora of valuable information

on the way in which the brain operates. Attempting to define neuroscience research in a clear concise manner is somewhat difficult given the diversity of discourse and practice within the subject field itself (Pickersgill, 2013:324). Broadly speaking, neuroscience concerns the study of the body's brain and nervous system, both in terms of structure and function, through the utilisation of a conglomeration of various disciplines, including molecular biology, neurochemistry, neurophysiology, neuroanatomy, computational neurology, embryology, and cell biology, that examine the brain and central nervous system with a view to better understanding of the mental processes we use to perceive, learn, feel, remember and act (Farmer D, 2008:288; Kandel et al., 2000; Pickersgill, 2013:324). Neuroscience is beginning to gain prominence in the social science arena with many scholars believing that it may indeed hold the key to increasing our understanding of behaviour and social systems (Farmer R, 2009:6; Matto & Strolin-Goltzman, 2010:147).

While working at the Drug Court I became aware of developments in neuroscience which are providing valuable information on the way on the way the brain operates. Research by scholars such as Bruce Perry has given insights into the impact of childhood maltreatment on brain development and function. Social work scholars such as Rosemary Farmer (2009:1) have also suggested that neuroscience can provide opportunities for social workers to be able to more comprehensively understand human behaviour. The painful histories of chronic childhood maltreatment experienced by the clients I saw at the Drug Court suggested a possible connection, through neurobiological correlates, between the experience of childhood maltreatment and engagement in offending behaviour. More broadly a range of questions can be posited. Is there a place for neuroscience knowledge on brain development to inform understandings of antisocial and criminal behaviour? Might social work benefit from understanding the ways in which development of the brain and nervous system impacts on the social functioning of a person? Is there a place for neuroscience knowledge about brain development to inform understandings of antisocial and criminal behaviour?

Since the 1990s there has been an increased focus on and financial backing of neurobiological research, with former American president George H.W. Bush declaring the 1990s to be the 'decade of the brain' (Goldstein, 1994:239). Attempting to define neuroscience research in a clear concise manner is somewhat difficult given the diversity of discourse and practice within the subject field itself (Pickersgill, 2013:324). Broadly speaking, neuroscience concerns the study of the body's brain and nervous system to better understand the mental processes we use to perceive, learn, feel, remember and act (Farmer D, 2008:288; Kandel et al., 2000; Pickersgill, 2013:324). It does this through the utilisation of various disciplines, including molecular biology, neurochemistry,

neurophysiology, neuroanatomy, computational neurology, embryology, and cell biology, that examine the brain and central nervous system (Pickersgill, 2013:324).

Using these various disciplines neuroscience research has demonstrated that the brain develops in a sequential fashion from infancy through to adulthood (Painter & Scannapieco, 2013:277; Perry, 2009:241; Perry, 1997:126; Weber & Reynolds, 2004:117). This sequential nature of brain development means that there are critical periods of development where particular areas of the brain are most sensitive to particular experiences. Intricate mechanisms of neural plasticity means that as the brain develops, the interactions between nature and nurture shape the brain to support survival within the child's unique environment (Gaskill & Perry, 2012; Cicchetti, 2002). The surrounding sensory environment influences the quantity, pattern and nature of neural activation, with neural systems organising and responding according to these unique and individual experiences (Weber & Reynolds, 2004:117; Perry, 2009:243). There is now a mass of emerging neuroscience research, for which Perry is a key figure, which provides evidence that the experience of chronic childhood maltreatment during the formative years can lead to a disruption of the development and organisation of the brain, resulting in extreme or abnormal patterns of neural and neurohormonal activity (Perry, 2009:241). Is there a place for this knowledge about the brain to contribute to addressing our understanding of offending behaviour? If so, what form would it take?

Running parallel with the emergence of neuroscience research is the emergence of research from the humanities and social sciences that has examined the relationship between the experience of chronic childhood maltreatment and later engagement in offending behaviour. Despite possible links between these ideas it appears that criminological, neurobiological and social science research has remained separated by traditional disciplinary barriers.

Additionally, during the same time period a neoliberal ideology emerged in western democratic countries whose response to crime has also gained prominence in the form of harsher more punitive responses to offending behaviour. Throughout the world there is an increasing divide of inequality and growing insecurity in employment, with the popularity of neoliberalist regimes encouraging governments to enact austere measures that further impact on the poor and vulnerable in society (Jones & Novak, 2013:6; Reisch & Jani, 2012:1135). The global financial crisis at the turn of the century saw dramatic increases in homelessness, bankruptcy and unemployment (Pomeroy, 2009:294), further fracturing the divide in society between rich and poor. Is there a place for these various threads to be woven together to create greater understanding of how pernicious

environments and experiences interact with brain development in such a way as to predispose some individuals to engage in crime?

Crime in Australia

To understand the contextual background within which this issue is situated it is useful to briefly explore the incidence of crime and imprisonment in Australia. Incarceration rates in Australia have risen from 86 per 100,000 in 1984 to 167 per 100,000 in 2012 (Wood, 2014:100). In fact, on 11 June 2015 the Australian Bureau of Statistics (ABS) released a media statement that, according to statistical figures for the March quarter of 2015, national prisoner numbers had reached a record high level of 35,467 (ABS, 11 June 2015). The increase in incarceration rates coincides with a dramatic increase in expenditure on criminal justice. Since the 2002 - 2003 financial year expenditure on criminal justice has increased nationally by 49 percent overall with spending now at \$14 billion for the 2011-2012 financial period (Australian Institute of Criminology [AIC], 2014:129). The majority of this (71 percent) is allotted for policing and just 23 percent funds adult corrective services (AIC, 2014:130).

An increase in incarceration rates does not necessarily equate with an increase in crime rates. Crime rates in a number of categories have in fact fallen over the past two decades. For example, national homicide rates have declined from 354 per annum in 1996 to 297 per annum in 2012, and robbery rates have declined four percent between 2011 and 2012, which is reflective of a continuing downward trend over the last decade (Australian Institute of Criminology [AIC], 2014:2, 3). Despite this, research has shown that public perception of crime rates indicates a belief that crime levels are far greater than actual recorded levels (Ambrey, Fleming and Manning, 2014; Davis & Dosseter, 2010; Weatherburn & Indermaur, 2004). When policymakers are legislating for criminal offences and associated penalties, as well as allocating resources for policing and prosecuting, public perceptions of increasing crime levels and concern about safety are significant influencing factors (Davis & Dosseter, 2010:1).

An alternate explanation for the increase in prisoner numbers is that these statistics are more reflective of the policy and practice rhetoric governing Australia's criminal justice systems. Since the 1990s, Australia, along with the majority of other western democratic nations, has taken a more punitive approach to crime, evidenced by the 'tough on crime' rhetoric that has dominated policy platforms and resulted in the introduction of increased statutory maximum penalties, mandatory sentencing, indefinite detention, and electronic monitoring of offenders (Baker & Roberts, 2013:121; Crispin, 2010:119; Freiberg, 2010:209). Mandatory sentencing for particular crimes, as indicated in policy prescriptions, aims to reduce crime through deterrence by imposing harsher sentences

and through incapacitation by preventing the offender from being able to commit further offences in the community as a result of being imprisoned (Legal Institute of Victoria [LIV], 2010:7).

In October 2014 the Victorian Ombudsman, Deborah Glass, released a report titled *Investigation into the rehabilitation and reintegration of prisoners in Victoria*. In the report Glass (2014:2) notes that the increasingly punitive response to crime by governments has prison populations in Victoria expanding from 4,350 in June 2009 to an estimated 7,169 in June of 2015. In order to accommodate such a dramatic increase in prison numbers Victorian prisons are increasingly using double and triple bunks in cells, as well as shipping containers (Human Rights Law Centre [HRLC], 2015). Additionally, more prisoners are being placed in solitary confinement and spending more time in lock-down as a management tool (HRLC, 2015). The rapid increase in prisoner numbers is largely due to parole reforms, which result in parole being more difficult to obtain and therefore requiring more prisoners to serve out their entire sentence, as well as the abolition of suspended sentences (Glass, 2014:6). Furthermore, since 2012 there has been a significant increase in the number of adults returning to prison after prior sentences (Glass, 2014:8).

Recidivism is the term used within research and policy documents to describe offenders who engage in persistent criminal activity (Payne, 2007:4). In examining the data from a number of recidivism studies in Australia spanning a ten-year period between 1995 and 2006, Payne (2007:63) found that when taking into consideration methodological differences in defining recidivism, recidivism rates have been relatively consistent across this period. These statistics may therefore signal that correctional programs may not be fulfilling a primary stated purpose of the justice system, which is to rehabilitate offending behaviour (see for example *Crimes (Sentencing Procedure) Act 1999 [NSW] s 3A[d]*; *Sentencing Act 1991 [Vic]*; *Criminal Law (Sentencing) Act 1988 [SA] s 10.1.m*). Preventing recidivism and reducing re-incarceration remain central priorities for Australian state and federal governments, particularly given that research has demonstrated that a minority of offenders are responsible for the majority of crime, due to recidivism (Payne, 2007:100). The efficacy of Australia's criminal justice system therefore remains a fundamental topic in the Australian political landscape. It begs the question as to whether there is a gap in the knowledge and evidence that can be used in correctional policy and programming to reduce offending behaviour, and also to provide future social and economic opportunities and civic engagement for offenders.

A strong correlation has however been found between custodial sentences and the risk of reoffending, highlighting that the application of more severe imprisonment sentences is in fact less effective as a deterrent than alternative sentencing options (Gelb, Fisher &

Hudson, 2013:xii). In part this is believed to result from prison environments exposing first-time offenders to experienced criminals and criminal organisations, as well as increasing the stigma and social exclusion already experienced, and impairing social skills (Gerra & Clark, 2010:3). Related to this is the need for attention to factors such as employment and stable housing availability in particular, a lack of which can contribute to a downward spiral of offending and incarceration.

Social work and neuroscience

Social work as a profession is comprised of multiple fields of work. The International Federation of Social Work highlights the core purposes of social work as being the promotion of wellbeing within society by identifying structural barriers that contribute to inequality, discrimination, and injustice (2012:online). Social work practice achieves this through various means, including casework, counselling, advocacy, community development, political activism, and creating and administering programs and organisations that are dedicated these purposes (Australian Association of Social Work, 2016:online; IFSW, 2012:online).

Social work is practice across a variety of fields and, alongside other professions, plays a pivotal role within the criminal justice system, including correctional rehabilitation. Historically, social work emerged as a practice that worked with populations who experienced a disproportionate amount of environmental hardships and early life stress (Farmer R, 2009:17; Matto & Strolin-Golzman, 2010:149). Social work has long had a focus on the 'person' and the 'environment', with the development of ecosystems theory by Carel Germain (1973, 1978, 1991) being particularly important in this regard. There is a tradition within social work that argues that for social work to intervene at the intersecting points of individuals and their environment there needs to be acknowledgment that people both influence and are influenced by their surrounding environment in a bidirectional flow. Person-in-environment perspective has been a defining social work stance that has attempted to cultivate a better way to classify and codify problems experienced by service users (Karls & Wandrei, 1992:80; Green D & McDermott, 2010:2416). Given the importance of this social work perspective, is there a place for neuroscience to provide a framework within which to understand the implications of environmental hardships and stress from the perspective of brain development and function? Would this knowledge then place social work in a stronger position to be able to implement interventions that will be more effective in meeting the needs of clients both at an individual and structural level?

Social work practice is becoming increasingly complex as technology advances and social systems become increasingly fragmented. Despite this increasing complexity, governments

and policy developers continue to strive to form unilateral linear solutions to complex social problems, but these solutions will inevitably fail if there is not sufficient recognition of the interrelationship between events and circumstance, including individual biology. As Green D and McDermott (2010:2415) argue,

“...for social work to be relevant to today’s societal problems, it must look beyond its practice and values in order to understand the changing environments and contexts that shape the lives of the people and communities we serve”.

Can neuroscience knowledge that is emerging about the contribution of the brain to the conditioning of behaviour, emotion and cognition, provide an avenue for more comprehensive understanding of the complexity of psychosocial problems? Evidence on the interrelationship of experience and biology represents an important concept in contemporary social work as it provides empirical data on the way in which marginalisation and vulnerability can result in increased stress, also known as increased allostatic load, which then compromises psychological, physical and immunological health (Green D & McDermott, 2010:2427).

Certainly there are writers who argue that neuroscientific insights improve understanding of behaviour by adding knowledge about the biological impact of chronic trauma, particularly when it occurs early in life (Farmer R, 2009:6). However, moving down this path is not without contention. There are some who argue that social work as a discipline has been cautious in integrating advances in neuroscience knowledge into its theory and practice, in part due to continuing binary arguments between empirical science and interpretive practice, as well as the quest to avoid biological reductionism (Egan, Combs-Orme & Neely-Barnes, 2011; Montgomery, 2013:337). Similarly, practices of medicine, psychiatry and public health have historically been fragmented into separate categories, often based on funding, organisational boundaries, and the traditional symptom-based focus of medicine (Anda et al., 2006:183). Academic disciplines have traditionally separated biological systems from psychological and contextual systems when examining the biological mechanisms of antisocial behaviour (Susman, 2006). Can emerging research into the neurodevelopmental consequences of chronic childhood maltreatment open the door for an interdisciplinary approach to managing the impact of chronic childhood maltreatment and increase successful interventions available to this population? How can social work fully utilise these advances in understanding to better target interventions and social policy approaches?

Similar to social work, criminology consists of multiple varying theories and assumptions that attempt to explain crime, with many of these theories contradicting one another (Agnew, 2011:192). Examples of variations include the perception that crime simply

involves a violation of criminal law, versus rational choice theory, which advocates individual self-interest contributes to ‘choosing’ to engage or avoid criminal behaviour, or alternatively, that it is social factors that pressure or entice individuals into crime (Agnew, 2011:192). Agnew (2011:193) argues that traditional criminological theories and assumptions are overly simplistic and fail to provide a complete explanation of criminal behaviour. Again, this thesis raises the question as to whether there is a gap in knowledge that neuroscience may be able to fill. Can knowledge from neuroscience provide an explanation as to why some individuals may be more predisposed to engaging in offending behaviour, as well as offering insights into the ways interventions might be better designed to support change?

One of the backdrops in debates about neuroscience knowledge is a well-founded concern about biological determinism. This resistance to biological interpretations of behaviour is strongly influenced by the use of ‘criminal biology’ by Nazi Germany to provide a ‘scientific’ justification for the indefinite incarceration, and eventual extermination, of groups of people that were labelled as hereditary criminals (Rafter, 2008:287). The eugenics movement is another example. There is also the concern about how far knowledge of brain function can go in its use as a criminal defence, or alternatively it use for legitimising the indefinite detention of dangerous offenders. Social work also has a strong focus on not blaming the individual and arguably this principle should inform engagement with biological neuroscience knowledge so that the social context is also considered. This will be discussed in greater detail in Chapter Two.

In line with the point made above, it is important to clearly state that this thesis does not seek to use neuroscience knowledge as a means to blame individual pathology for engagement in crime, nor does it intend to promote biological reductionism at the expense of examining societal, structural and cultural influences on behaviour. It is instead focused on presenting knowledge from multiple disciplines in an attempt to provide a more comprehensive understanding of the potential impact of chronic childhood maltreatment on brain development and function as a contributor to future criminal recidivism

This thesis explores whether a cross-discipline incorporation of knowledge between social work, neuroscience and policy makers can enhance understandings of psychosocial, biological and environmental influences on the individual, not only to help reduce recidivism, but also to improve the quality of life and opportunities for those individuals who have experienced chronic childhood maltreatment. The backdrop is a focus on the person and the environment in a way that seeks to avoid biological determinism, but remain ever mindful that this knowledge can be used in such ways.

What is missing from the literature?

There appears to be an expanse of literature linking the experience of chronic childhood maltreatment with later offending behaviour that is largely characterised by a reliance on traditional theoretical explanations, such as general strain theory, developmental theory, behavioural theories, or psychoanalytical explanations. Less obviously linked in this relationship is the neurobiological and physiological changes that may occur in the brain as a result of chronic childhood maltreatment, and the associated implications for increasing the likelihood of engaging in recidivistic offending. Moreover, despite rapid developments in neuroscience and understanding the impact of chronic childhood maltreatment on the developing brain, the translation of this knowledge into actual social policy and practice outcomes, particularly in the area of corrections, is weak.

This thesis aims to explore whether there is a gap in knowledge about the influence of chronic childhood maltreatment on offending behaviour regarding the influence of this mistreatment on brain development. Additionally it aims to explore whether neuroscience knowledge can be used in correctional policy and programming to not only reduce offending behaviour within this population, but also provide future opportunities and civic engagement. Finally it analyses the design and theoretical underpinnings of current correctional programs in Australia in order to determine whether advances in neuroscience knowledge are being incorporated into rehabilitation programs or whether there are more specific needs of this particular subject population that are not being met by current correctional discourse.

The research question

The central question of this thesis is whether existing research evidence supports the idea that chronic childhood maltreatment has a physiological impact on the developing brain resulting in abnormal structure and functioning, placing individuals at a greater risk of engaging in recidivistic offending in adulthood. Given the high incarceration rates within Australian prisons, can extrapolating this neuroscience knowledge into correctional programs better accommodate and rehabilitate these populations to reduce the human, social, and economic costs of criminal recidivism within Australia? More specifically the research questions are as follows:

1. In what ways does chronic childhood maltreatment impact on the physiological and functional development of the brain?
2. What role, if any, does chronic childhood maltreatment play in engagement in criminal recidivism?

3. How do current offender rehabilitation programs for recidivist offenders recognise and respond to experiences of chronic childhood maltreatment?
4. To what extent does the emerging neuroscience research about chronic childhood maltreatment provide insights that can be translated into correctional orders and rehabilitation programs for recidivist offenders?

As with any type of study, the research question will determine the type of method that is applied. Cognisant of the extensive literature, firstly in the field of neuroscience examining the impact of chronic childhood maltreatment on brain development and function, and secondly in the fields of social work, criminology and psychology linking chronic childhood maltreatment and criminal offending, it became apparent that there is limited interdisciplinary knowledge utilisation of this amassed research evidence and little neuroscience knowledge being used in correctional programs. A systematic review is one research method that allows for the collation of a large amount of empirical data, resulting from many studies, in a way that covers the greatest range of searching parameters and limits bias (Higgins & Green S, 2011:online; Petticrew & Roberts, 2006:9).

There are varied methods and methodologies for systematic reviews. The method of systematic review that is used in this thesis is a mixed research synthesis. This term derives from the fact that the object of synthesis, being the written reports of the primary data, and the mode of synthesis, being the qualitative and quantitative approaches to integrating the findings, are combined (Sandelowski et al., 2012:317). Research syntheses aim to generate new knowledge by making explicit connections between study reports that have not been visibly connected before and is fundamental in being able to disseminate knowledge from an array of research areas to inform policy and practice (Suri, 2013:889). Given that a primary aim of this thesis is to assist in the dissemination of neuroscience knowledge into social work and criminal justice policies, a research synthesis is the most appropriate way to fulfil this aim.

The thesis uses a mixed research synthesis in two stages: firstly, to conduct a detailed analysis of research on the impact of chronic childhood maltreatment on the development and function of the brain, and secondly, to examine research that has analysed the link between chronic childhood maltreatment and engagement in recidivist offending. Finally, the thesis explores the policies and practices that inform Australia's criminal justice system, focusing specifically on theoretical underpinnings of correctional programs and their use of, or absence of, neuroscience knowledge in the treatment of offenders.

Elements of a critical methodological approach will be evident in this third section of the research process given that the aim is to uncover power structures and dominant discourses within the justice system and public policy that frames it.

Definitions

In order to provide clarity of language, it is necessary to explicitly define common terms used throughout this thesis. The major terms used throughout this thesis are identified below.

Child maltreatment

A central term used throughout this thesis is that of chronic childhood maltreatment. This term has been carefully selected over other terms such as trauma or abuse. The term trauma is extremely broad, not only describing psychological trauma but also used in medicine to describe a physical injury. Psychiatric definitions of trauma are primarily concerned with defining a clear line between the traumatic and non-traumatic (Kansteiner, 2004:113). This however can become problematic as it is greatly influenced by political and power dynamics both within and outside the psychiatric field (Kansteiner, 2004:113). For example, after World War I the German psychiatric association adhered to a significantly narrow definition of what constituted psychological trauma, which meant that survivors could not claim continued support from the government because the accepted definition only allowed for a small number of people to receive a clinical definition of psychological trauma (Kansteiner, 2004:99). This highlights the subjective nature of defining trauma, and the inescapability of social, political and economic influences. Given the subjective and arbitrary use of the term trauma, as well as its concurrent association with physical injury, it was decided that another term was needed to better differentiate accident and single incident trauma from chronic maltreatment.

The term child abuse is an alternate term that could have been used given its prominent use throughout the supporting literature; however, there were disadvantages in relying on this term. Firstly, the term is somewhat vague in describing the types of abuse covered under this blanket term. Additionally, defining abuse and neglect remains a difficult task. Not only does the legal definition vary between jurisdictions, there are also significant cultural and temporal differences in what constitutes abuse (Cashmore, 2012:4). Public health commentators acknowledge that there are numerous inconsistencies across operational sectors in defining child abuse and neglect, which limits communication and impedes identification, assessment, and treatment, as well as the conclusions drawn about its incidence and prevalence (Leeb et al., 2008:3). In Australia, definitions of child abuse and neglect vary considerably between states. For example, Victoria classifies neglect that causes physical harm as physical abuse, whereas Western Australia uses the blanket term

'harm' rather than abuse (Bromfield & Higgins, 2004:21). In contrast, Queensland substantiates physical, psychological or emotional harm but does not define abuse or neglect (Bromfield & Higgins, 2004:21). Additionally, abuse implies something that is done to someone and therefore may exclude the important form of maltreatment, which is neglect, given that the definition of neglect implies the deliberate omission of care (Mennen et al., 2010:648).

Using the term child maltreatment is an alternative way of avoiding the inconsistency and ambiguity associated with the term child abuse. That said, defining what constitutes child maltreatment is highly contentious, particularly when the definition will be used for state intervention (Levesque, 2009:62). In recognition of this the American Centre for Disease Control released a paper designed to clarify the definition of child maltreatment. In this paper child maltreatment was succinctly defined as; *“Any act or series of acts of commission or omission by a parent or other caregiver that results in harm, potential for harm, or threat of harm to a child”* (Leeb et al., 2008:11). Acts of commission are defined as deliberate or intentional actions that harm or potentially harm a child, and include physical, sexual and emotional/psychological abuse (Leeb et al., 2008:11). The term 'acts of omission' is used to indicate a failure to provide care or protect from harm and include physical, emotional, medical or educational neglect, as well as inadequate supervision or exposure to violence (Leeb et al., 2008:11). It was therefore decided that this term was more useful than trauma or abuse as it was broad enough to encompass the various forms of child abuse, including emotional, physical, sexual abuse and neglect, without being so specific as to exclude potential causes of harm.

In using this definition of child maltreatment it is also useful to briefly discuss what is meant by the term harm. Of all the states and territories, only Queensland and Northern Territory specify the meaning of harm in their child protection legislation. Section 9.1 of the *Child Protection Act 1999* (Qld), states: *“Harm, to a child, is any detrimental effect of a significant nature on the child’s physical, psychological or emotional wellbeing”*. Similarly section 15.1 of the *Care and Protection of Children Act 2007* (NT) states that:

“Harm to a child is any significant detrimental effect caused by any act, omission or circumstance on: (a) the physical, psychological or emotional wellbeing of the child; or (b) the physical, psychological or emotional development of the child.”

The Northern Territory definition is more useful as it includes recognition of the impact of maltreatment on developmental outcomes.

Brain development

Brain development is another term that appears regularly throughout this thesis and it is useful to clarify this from a neuroscience perspective. The human brain begins its

development in the third week of gestation, when the neural progenitor cells differentiate, and continues at least until late adolescence, if not throughout the lifespan (Stiles & Jernigan, 2010:328). The lower brain regions of the brainstem and diencephalon develop in-utero to be fully functioning at birth to control basic life-support activities such as breathing, heart rate and blood pressure (Farmer R, 2009:89; Gaskill & Perry, 2012; Perry, 2002:86). The diencephalon develops during infancy and is responsible for motor regulation, arousal, appetite and satiety (Farmer R., 2009:89). The more complex limbic system develops during early childhood, to regulate memory, emotion, affect and primary sensory integration (Farmer R, 2009:89; Perry, 2002:82; Perry et al., 1995:276). The higher cortical areas, which control abstract cognitive processing, begin to develop during infancy and extend through early childhood into adolescence and early adulthood (Levitt, 2003:543).

The sequential nature of brain development means that there are critical periods of development where particular areas of the brain are at their most sensitive to certain experiences. Disruptive development from critical cues can result from either a lack of sensory experiences during critical periods of development (neglect), or extreme experiences resulting in abnormal patterns of neuronal activation (the effects of maltreatment) (Perry et al., 1995:276). Bruce Perry strongly asserts that if the primitive brain areas develop in a dysregulated or asynchronous manner as a result of early childhood maltreatment, the higher brain areas will also organise to reflect these abnormal patterns (Perry, 1997:128; Perry, 2009:242). This is a fundamental concept underlying this thesis.

Developmental years

The timeframe within which these experiential influences are most critical on brain development is another concept that needs to be clearly defined. Whilst prenatal experiences establish the foundational components of the developing nervous system (Stiles & Jernigan, 2010:343), the most crucial years of brain development are believed to occur between birth and six years of age, whereby an infant's brain, being approximately a quarter the size of an adult brain at birth, will reach 95 per cent of an adult size by six years of age (Fair & Schlaggar, 2008:218). The fastest period of growth occurs in the first two years of life, with the brain weighing the same as an adult brain by age 10 to 12 years (Paus et al., 2001:258). The peak period of synapse formation also correlates with the development and function of emotional and cognitive systems during the first two years of life (Levitt, 2003:542). From a neuroscience perspective the majority of the brain's crucial pathways are forming, particularly between birth and around six years of age.

Recidivism

Another important term that regularly appears throughout this thesis is the term recidivism. A systematic and consistent definition of recidivism is problematic with parameters differing depending on the context within which it is used (Payne, 2007:4; Stoodley, 2010:86). The term recidivism is used within research and policy documents to describe offenders who engage in persistent criminal activity (Payne, 2007:4).

Within the research literature that was examined as part of the systematic reviews, variations of the definition occur depending on the population sample studied, data sources relied on (such as self-report or administrative data), the researchers' ontological framework, as well as researchers' specific counting rules when developing statistics (Maltz, 1984:22; Payne, 2007:9). Statistics of recidivism can also be misleading due to differing boundaries in data interpretation. For example, the time frame used to track results of reoffending can have a marked influence on recidivism rates, with some studies using a 12-month period and other studies relying on data over a much longer time frame (Maltz, 1984:22; Payne, 2007:9). Alternatively, the rate of return to prison is a measure that is heavily relied upon throughout the research literature, though it is acknowledged to be an incomplete measure of recidivism. For example, a previous offender may continue to commit further offences that do not warrant a return to prison and may instead be handled with an alternative correctional order. Additionally, using recidivism as a measure of sentencing or program effectiveness, by its very nature, assumes that it is offenders that need correcting, not elements of society (Maltz, 1984:4). It also ignores the fact that rehabilitation programs may have other benefits, such as literacy or vocational skills, whose success cannot be measured by reoffending rates alone (Maltz, 1984:20).

Despite this, statistics on recidivism remain the primary conceptual tool used to examine the constitution of a prison population, to evaluate program effectiveness, as well as the effectiveness of crime prevention strategies, all of which generate important knowledge for criminal justice policy development and crime prevention strategies (Payne, 2007:100). Recidivism data is also a more cost-effective and simple form of data collection, as measuring success would entail investigating individual circumstances in terms of employment, housing, relationships and other aspects of the offenders' lives (Maltz, 1984:24).

Finally, it is important to acknowledge that recidivism and imprisonment of Indigenous populations represents a significant issue for Australia's justice system, with Indigenous offenders appearing in court at a rate thirteen times higher than non-Indigenous Australians, and being ten times more likely to be imprisoned than non-Indigenous

Australians (Weatherburn et al., 2006:1). The multitude of contributing historic and present day factors that contribute to this are highly complex and are therefore beyond the scope of this thesis, and the topic would not be done justice if it were to be included. Recidivism and rehabilitation discussions included in this thesis will therefore not address the issue of Indigenous offenders.

Outline of the thesis structure

This thesis is divided into nine chapters. Chapter Two addresses the need for a contemporary understanding of social work and neuroscience and the move away from traditional distancing and compartmentalising of science's positivism and social work's interpretivism. Chapter Three examines the rehabilitation side of Australia's criminal justice system, focusing on the dominant discourse that provides the foundation for its policies and practices. Chapter Four describes the methodological framework of this thesis. Chapter Five will present the results from the systematic review into research that examines links between recidivist offending and the experience of chronic childhood maltreatment. Chapter Six presents results from the systematic literature review that examines research into the impact of chronic childhood maltreatment on the developing brain from a neuroscience perspective, with a particular focus on structural brain changes, whilst Chapter Seven will present findings of research that has focused on functional alterations in the brain. Chapter Eight examines Australian correctional orders, with the main interest being an examination of the disciplines of knowledge that are privileged in informing these policies and practices. Finally, Chapter Nine examines the contribution neuroscience can make to the justice system by informing a better understanding of why chronic childhood maltreatment is a risk factor to engagement in recidivist offending. It will also explore how neuroscience knowledge can be used to improve correctional programs to better rehabilitate these populations. Critical theory will provide the structural foundation for analysis of the way in which the justice system has traditionally operated, whose knowledge is privileged above whom, and who is served and oppressed by the operating system.

CHAPTER TWO: A NEED FOR INTERDISCIPLINARY KNOWLEDGE

“Sociologists have been studying human environments for decades, and have tallied the social damage that stresses such as poverty or child abuse can cause. Biologists are now in a position to benefit from their insights, although they will need to learn the language of sociology. And sociologists stand to benefit from the understanding that biology will bring to their own, vindicated, empirical research”

Nature Editorial Group, 2012, p. 143

Introduction

The previous chapter introduced the background to this thesis, highlighting that despite an expanse of literature linking the experience of chronic childhood maltreatment with later offending behaviour, a search for explanatory models using emerging neurobiological knowledge of brain development appears to have been largely overlooked. As was alluded to, there is an argument that social work has not strongly incorporated advances in neuroscience knowledge into its theory and practice, in part due to continuing binary arguments between empirical science and interpretive practice, as well as the quest to avoid biological reductionism (Egan, Combs-Orme & Neely-Barnes, 2011; Montgomery, 2013:337). It is important to differentiate between social work as a professional entity and social workers as individuals within this profession, who will have a range of perspectives and levels of knowledge about neuroscience. The use of the term social work throughout this thesis refers to social work as a professional entity rather than social workers as individuals. Rose (2013:15) suggests that as neuroscience comes to the fore, social science is fearful that human beings will merely be understood as ‘puppets of their brains’, with sociality being viewed simply as a bi-product of our neurobiology. Criminology too appears uneasy of the implications of incorporating biological knowledge into explanatory theories largely as a result of the historical use of biological discourse to justify oppressive regimes in the not-too-distant past. This distrust is not necessarily unfounded, as will become apparent in this chapter. Looking back on history can assist understandings about why this perspective exists and why natural sciences and social sciences have been explicitly separated. This chapter will then examine what knowledge these disciplines may be able to offer one another as a foundation for the discussion to follow in this thesis.

Knowledge divides

Knowledge is the means to provide an understanding of a particular phenomenon, whilst theories are developed in order to provide an explanation of a particular phenomenon

(Trevithick, 2008:1214). As a practice, social work has been grounded in a vast foundation of knowledge, some of which emerged indigenously from practice wisdom, and some of which has been borrowed from other disciplines (Reid, 2002:6). Many scholars have focused on the lack of theoretical coherence within the social work profession, not only due to the diverse and varied practice tasks and contexts that exist within the field, but also due to the lack of a common knowledge base or agreed method of building knowledge (Bartlett, 1970; Healy, 2005:3; Hudson, 2000:215). Indeed dominant social work theories have largely emerged from practice-based knowledge (Reid, 2002:7), central to which has been the focus on individual experience (Bartlett, 1970:53). As Harriett Bartlett (1970:53) aptly highlights in her book, *The Common Base for Social Work Practice*, social work's positioning of individual experience as central to its value base has meant that generalisations about the profession have been slow to emerge, and perhaps more importantly, a focus on the nature of social work knowledge has been largely neglected. Stemming from this, Bartlett (1970:38) argues that there has been significant resistance to any kind of analysis that separates part of that person from the experiences of the whole person and the systems that surround them. Could this be reflected in contemporary social work responses to the inclusion of knowledge from the biological sciences?

In their text, Dunk-West and Verity (2013:20) highlight the metaphor of astronomical constellations that was used by North American social workers in the 1950s to describe the organising frameworks that are employed in order to unite the various components of social work as a profession. They reframe this metaphor and use astronomical constellations existing in our night sky as symbolic of the multitude of variations that exist within social work ideologies, epistemologies, values and purposes (Dunk-West & Verity, 2013:21). Depending on the particular setting within which social work is situated, different paradigms will be privileged over others (Dunk-West & Verity, 2013:21). For example, as Lefmann and Combs-Orme (2013:640) argue, in the field of early childhood development social work has relied on traditional developmental theories such as Piaget's cognitive developmental theory or Erikson's stages of psychosocial development, as opposed to incorporating emerging evidence-based science that examines the physiological and neurological processes of development. Scholars argue that social work has tended to focus on general systems theory and systems perspective, largely ignoring new developments in natural sciences' explanations of complex systems (Green D & McDermott, 2010:2419; Hudson, 2000:215). This is a curious situation given that one would expect neurobiological systems to fit nicely within system theories. Why is there such a structural divide between the social and natural sciences? To what extent does Bartlett's argument about the search for theoretical coherence in social work have

relevance in respect to use of neuroscience knowledge that can contribute to understanding particular phenomena?

Despite the broad variety of subfields and methodological stances within social work, Simons and Klopach (2015:573) suggest a tendency for social work to value a particular paradigm that views human behaviour as a result of socialisation and culture, with very little acknowledgement of the effect of biology. In part this may result from the value social work has inherently placed on individual experience, as noted above. Rather than mere differences in ontology there is a much bigger story that exists around social work's ambivalence towards positivism, biology and the natural sciences. Meloni, (2014:733) argues that traditionally social work has viewed the nature/nurture dichotomy as being two opposing sides of the coin and in fact the influence of biology has been quite obviously shunned. Furthermore, some commentators go so far as to argue that common understandings of the biological within the social sciences are increasingly out of touch with advances in the natural sciences, particularly that of epigenetics and neuroscience (Meloni, 2014: 733; Wright R & Miller, 1998:1).

Writers such as Rose (2013) describe the concern that incorporating neurobiology may generate a perception of individuals as 'victims' of their brains, and ideas such as structural inequalities and personal agency will be overlooked in favour of individual pathologising. From a critical theoretical perspective there is concern that, if it is acknowledged that there are fundamental biological laws that impact human behaviour, this biological reductionist perspective will limit personal agency and ignore the impact of power structures and hegemonic discourse on experience and behaviour.

Criminal justice and neuroscience

Also of relevance to this thesis is the potential contribution of neuroscience to the criminal justice system, particularly in terms of being able to assist with understanding behaviour commonly associated with criminality, such as impulsivity and anti-social behaviour (Farmer R, 2009:17). As with social work, criminology consists of varying and often contradictory theories and assumptions that attempt to explain the underlying cause of crime, although criminology perhaps has been more closely aligned with the positivist paradigm than social work (Agnew, 2011:192; Young J, 2011). For example, in its crudest form crime might be viewed as simply a violation of criminal law. On the other hand, rational choice theory may argue that individual self-interest is the cause of crime, or alternatively, a Marxist perspective may assert that crime is the result of structural oppression and that it is therefore social factors that pressure or entice individuals to commit crime. Agnew (2011:193) argues that traditional criminology theories and assumptions are overly simplistic and fail to provide a complete explanation of criminal

behaviour by not incorporating interdisciplinary research. For example, Gottfredson and Hirschi's (1990) general theory of self-control focuses on sociological explanations for its influence on crime, particularly the influence of parental rearing practices on self-control, and firmly rejects biological explanations, despite clear empirical evidence of neurological contributions to self-control (for example see Bufkin & Luttrell, 2005; Matsuo et al., 2009; Schilling et al., 2012; Schilling et al., 2013).

Similar to social work, the contemporary discipline of criminology has been resistant to the application of biological theories to understanding crime. In part this has its roots in history as a result of biological conclusions asserted by researchers such as Cesare Lombroso, who developed theories of anthropological criminology in the late nineteenth century and who advocated that criminal behaviour was the result of inherited physical abnormalities resulting in a 'sub-human' individual (Bufkin & Luttrell, 2005:184). Interestingly, the discipline of criminology was largely born out of this biological positivism from theorists such as Cesare Lombroso who famously wrote *L'uomo Delinquente* ("The Criminal Man") in 1876, and his students Enrico Ferri and Raffaele Garofalo, and English criminologist Charles Goring (1913) (Wright R & Miller, 1998:2). Although not then acknowledged as a separate discipline in its own right, criminology as a field of study began to emerge in the late eighteenth century when researchers attempted to apply scientific methods to the study of crime, criminals, and systems of social control (Rafter, 2010:344). As Rafter (2010:346) notes, it was not until 1876 when Cesare Lombroso introduced his theory of criminal anthropology that a crude application of scientific positivism to the study of crime and criminals saw the discipline of criminology gain prominence. Despite being grounded in positivism, at the heart of the emergence of criminal anthropology is the social construction of crime and therefore the criminal. The primary focus of Lombroso's anthropological stance on criminality was documenting indications of dangerousness through various facets of criminal anatomy (Horn, 2008:137). Lombroso's discourse on criminality incorporated concepts from physiognomy ("the study of the features of the face, or of the form of the body generally, as being supposedly indicative of character" [Oxford English Dictionary online, n.d.]) and phrenology ("the study of the external conformation of the cranium as an index to the position and degree of development of the various faculties" [Oxford English Dictionary online, n.d.]) (Horn, 2008:138). This included drawing associations between left-handedness and criminality, as well as linking the length of stride and angle of deviation of the foot to engagement in criminality (Horn, 2008:140).

Rafter overviews the emergence of a very sinister side to this research when Lombroso's discourse on anthropological criminology was extensively relied upon to support a number of oppressive and racial political regimes, including the eugenics movement

(Rafter, 2008:290). Lombroso's theories and suggestions were adopted by the eugenics movement, which aimed to improve the genetic quality of the human race by preventing 'inferiors' from reproducing through exile, incarceration and extermination (Rafter, 2008:290.293). Additionally, racial hygiene was also practised, utilising biological criminology that identified specific racial groups as 'genetically criminalistic' (Rafter, 2008:293). This ideology was centred on two fundamental assumptions related to criminology: firstly, that biology determines criminal behaviour, and secondly, that biology is inherently genetic and will therefore be passed between generations (Rafter, 2008:294). As Rafter (2008:290) claims, a major component of Lombroso's prescription for crime control was that punishment should fit the criminal not the crime, and therefore criminals should be removed from the community to prevent the contamination of society.

Furthermore, biological criminology was used by a number of oppressive regimes in order to provide 'scientific' justification for radical policies (Björkman & Widmalm, 2010; Rafter, 2008; Rose, 2000). During Hitler's reign from 1933 to 1945, Nazi Germany developed a science of criminal biology that was used to justify the indefinite incarceration, and eventual extermination, of groups of people that were labelled as hereditary criminals (Rafter, 2008:287). In Sweden, between 1935 and 1975, 62,000 people were prevented from reproducing as part of a government sponsored system of sterilisation that targeted women and young girls who were believed to be of poor moral judgement, antisocial, and sexually active (Rose, 2000:23). The eugenics movement in Sweden emerged from perceptions of genetic denigration and increased economic burdens imposed on the state as a result of caring for the 'unfit' through welfare benefits (Björkman & Widmalm, 2010:383). Similarly, Mussolini's fascist reign in Italy from 1922 to 1943 was also another period in history where biocriminological theories were used to justify oppressive social policies, such as the series of racial laws that prevented marriage between Italians and other races, including Arabs, Ethiopians or Jews, and that excluded Jews from engaging in education and employment (Rafter, 2008:289, 302).

It is therefore not surprising that for much of the twentieth century any biological arguments that link genetics, neurophysiology or biology to crime have been severely denounced and unthinkable throughout the academic community (Wright R & Miller, 1998:1). The influence of Lombroso's legacy and its links with oppressive and racist government policies has significantly contributed to the creation of an ideological partition that seeks to exclude biological science from criminology theories (Wright J & Cullen, 2012:238), possibly to the detriment of a more complete understanding of criminal behaviour.

In the field of criminology the obstruction to biologically informed knowledge is being slowly eroded, particularly with seminal works such as Moffitt's (1993) article, which attributed biological deficits with experiential and environmental factors and used terms such as 'neuropsychological deficits' in order to make the findings more acceptable to the academic world (Wright J & Cullen, 2012:244). Additionally, advances in brain imaging and neurobiology have allowed a more sophisticated application of biology to take traction in the field of social sciences and criminology. It is now being recognised that biological science can provide empirical evidence to legitimise the sociological model of crime, which examines social structures and social psychology, and the legalistic model of crime, which focuses on ideas around rational choice theory (Bufkin & Luttrell, 2005:186).

Whilst recognising the unease that biocriminology may be used politically as a tool of oppression and marginalisation, contemporary applications of biocriminology do not advocate a fatalistic view of biology nor do they promote the historical fear of 'defective stock' through reproduction (Rose, 2000:18). Instead biological criminology focuses on the existence of antisocial and violent conduct that results from a lack of impulse control and reasoning ability (Rose, 2000:18). Neuroscience research has found evidence of neurocognitive deficits for individuals with impulse control disorders, with frontal lobe abnormalities in particular being robustly linked with impulsivity (see Bechara et al., 1994; Kiehl et al., 1999; Barratt et al., 1997). In order to address this, biological criminology firstly aims to understand the conditions (both biological and environmental) that contribute to this behaviour in order to identify and intervene (Rose, 2000:18).

Neuroscience and the law

Another concern, which arises in the criminology literature, is the potential for neurobiology to be used as a criminal defence in a court of law. Law is founded on the presumption that individuals have a general capacity for rational choice (Greene J & Cohen, 2004:1778), but what if neuroscience can prove otherwise? With advancing abilities to describe the biology and functioning of the brain, it is reasonable that in the future courts may seek to incorporate knowledge of criminal responsibility and risk of reoffending from a neuroscience perspective in their deliberations on guilt or innocence (Eastman & Campbell, 2006:311). As Kaliski (2009:5) suggests, there are concerns that neuroscience may provide objective evidence that individuals who have deficits in their brain circuitry may therefore be able to argue diminished responsibility for a crime (Kaliski, 2009:5). For example, a famous use of a biological defence was that of John Hinckley in the attempted assassination of US president Ronald Reagan. A defence was mounted using evidence from computerised axial tomography (CAT) scans to argue that

there was observable organic evidence that Hinckley was schizophrenic and therefore not guilty by reason of insanity (Rose, 2000:12). This defence was successful.

The term 'responsibility' is significant for courts deliberating on the guilt or innocence of an individual charged with a criminal act. The legal concept of the term 'responsibility' is not unitary but instead a combination of six different concepts that include whether one is responsible for: the outcome, his/her actions, the role he/she played, whether one has the capacity for responsibility, the virtue of whether one is a responsible or irresponsible person, and whether one should accept liability/responsibility for his/her actions (Rafter, 2010:93; Vincent, 2010:82). Whilst neuroscience knowledge is rapidly expanding, our understanding of the complex workings of the brain remains decidedly limited (Rafter, 2010:93). When applying neuroscience to the legal domain there exist a number of normative assumptions that do not necessarily have a straightforward answer, particularly in terms of decisions around legal responsibility. For example, whilst neuroscience may be able to assert that a particular individual lacks the capacity for responsibility of his/her actions, it cannot clearly answer whether one ought to have developed that capacity (Rafter, 2010:94). In addition, as Vincent (2010:94) notes, the assumptions held in neuroscience are 'normative' not individual and are therefore not as easily applicable to individual cases. Add this to the complexity of the legal definition of responsibility and it becomes clear that there is no concise coupling for these two fields (Vincent, 2010:96).

A detailed discussion into the legal implications of neuroscience research in regards to self-determinism and personal agency in crime is beyond the scope of this chapter, however it does raise interesting questions, particularly as to whether there are specific genes that result in brain impairments that may predispose individuals to violent and antisocial behaviour (Raine, 2008:327). Overall however, neuroscience as it currently stands does not appear to be in a position to answer the complexity that the law would demand of it.

Moreover law is not solely about punishment. Generally the law is hoping to achieve five different principles: retribution, deterrence, reform, quarantine and condemnation (Vincent, 2010:91). As was raised in Chapter One, with increasing pressures on the prison system and very little change to recidivism rates in Australia over the last decade, successful rehabilitation is crucial to improving the functioning of our justice system and society as a whole. Whilst the precise contribution neuroscience knowledge can make in regard to criminal cases remains murky at best, it is possible that there is a role for neuroscience in informing intervention and risk assessment practices as well as how the brain responds to chronic trauma and the structural or social conditions which aid or hinder the desired outcomes of rehabilitation. Indeed by limiting its application to the

formulation of treatment practices and assessment purposes, it reduces the risk of this neuroscience knowledge being used politically as a punitive tool of oppression, thereby making this knowledge more palatable to those concerned with the prospect of biological reductionism and the oversimplification of what are complex and multifaceted issues.

The paradigmatic shift of science

At the end of the twentieth century the natural sciences experienced fundamental paradigm shifts, with a number of foundational theories being disproven (Green D and McDermott, 2010:2422). Newton's theory of absolute time and space was superseded by Einstein's theory of relativity, the belief in the existence of a controllable measurement process was replaced by quantum theory, and most importantly, deterministic predictability was repudiated by the emergence of chaos theory (Gleick, 1987:6). The emergence of the chaos paradigm has essentially disproved the dominant Newtonian view of the universe as being mechanistic and predictable, forcing a shift in focus from simple systems to the inclusion of the interactions of multiple complex systems (Elliot E & Kiel, 1997:2). Concepts of chaos theory began to appear in physics during the 1960s when it became apparent that small differences in input could generate significant differences in output (Gleick, 1987:6). It was chaos theory that allowed for the evolution of concepts such as the Butterfly Effect, which began as a playful metaphorical question that was posed by meteorologist Edward Lorenz: *'Does the flap of a butterfly's wings in Brazil set off a tornado in Texas?'* (1972), and describes the phenomenon that small differences in input in a chaotic system can result in amplified differences in output (Gleick, 1987; Hilborn, 2004:425; Kauffman, 1995:17). This idea contradicted traditional scientific theories which, when faced with complex results, looked for complex causes (Gleick, 1987:6; Kauffman, 1995:17). Commentators such as Gleick (1987) assert that chaos theory essentially averted the potential crisis that may have occurred had science continued along the path of increasing specialisation, and lead to a realisation that studying elements in isolation was somewhat ineffective, and in fact chaos theory provides a fresh perspective in analysing new data.

There are two fundamental paradigm shifts that have occurred in the natural sciences that are particularly relevant to the field of social sciences: the move away from genetic determinism towards epigenetics, and the shift in neuroscience from a fixed understanding of brain structure and function towards a more fluid acknowledgement of neuroplasticity (Simons & Klopach, 2015:574). Both of these alterations have revolutionised the knowledge emerging from these fields. These paradigm shifts have moved the focus towards a heavy emphasis on the role of environment in human development, and in particular "the dynamic bi-directional relationship" between individuals and their environment, and the way in which an individual simultaneously

shapes and is shaped by their environment (Green D & McDermott, 2010:2426). Genetic determinism holds that genes control all aspects of human traits, including behaviours, emotion and physicality (Simons & Klopach, 2015:574). This concept provided the theoretical foundation for the Human Genome Project, which was launched in 1984 by the American National Institute of Health and aimed to identify the genetic basis to all human traits (Simons & Klopach, 2015:574). Despite completion of the sequencing of the human genome in 2002, scientists failed to find any significant associations between genetic variations and human traits, illness, or behaviour. (Simons & Klopach, 2015:574). Instead it was concluded that in fact an individual's genetic code is not the sole predictor of physiology, but rather experience and environment dictates what genes will be expressed or silenced (Combs-Orme, 2013:23). This, among other conceptual failures, has contributed to the paradigmatic shift from pure genetic determinism towards a focus on epigenetic factors that regulate gene expression (Landecker & Panofsky, 2013:334; Simons & Klopach, 2015:574). Epigenetics describes the biochemical process on the malleability of genes and gene regulation as a result of the influence of environment (Combs-Orme, 2013:23; Landecker & Panofsky, 2013:334; Meloni, 2014:732; Simons & Klopach, 2015:575). Despite social science's enmity to biological determinism, the natural sciences have long since dismissed the theory of biological reductionism, having acknowledged that there is no longer any doubt as to the dependence of gene expression on environmental experiences (Nature Editorial Group, 2012:143).

A similar shift in understanding has also occurred within neuroscience. As was introduced in Chapter One, neuroscience is the study of the brain and nervous system and how these mediate cognition, behaviour and emotion (Farmer R, 2009:9). As in social work, neuroscience is a diverse subject that encompasses a range of disciplines including molecular biology, neurochemistry, neurophysiology, neuroanatomy, computational neurology, embryology, and cell biology (Kandel et al., 2000). The contemporary discipline of neuroscience aims to provide a scientific explanation for exactly how the individual and environment interrelate, and therefore challenges the traditional belief that segregates the individual from the surrounding environment (Green D & McDermott, 2010:2426). Prior to recent advances in neuroscience the understanding of the brain was one of a static organ with the fundamental structure being dictated by genes and once damaged it could not be repaired (Simons & Klopach, 2015:575). This concept was challenged by the revelation that neurogenesis (the creation of neurons) continues throughout the lifecycle, as well as evidence that patients with substantial brain injuries can recover and compensate through other undamaged areas of the brain (see Taub et al., 2006). Rather than being a static entity, it is now understood that the brain is inherently plastic in its structure and is highly responsive to both acute and chronic stress (Davidson & McEwen, 2012:693).

Advances in medical imaging and neuroscience knowledge mean we now have considerably more insight into the intricacies of brain function, however this knowledge still only just scratches the surface of what is a highly sophisticated organism. Not only can neuroscience provide crucial knowledge in explaining how the brain may be altered by developmental experiences, the paradigm shifts in natural sciences have allowed for the understanding of the bidirectional relationship between the environment and our genetic potential.

This paradigmatic shift in the natural sciences has brought about a recognition that events are fashioned via the interaction of complex systems that adapt and evolve over time, meaning that fundamental principles in social work, such as environmental, social and cultural influences on the human condition can become biologically embedded (Green D & McDermott, 2010:2422; Simons & Klopach, 2015:576). This recognition of the interdependence of complex systems is not new to social work theory. Indeed, social work scholars such as Combs-Orme (2013) and Green D and McDermott (2010:2416) contend that social work's major theoretical contribution to social and behavioural science has been the positioning of person-in-environment as being central to understanding the world. This is reflected in the International Federation of Social Work's definition of social work as a profession that

“promotes social change, problem solving in human relationships and the empowerment and liberation of people to enhance well-being. Utilising theories of human behaviour and social systems, social work intervenes at the points where people interact with their environments. Principles of human rights and social justice are fundamental to social work” (International Federation of Social Work, June 2012).

In fact, social work has argued for more than a century that human social and emotional behaviour is modified by experience (Davidson & McEwen, 2012:693). The underlying neural mechanisms of behaviour are however only just being recognised through advances in understandings of neuroscience (Davidson & McEwen, 2012:693).

Central to this thesis is this paradigm shift that has occurred within in the natural sciences as it provides a template for understanding how early life experiences intersect with biological development to fundamentally alter the way in which the brain develops and functions. The common thread running through these developments is the revelation of the interconnectedness of multiple systems. This provides a critical entry point for social work to acknowledge the importance of neuroscience in order to more comprehensively understand the human experience (Simons & Klopach, 2015:577). Despite this, the collaboration of interdisciplinary knowledge to understand social phenomenon, such as the link between chronic childhood maltreatment contributing to neurological alterations

that may enhance the risk of offending, appears at face value to have been slow to take hold.

The ideological divide

Historically the scientific theory of reductionism, that reality is constructed by a series of atomic building blocks that can be understood in its separate parts, has been a dominant ideology throughout the western world (Ramsay, 2003:327). This has resulted in the widespread practice of separating academic disciplines into specialty groups (Ramsay, 2003:328). Compounding this, the ideological revolution of the 1960s, with the emergence of Marxism, civil rights movements, and feminism, contributed to the linking of the natural sciences with oppressive and dehumanising regimes (Harvey & Reed, 1997:295; Wright J & Cullen, 2012:242). Wright J and Cullen (2012:242) assert that this, combined with the horrors of the eugenics movement and the use of Lombroso's theories to justify horrifically oppressive social policies, meant that the use of biological theorising in the social sciences became "polarising and career ending". The historic equation of biological theorising with oppressive and racist government regimes has resulted in the creation of an ideological boundary, which Wright J and Cullen (2012:238) argue, has been used to exclude natural scientific knowledge from the social work fields.

Initially neuroscience reluctantly acknowledged the social context of brain function, largely due to the associated difficulties in being able to simplify and control all aspects of the individual under study, particularly in a qualitative research design (Brothers, 1997:67). Brothers (1997:71) argues that by excluding the sociality of the human brain it ignores the extensive socialisation that is required to produce organised thoughts and behaviour. No infant can survive without other human beings to provide care and, in fact, from birth infants will actively seek out faces with their gaze indicating an instinctive connection with other human beings (Brothers, 1997:71). This understanding is prominent in attachment theory.

There are however scholars that are leaning towards the incorporation of social work and neuroscience. In recognition of the role the social environment plays in neurobiology the concept of 'social neuroscience' was introduced in 1992 to describe research that includes both social and biological levels of analysis (Cacioppo & Bernston, 1992:1025). It has now developed into a unique emerging field that aims to examine the relationship between brain systems and social interactions (Farmer R, 2009:6; Matto & Strolin-Goltzman, 2010:147). Social neuroscience acts as a conduit between the limits of positivist biological explanations, and the limits of social work that traditionally ignores the contributions neuroscience can make to advancing knowledge (Farmer R, 2009:35).

As discussed in this chapter, there is an argument that both criminology and social work have been slow in incorporating neuroscience knowledge into their theories and discourse. One explanation is an aversion to biological determinism and the dark history from which biological science has emerged – a history that used biological knowledge to legitimise radical social policies and political agendas that caused horrific fear, suffering and oppression. However, with technological advances, and as our understanding of the workings of the human brain and neurological system improve, there appear to be compelling counter arguments to develop interdisciplinary approaches to understanding the complexities of society. Neuroscience highlights the biological basis of cognition and behaviour and links emotion not only with decision-making, but also with entire body reactions or processes rather than simply an abstract psychological conception (Green D & McDermott, 2010:2426). As Kandel (1998:460), one of the world's leading neuroscientists, asserts the long-term success of counselling and behavioural interventions most likely occur as a result of learning, which causes changes in gene expression that strengthen or weaken synaptic connections in the brain, as well as structural changes that alter anatomical patterns of nerve cell connections in the brain.

Social work historically emerged as a practice that worked with populations who experienced environmental 'deprivations'. The question to be explored in this thesis is whether the convergence of biology and social behaviour that is associated with social neuroscience can provide an important framework within which to understand such phenomena (Farmer R, 2009:17). Matto and Strolin-Goltzman (2010:149) argue that given the disproportionate distribution of early life stress on particular groups in society, that social work has an obligation, from a social justice perspective, to understand the implications of this in terms of brain development and function. They further contend that this places social work in a position to be able to better advocate for and implement interventions that will more effectively meet the psychosocial–environmental treatment needs of clients (Matto & Strolin-Goltzman, 2010:149). Matto and Strolin-Goltzman (2010:150) also contend that combining neuroscience and social work research allows for the creation of interventions that allow individuals to access the various brain regions that will allow for the generation of a wider variety of alternative behavioural responses. What this thesis is exploring is the value of neuroscience knowledge to social work and understanding risk factors associated with various psychosocial problems to expand and improve intervention outcomes, both at the level of the individual and the social world in which they develop.

The emergence of terms such as social neuroscience and biological criminology and their associated philosophies indicate an attempt to bridge the gap between disciplines that have been divided. The question of this thesis is whether there is scope to bridge such a

gap between social work, criminology and neurosciences. Just as the natural sciences have recognised the fallacies in traditional Newtonian ideas of order and predictability, opting instead for a more encompassing, holistic recognition of complex systems continually interacting together in a state of flux, is it now time for social work and criminology to extend the work in this area? Social work has a means to incorporate knowledge about the influence of the biological brain on emotional and behavioural responses given its fundamental recognition of the interdependence of the individual and surrounding systems, including biology.

Conclusion

The acknowledgement within social work of the historical, temporal, and indeed chaotic nature of social systems lends itself well to the incorporation of chaos theory into its understanding (Elliot E & Kiel, 1997:2; Gregersen & Sailer, 1993; Long, Mathews & White, 1999). Indeed, as Elliot E and Kiel (1997:3) assert, the gap between social science and natural science is largely artificial, with the seeming chaos of social phenomenon making definitive knowledge acquisition difficult to attain (Elliot E & Kiel, 1997:3). Byrne (1998:160) goes so far as to contend *“the notion of separate and distinct fields of science no longer has any validity as an intellectual position and should not serve as the basis for academic organisation”*. As natural sciences are now also acknowledging the influence of complex social phenomena, a bridge between the two disciplines is slowly being forged (Elliot E & Kiel, 1997:3). Where once the analysis of the surrounding environment was seen as being the exclusive domain of social sciences, the broader natural scientific community now acknowledges its supreme importance (Nature Editorial Group, 2012:143).

The bidirectional relationship between brain development and the surrounding environment may represent an important concept for contemporary social work, with the potential to provide knowledge on the way in which marginalisation and vulnerability can result in increased stress, which can then compromise psychological, physical and immunological health (Green D & McDermott, 2010:2427). Green D and McDermott (2010:2427) argue that this has the potential for tangible medical evidence to contribute to critical theory’s arguments on the impact of power structures on the human condition. Indeed, it may be that social work could improve understanding by drawing the attention of neuroscientists to the whole person, including the complex social and power structures within which the individual is positioned. The link between the surrounding environment and the brain is central to this thesis and will be discussed in detail in Chapters Six and Seven.

This chapter has examined some of the debates in the fields of social work and criminology about the use of biological knowledge, particularly from fields of

neuroscience, into theory and practice. It would seem that there has been a slow uptake of knowledge from neuroscience and this, at face value, is not given the historic use of biological knowledge to legitimate oppressive regimes such as the eugenics movement. The natural sciences have experienced a fundamental paradigm shift in understanding the laws that govern our existence, and it is the development of chaos theory that has paved the way for these changes to occur. Chaos theory is an enormous field in itself and far too complex to delve into as part of this thesis, however of relevance to this thesis is the contribution chaos theory can make to the recognition of the complexity of interactions between systems and inability to understand existence by merely studying the atomic building blocks of life as separate entities.

Are these conceptual leaps reaching the fields of social work and criminology? Importantly, is this knowledge from fields of neuroscience being incorporated into Australia's criminal justice systems? In order to explore whether there is indeed a gap in the knowledge and evidence being used in Australia's criminal justice system it is first necessary to explore the dominant discourse that influences the Australian criminal justice system. The following chapter will enquire into the dominant discourse that influences the Australian criminal justice system and in particular, Australian sentencing legislation and rehabilitation programs in an attempt to explore the answers to these questions.

CHAPTER THREE:

AUSTRALIA'S CRIMINAL JUSTICE SYSTEM

“The increasing rate of reoffending in Victoria is a signal that our criminal justice system is broken, and we need to look to the evidence of what reduces crime, rather than continuing massive spending on prisons as the sole solution – a ‘solution’ that limits the resources available for more effective and less expensive alternatives such as diversion.”

Michelle McDonnell, spokesperson for Smart Justice, 24 November 2014.

Introduction

Repeatedly there has been commentary that the Australian criminal justice system is ‘broken’ and ineffective (Australian Community Law, 2012; Marks, 2015; O’Donnell, 2014; Smart Justice, 2014). This perception is further reinforced by Australia’s unprecedented levels of prisoner numbers, media reports depicting Australia’s dysfunctional parole legislation (Alberici, 1 October 2012; Farnsworth, 23 March 2015; Lowe, 28 September 2012), not to mention the significant impact of the Justice Ian Callinan’s *Review of the Parole System in Victoria* (2013), which found significant flaws within the parole system.

The third question of this thesis aims to answer how current offender sentencing legislation and rehabilitation programs recognise and respond to experiences of chronic childhood maltreatment. This chapter focuses on Australia’s legislative responses to crime, particularly in terms of sentencing legislation and the options available to judges when imposing sentences. To embed this discussion within a relevant context it is first necessary to provide an overview of Australia’s criminal justice system. I begin with a broad overview of the criminal justice system in Australia and the trends of legislative response to recidivist offending. This paints the picture for how offending in general, and recidivism in particular, is represented and indeed problematised in Australian policy discourse, and forms part of the background structure to this thesis. The material used in this chapter is sourced from government websites describing Australia’s criminal justice system, as well as literature reviews that sourced information to provide a foundational structure of Australia’s criminal justice system and current trends in sentencing legislation.

The Commonwealth of Australia Constitution Act 1901 (Cwth) establishes Australia as having a federal system of government wherein powers are distributed between the federal and state and territory governments. The federal government has exclusive legislative power over trade, commerce, taxation, defence, external affairs, immigration and citizenship, while state and territory governments have independent legislative power for all other

matters not assigned to the federal government (Department of Foreign Affairs and Trade [DFAT], 2012, online). In areas where both tiers of laws overlap, federal law prevails (DFAT, 2012, online). The legislative power over the administration of criminal justice resides with each of the six states and two territories, meaning that there are essentially nine legal jurisdictions within Australia (AIC, 2010). Each jurisdiction controls their own system of criminal justice and is essentially comprised of a number of independent agencies including police, prosecutors, courts, community corrections, and prisons (Daly, 2012:290).

In terms of the enactment of Australia's justice system, the parliament creates the laws through legislation, the executive government administers the laws, and the judiciary, which is independent of the government, interprets and applies the laws through the court system (DFAT, 2012, online). As Crispin (2010:63) writes, Australia practises an adversarial system of justice, which is characterised by three essential features: the presence of an impartial tribunal, procedural rules to ensure a fair trial, and the parties having to present their own cases. A criminal act is one that is defined by a state or territory to be a crime and to be subject to criminal penalties (Daly, 2012:291). Serious criminal charges are heard in superior courts with a jury who decides on guilt or innocence to the charge (Crispin, 2010:66).

From a normative position the criminal justice system in Australia serves two purposes; the first is utilitarian, where the state responds to crime in order to benefit and protect the wider society, and the second is symbolic, wherein the state takes action to redress the impact of crime on the victim and society (Daly, 2012:290). Blokland and Nagin (2012:221) suggest that there are essentially three main ways that the state responds to crime: incapacity, specific deterrence and general deterrence. Incapacity refers to the incarceration of offenders physically preventing them from reoffending; specific deterrence is achieved through the presumption that reoffending will reduce as a result of the experience of punishment, and general deterrence is achieved through the threat of punishment acting as a deterrent (Blokland & Nagin, 2012:221). In order to achieve these aims the government establishes legislation, creating a framework within which laws are established (Althaus, Bridgman & Davis, 2013:19). As part of this legislation, sentencing procedures set out penalties that can be applied when laws are broken. The process of determining a sentence involves the weighting of the contradictory objectives of community protection, deterrence, retribution and rehabilitation (Spigelman, 2008:450).

In reviewing the criminal justice literature there are two foundational principles that guide sentencing in Australia: consistency in sentencing and individualised justice (Krasnostein & Freiberg, 2013:265). Krasnostein and Freiberg (2013:265) explain that consistency in sentencing holds that similarly situated offenders should be given similar sentencing outcomes, whereas individualised justice advocates that the individual circumstances of each offender and case must be taken into consideration when sentencing outcomes are being decided. As part of the concept of individualised justice, the principle of proportionality represents one of the most fundamental principles in Australian sentencing law (Figgis, 1998:2). This principle holds that the punishment imposed is proportional to the gravity of the offence (Figgis, 1998:2). There are inherent tensions between these two discourses and the balance between them will vary between judges, as each one places a different weight on either consistency or individualistic approaches to sentencing (Freiberg & Krasnostein, 2011:4; Preston & Donnelly, 2008:8). As Chief Justice Spigelman commented in his judgement of *R v Whyte*,

“The maintenance of a broad sentencing discretion is essential to ensure that all of the wide variations of circumstances of the offence and the offender are taken into account. Sentences must be individualised” ([2002] NSWCCA 343, para. 147).

All Australian jurisdictions have developed some type of sentencing framework, which are not laws but guidance principles. The development of sentencing frameworks is one mechanism for which consistency in sentencing is being ensured, although these frameworks are largely legislative responses that produce mandatory sentencing in response to political opinion (Krasnostein & Freiberg, 2013:282). Other consistency measures include sentencing councils, which have been developed in NSW, Victoria, Queensland and Tasmania and which function to promote consistency in sentencing through the collection and dissemination of sentencing data, and by creating greater transparency for the general public in the development of sentencing policy (Krasnostein & Freiberg, 2013:284). These councils are essentially concerned with promoting a comparativist approach to sentencing, rather than a consideration of individual circumstances (Krasnostein & Freiberg, 2013:284).

Applying an interpretive lens, the criminal justice system, and sentencing in particular, is intrinsically subjective, with definitions of deviance being inherently socially constructed (Becker, 1963; Drake, 2012:78). Australia’s sentencing procedure is not immune to this subjectivity. The High Court of Australia has stated that there is no single correct sentence but a range of possible sentences that can be applied (see *Lowe v The Queen* [1984]; *Pearce v The Queen* [1998]; *Makarjian v The Queen* [2005]). In Australia, there are various sentencing guidelines, and consistent with the jurisdictional independence noted above, there are nine separate sentencing jurisdictions across Australia, eight state and

territory systems plus a federal system (Freiberg, 2010:204). Sentencing options vary by jurisdiction, but can broadly be classified into two areas: custodial, including imprisonment, intensive corrections orders, community corrections orders and suspended sentences; and non-custodial, which include fines, penalties, community service orders, good-behaviour bonds and non-conviction orders (NSW Law Reform Commission [NSWLRC], 2013). Community corrections has a variety of non-custodial programs that provide sentencing alternatives to imprisonment, as well as a post-custodial mechanism for reintegrating prisoners back into the community post-sentence (AIC, 2012:127). There are three main categories of community corrections orders: restricted movement orders; reparation orders, such as community service or fines; and supervision orders (AIC, 2012:129).

The general aims of sentencing are identified as ‘punishment’ and ‘retribution’, ‘deterrence’, ‘rehabilitation’, ‘denunciation’ and ‘restoration’ (Freiberg, 2010:208; *Sentencing Act 1991 [Vic]* s.5.1). Common law principles dictate that the severity of the punishment should be equivalent to the seriousness of the offence and the offender’s circumstances (Freiberg, 2010:208). This is known as the proportionality principle. As Freiberg writes, this principle of proportionality has been eroded since the 1990s when legislation began to be introduced to empower courts to impose longer and disproportionate sentences for particular offences, such as serious sexual, violent, drug and arson offences, in order to protect the community (Freiberg, 2010:208). The principle of proportionality also allows courts to impose indefinite periods of imprisonment when the offender is believed to be of serious danger to society (Freiberg, 2010:208). This is essentially implementing punishments in the anticipation that a crime may be committed in the future if the offender is not maintained in custody. As will be discussed, this is a contested area, and there are other perspectives that argue that community protection is better pursued through structural change and attention to the causes of crime.

The changing political landscape of sentencing legislation in Australia

As stated in Chapter One, incarceration rates in Australia have risen from 86 per 100,000 in 1984 to 167 per 100,000 in 2012 (Wood, 2014:100) and have reached a record high level in the March quarter of 2015 (ABS, 11 June 2015). This makes Australia’s justice system a central topic in the Australian political landscape. Despite these record high figures it would be naïve to equate this with increasing crime rates. Overall crime rates across Australia have been on the decline since the 1990s, with the exception of assaults (AIC, 2012). Statistics from Victoria Police indicate that the overall crime rate has in fact dropped by 1.6 percent since 2004/2005 (Victoria Police, 2014). Instead, increasing incarceration rates in that state are more reflective of the dominant neoliberal ideology that has underpinned governmental policy and legislative changes since the 1990s. This

changing policy rhetoric has moved towards more punitive measures, with longer sentences, mandatory minimum sentences, three-strikes legislation, more restrictive bail conditions, and increasing parole revocations (Wood, 2014:101).

Recidivist offending has long been a public policy concern, and legislation targeting recidivist offenders began to emerge in the early twentieth century. For example the *Habitual Criminals Act 1905* (NSW), which aimed to both protect the community from harm and provide an opportunity for offender rehabilitation (Drabsch, 2006:18). This Act was eventually repealed and replaced with the *Habitual Criminals Act 1957* (NSW), which stemmed from the belief that there existed a population of criminals who possessed “*criminal qualities inherent or latent in [their] mental constitution*” (Sheahan, 14 March 1957, Hansard). This Act remains in force today and was in fact used in the sentencing of *Strong v R* in 2005, wherein Robert Strong was sentenced to four years imprisonment for intimidation and five years imprisonment for stalking, with an additional 14 year sentence applied for being a ‘habitual criminal’ under the *Habitual Criminals Act 1957* (NSW) (Drabsch, 2006:19). This demonstrates the dominant historical conception that the problem resides within the offender, without consideration of wider societal influences and consequently implementing individualised punishments. There are many who argue that the historical dominance of punitive approaches to criminal justice in western democratic nations means that attention is focused on the effects of crime on victims and society, rather than examining and addressing the underlying causes that contribute to criminality (Monterosso, 2009:18).

Furthermore, Australian government policy towards crime and punishment vacillates between rehabilitation and punishment depending on the political climate (Ogloff & Davis, 2004:229). Economic pressure associated with increasing incarceration numbers has contributed towards the promotion of rehabilitation, however as Ogloff and Davis (2004:229) argue, without tangible results, there is increased pressure to return to punitive responses. The 1990s saw Australia, along with the majority of other western democratic nations, reach a turning point towards an increasing punitive approach to crime, with legislative reforms aimed at ‘getting tough on crime’ by introducing increased statutory maximum penalties, mandatory sentencing, indefinite imprisonment and electronic monitoring of offenders (Baker & Roberts, 2013:121; Crispin, 2010:119; Freiberg, 2010:209). Anthony Bottoms first introduced the term ‘populist punitiveness’ in 1995 to describe this global political trend in sentencing policy towards more punitive outcomes (Bottoms, 1995). The rationale behind this punitive turn is that custodial sentences exact a higher cost on the offender than non-custodial sentence and therefore act as a greater punishment and deterrent (Cullen, Jonson & Nagin, 2011:50), however the rise of

‘popular punitiveness’ also correlates with the emergence and promotion of neo-liberal ideals (Cavadino & Dignan, 2006:450; van Kesteren, 2009:45).

From a critical perspective, it is argued that there are additional elements at play in the purpose of the criminal justice system, including the importance of correctional facilities for political and economic investment (Fulcher, 2012:489; Wehr & Aseltine, 2013:2). These ideas in particular have spurred the term ‘Prison Industrial Complex’ in popular discourse to describe

“a set of governmental, private, and corporate interests that develop policies and practices in order to exert social, political, and economic control, and to perpetuate social processes that are biased by race, class, gender, and political perspective” (Wehr & Aseltine, 2013:2).

The privatisation of prisons has transformed prisons from publicly operated facilities with rehabilitation as a primary aim towards an enterprise aimed at private profiteering (Fulcher, 2012:592). Contributing to the Prison Industrial Complex is the political and media fuelling of public perceptions that crime is increasing and therefore the need for ‘tough on crime’ responses is perpetuated (Wehr & Aseltine, 2013:2).

A number of commentators, such as Monterosso, argue that popular punitiveness is fuelled by political, rhetorical and media discourse that attacks the ‘other’ (Monterosso, 2009:17), causing distrust and division within society. As noted earlier in this chapter, since the emergence of dominant neoliberal ideologies, incarcerated populations have steadily increased whilst in contrast overall crime rates have fallen (ABS, 2008; Freiberg, 2010:209). Contributing to this contradiction are stricter sentencing approaches, such as increasing sentence length as well as tightened bail conditions and the introduction of more punitive responses to crime as a result of the dominance of ‘tough on crime’ rhetoric (Brown, 2013:35; Freiberg, 2010:209; Legal and Constitutional Affairs Reference Committee [LCARC], 2013:17). Particularly telling is Cavadino and Dignan’s (2006:447) research on the relationship between dominant political ideology and the state’s response to crime by examining twelve different capitalist countries who were classified as either neoliberal, conservative corporatist, social democratic, or oriental corporatist. Their research found that neoliberalist countries, of which Australia is classified, were the most punitive in their responses to crime (Cavadino & Dignan, 2006:447).

In recent years within Australia, Queensland in particular has introduced a number of legislative reforms that are highly punitive in nature (Trotter & Hobbs, 2014:2). These include mandatory minimum sentencing for various crimes ranging in severity from graffiti to child sex offences (see *Criminal Law (Two Strike Child Sex Offences) Amendment Act 2012 (Qld)*, *Criminal Law Amendment Act 2012 (Qld)* ss.3.7, *Criminal Law and Other Legislation Amendment Act 2013 (Qld)* ss.47, 83). Legislation was also introduced that established very

punitive terms of imprisonment for crimes committed in groups (*Vicious Lawless Association Disestablishment Act 2013* [Qld]; *Tattoo Parlours Act 2013* [Qld]; *Criminal Law (Criminal Organisation Disruption) Amendment Act 2013* [Qld]). Similarly, legislation enacted in Victoria in 2005 (*Serious Sex Offenders Monitoring Act 2005* [Vic]) and 2009 (*Serious Sex Offenders (Detention and Supervision) Act 2009* [Vic]) introduced a system within which high-risk dangerous offenders can continue to be monitored or detained beyond the terms of their initial sentence.

In 2003 New South Wales followed suit by enacting Australia's first Standard Non-Parole Period (SNPP) scheme, which increased both the consistency and severity of sentences. With each sentence of imprisonment there is a maximum term for which a person can be held in custody and a minimum term, prior to which the person is ineligible for parole (Krasnostein & Freiberg, 2013:281). South Australia, Northern Territory and Tasmania also have a form of the SNNP scheme (Krasnostein & Freiberg, 2013:281).

The 'tough on crime' rhetoric can be observed in its most blatant form during the recent period of the Liberal Coalition government in Victoria between 2010 and 2014. During their first year in government sentencing laws were reformed quicker and more substantially than any other area of policy (McDonnell & Farrell, 2012:238). These changes included the abolition of home detention, which was described in the *Sentencing Legislation Amendment (Abolition of Home Detention) Bill 2011*, as being a "soft punishment" (p.6). Much of the concern was centred on public and media perceptions of this being an inadequate punishment measure (for examples see: Donnelly, 2010:13; Healey, 2009:14; Lowe, 2011:7; Mickelborough, 2010; Murphy, 2009).

Popular punitivism is inherently linked with the sensationalisation of crime by the media and the use of this by politicians for electoral gain (Lappi-Seppälä, 2012; Mason P, 2006; Monterosso, 2009). Mason P (2006:253), in agreement with scholars such as Thomas Mathiesen (1995) and Nils Christie (2000), argues that increases in prison populations is not driven solely by crime but is inescapably linked with inaccurate media representations of crime, which are capitalised on by politicians. As Mason P (2006:263) argues, the dominance of the media's sensationalism around crime and the continuing use of crime as a political bargaining tool precludes any form of rational debate from occurring regarding alternatives to imprisonment.

The media has played a significant role in generating rhetoric that crime levels are rising out of control, partially as a result of inadequate sentencing procedures (Crispin, 2010:117). Crispin (2010:117) argues that this concept is then grasped by politicians who regurgitate the rhetoric of being 'tough on crime' in order to win the public vote. A

national study conducted in 2007 into the public's perception of crime found that the majority of the Australian public perceives the rate of crime to be increasing, with 12.9 percent of respondents believing that crime, drugs and terrorism are the most important issues facing Australia today (Roberts & Indermaur, 2009:xi). Alarming, 87.7 percent of respondents had little or no confidence in the prison system's ability to rehabilitate offenders (Roberts & Indermaur, 2009:xii). In general the public perception of crime is largely at odds with the actual statistical trends in crime (LCARC, 2013:7).

Democratic policy decisions are centred around public opinion (Spiranovic, Roberts & Indermaur, 2012:249). As was introduced in Chapter One, there appears to be a disconnect between public perceptions of rising crime levels and actual recorded levels of crime (Ambrey, Flemming & Manning, 2014; Davis & Dosseter, 2010; Weatherburn & Indermaur, 2004). In part these perceptions are fuelled by the media's sensationalisation of crime. Whilst this may contribute to the erosion of public confidence in the criminal justice system (Weatherburn & Indermaur, 2004), it also plays into the hands of government policy makers who wish to further the neoliberal agenda of increasing punitiveness and harsher sentencing.

One cannot discuss Australia's sentencing climate without mentioning the prominent case of Ms Jill Meagher and the media hype surrounding it. In September 2012 Ms Meagher was attacked, raped and strangled, with her body dumped in a shallow grave by a man who had a significant history of recidivist violent sexual offending and who was currently on parole for similar offences (Callinan, 2013:89). Social media played a prominent role in this case, fuelling public perception of the increase in violent crime and inadequacy of Victoria's justice system (see Alberici, 1 October 2012; Farnsworth, 23 March 2015; Lowe, 28 September 2012). Partly in response to this public outcry, Ian Callinan was appointed by the Victorian government to conduct a review of Victoria's system of parole. Callinan (2013) arrived at 23 measures he recommended be enacted for Victoria's parole system. These recommendations were inherently more punitive, and included removing automatic reviews of parole cancellations, with parole not being reconsidered until half the unexpired time of parole has elapsed, making parole eligibility more difficult for serious violent and sexual offenders (Callinan, 2013:89.90). This further entrenches the individualised approach to crime, stripping the criminal act both from the life course experiences of the individual and the individual from society.

Deterrence through legislation

Deterrence through legislation is based on the idea that the penalty that will be incurred for committing the crime will deter individuals from engaging in that offence in the first place (Cullen, Jonson & Nagin, 2011:52; LIV, 2010:7). The concept of deterrence in

criminal justice is based on the traditional economic theory of rational choice, which assumes that offenders will weigh up the costs and benefits of committing a crime and make a rational decision based on this analysis (Cullen, Jonson & Nagin, 2011:52; LIV, 2010:7; Ritchie, 2011:1). Not only does this assume that individuals are capable of this type of analysis, it also assumes that offenders are well informed of the consequences they will face if they commit a particular offence (Ritchie, 2011:1). The dominance of rational choice theory in explaining crime has moved the focus from crime being a social problem, whereby structural inequalities contribute to engagement in offending, to crime being a result of individual pathology (Campbell, 2015:186).

Mandatory sentencing has emerged in Australia as a major component of deterrence through legislation. There is however limited empirical evidence to suggest that mandatory sentencing works to reduce crime levels through either deterrence or incapacitation (LIV, 2010:9). Furthermore, research suggests that the threat of imprisonment has a minimal deterrent effect, and in fact an increase in the severity of the prison term has no associated deterrent effect, suggesting that the overall effect of deterrence is minimal (Chen & Shapiro, 2007:3; Green D & Winik, 2010; LIV, 2010:9; Mears & Bales, 2009). In addition to imprisonment having a limited or no deterrent effect on offending it can in fact increase recidivist offending (Chiricos et al., 2007; Bernburg & Krohn, 2003; Bernburg, Krohn and Rivera, 2006; Gatti, Tremblay & Vitaro, 2009; Petrosino, Turpin-Petrosino & Guckenburg, 2010; Sampson & Laub, 1993). This is thought to be largely due to the increasing criminogenic conditions, including the social and learning environment for crime within prisons, which contributes to reinforcing the criminal identity, the destruction of pro-social ties within the community, and decreased job stability (Blokland & Nagin, 2012:222; Cullen, Jonson & Nagin, 2011:52; Nagin, Cullen and Jonson, 2009:126-128; Ritchie, 2011:3; Spohn, 2007:31). Haney (2012:12) asserts that because many aspects of prison are often similar to previous experiences of maltreatment individuals with a history of chronic childhood maltreatment are more vulnerable to the stressors experienced in prison, resulting in re-traumatisation. There are a number of studies that have found individuals with a history of childhood maltreatment are more likely to experience victimisation in prison and are more vulnerable to the psychological impact of prison (Haney, 2012:3; Hochstetler et al., 2004; Wolff et al., 2009).

Despite this rise in punitive responses to crime, Australia maintains a degree of flexibility in sentencing options, having not evolved into the more rigid systems seen in America, which employs the premise of consistency or 'comparativism' that states that similar offences should receive similar sentences (Freiberg, 2010:210; Krasnostein & Freiberg, 2013:265). Australia adheres to a more individualistic paradigm for sentencing, meaning

that individual circumstances are taken into consideration when arriving at a sentencing outcome. However this is beginning to change with common law jurisdictions developing measures to increase consistency of sentencing in similar cases (Krasnostein & Freiberg, 2013:265). An example of this is the rise of legislation aimed at mandatory sentencing.

Mandatory sentencing for certain crimes, as indicated in policy prescriptions, aims to reduce crime through deterrence and incapacitation. Reducing crime by incapacitation is achieved by preventing the offender from being able to commit further offences in the community (Law Institute of Victoria [LIV], 2010:7). The last widespread scheme of minimum mandatory sentencing was introduced in 1883 with the *Criminal Law Amendment Act 1883* (NSW), and until recent years mandatory sentencing regimes have been rare (Trotter & Hobbs, 2014:12). The injustice in sentencing caused by these laws was immediately apparent and the concept was officially abandoned in 1924 (Trotter & Hobbs, 2014:13). Mandatory sentencing regimes were introduced in Western Australia in 1996 and the Northern Territory in 1997, which included mandatory incarceration for theft of 14 days for first-time offenders, 90 days for second-time offenders, and 12 months for third-time offenders (*Criminal Code Amendment Act (Number 2) 1996* (WA) s.5; *Sentencing Act 1995* (NT) s.78B; *Juvenile Justice Act 1993* (NT) s.53AE). In 1996 Western Australia introduced 'three strikes' policy in relation to home burglaries, wherein under amendments to the *Criminal Code* (WA), individuals with two previous convictions for burglary will be required to serve a minimum of 12 months imprisonment if convicted a third time (LIV, 2011:6). In 2009, Western Australia introduced further amendments to the *Criminal Code*, prescribing mandatory imprisonment for assaults on police officers or other prescribed public officials (*Criminal Code* [WA] s.297.5). These laws remain in force in Western Australia.

Mandatory sentencing essentially removes the power of the court to take into consideration the individual circumstances of a crime, thereby rendering void one of the foundational principles of sentencing: the valuing of individualised justice. An example of the arbitrary nature of this sentencing regime can be found in the case of an eleven year old boy who received two sets of 12 month detentions, two 12 month conditional release orders, and one supervised release order of six months, largely as a result of him stealing food stemming from necessity due to a lack of parental care (Bayes, 1999:288). As Bayes (1999:289) writes, not only does this result in the harsh criminalisation of young people, it also undermines rehabilitation opportunities.

Legal experts have reported that mandatory sentencing does not lead to consistency in sentencing given that it forces the imposition of sentences that may be disproportionate to the gravity of the offence (LIV, 2011:3). Moreover, a number of important studies have

concluded that imprisonment not only had no effect on recidivism, but in fact increased recidivism, as canvassed earlier (Nagin & Snodgrass, 2010; Nieuwbeera, Nagin & Blokland, 2009; Sampson & Laub, 1993; Smith P & Gendreau, 2010; Spohn & Holleran, 2002). Mandatory sentencing legislation was repealed in the Northern Territory in 2001 due to heavy criticism of the arbitrary effect, particularly on Indigenous and juvenile populations (Trotter & Hobbs, 2014:13). Despite previous failings of mandatory sentencing laws that were introduced into the Northern Territory in 1997 and repealed in 2001, mandatory sentencing was reintroduced in December 2008 with an amendment to the *Sentencing Act* (NT) (LIV, 2010:6). This amendment provides that a mandatory imprisonment sentence must be served for offences of serious harm, harm, assault causing harm, and assaults on police resulting in harm (see s181, s188 and s189A *Criminal Code Act* (NT)). Additionally mandatory minimum sentencing was reintroduced in the Northern Territory in 2013 with the *Sentencing Amendment (Mandatory Minimum Sentences) Act 2013* (NT). The net effect of this legislation has resulted in an increase of imprisonment rates of 72 percent between 2002 and 2012, with rates rising from 480 prisoners to 826 prisoners per 100,000 (LCARC, 2013:4).

Mandatory sentencing essentially aims to reduce offending initially by incapacitation, but is also reflective of the idea that through punishment the offender will see the error of his/her ways. In reality this does not necessarily translate into practice. An Australian study conducted by Weatherburn (2010) matched offenders convicted of either burglary or non-aggravated assault who received a full-time prison sentence with others who committed the same offence and who had similar histories and bail statuses but did not receive a full-time prison sentence. Results demonstrated that there was no difference in recidivism rates for those who committed burglary offences, however for non-aggravated assault the experience of imprisonment increased the risk for further offending (Weatherburn, 2010). Spohn and Holleran (2002) revealed similar results, concluding that drug offenders who served a prison sentence were five to six times more likely to recidivate than those placed on probation in the community. Another study, by Smith P and Gendreau (2010), differentiated between high- and low-risk offenders, and found that for high-risk offenders, recidivism rates varied depending on whether they received effective rehabilitation while in prison, whereas low-risk offenders routinely experienced inflated recidivism rates after receiving a sentence of imprisonment.

Conclusion

Based on the policy rhetoric and legislative amendments that have occurred in recent years it is clear that popular punitivism and the ‘tough on crime’ mentality are not diminishing. Indeed, the sensationalisation of crime in the media, and indeed the public obsession with a criminal “underbelly”, as evidenced in the creation of numerous

televised dramatisations of Australia's notorious gangland figures, further focuses public attention on crime, for which governments then attempt to gain popularity by promising to be 'tougher on crime'. Commentators such as Fulcher (2012) argue that the privatisation of prisons in particular has contributed to the need for 'tough on crime' measures that increase prison numbers in order to ensure profitability of the private prisons (Fulcher, 2012). The dominance of neoliberal ideologies ignores the existence of social and economic inequalities in society, and in particular promotes the idea that employment is easily accessible, thereby dismissing the realities of de-industrialised labour market that has resulted in a dramatic increase in part-time, casual and underemployment (Kramer, Rajah & Sung, 2013:537). Rather than taking a critical perspective and examining societal and structural contributors to crime and recidivism, it is clear that the problem in public policy is represented to be one of individual pathology wherein the idea of crime and recidivism are seen to be the result of penalties not being severe enough to adequately punish or deter the offending.

Taking a critical perspective on crime and justice is not designed to make excuses or provide justification for engagement in offending behaviour, but rather aims to highlight additional elements that contribute to offending. In order to comprehensively understand and adequately address crime, and recidivism in particular, a multifaceted understanding of the issue is critical, not simply responding by pathologising and blaming the individual. The net effect of the neoliberal representation of crime is the inherent separation of 'us and them', whereby the 'other' is to be feared and thereby controlled by tighter regulation.

From this reading of current criminal justice policy and practice, there are a number of presuppositions not included in what Bacchi calls the 'representation of the problem' (Bacchi, 2000:46). Each year the Australian Institute of Criminology releases data on facts and figures of Australian crime. As part of this, a chapter is devoted to statistics on offender profiles. These profiles however contain only information on age, gender and offence type, and fail to acknowledge offender histories that may increase the likelihood of engagement in crime. Whilst there has been significant literature produced that acknowledges the link between childhood maltreatment and offending behaviour (the subject of Chapter Five), very little of this explores the neurobiological impact, instead speculating on various psychosocial models which may explain the link. The question can be raised as to whether the inclusion of neuroscience research in criminology data sources and in the development of public policy, and therefore legislative responses to crime, could shift the dominant ways in which recidivism is addressed. The possible effects of a history of chronic childhood maltreatment are certainly not included in any public policy rhetoric to do with crime or recidivism, nor are the neurobiological consequences of this

considered. The structural circumstances that influence chronic childhood maltreatment are also not in the frame. The language and policy prescriptions convey the assumption that engagement in crime is a free and rational choice and that individuals have every opportunity of education and employment available to them. It is further assumed that crime committed as a result of substance abuse is a lifestyle choice rather than an attempt at self-medicating. Whilst this appears to be the dominant story presented in the discourse, it is useful to recognise that there are always counter narratives to this hegemonic discourse.

This thesis is primarily concerned with individuals who become ensnared in the revolving door of incarceration and release. As has been highlighted in this chapter, Australia is on a path that is steering towards the neo-liberal trend of increasing punitive responses to crime in an attempt to influence deterrence and thereby reduce recidivism. Criminology and social work research however indicates that punitive responses, such as mandatory sentencing, are largely ineffectual as deterrents and in fact ignore underlying criminogenic influences on recidivist offending. Mandatory sentencing as well as increased SNPP is greatly expanding Australia's reliance on the prison system, without necessarily providing avenues for successful rehabilitation back into the community. As discussed in the previous chapter neuroscience research has shown differences in brain development and function for individuals who have experienced chronic childhood maltreatment. What can these understandings offer in terms of the rehabilitative needs of these offenders and for Australia's justice system?

CHAPTER FOUR: METHODOLOGY

“The precise connection of biological factors to criminal conduct is not a matter of ideology but of objective reality”

Wright J & Cullen, 2012, p. 239

Introduction

As outlined in previous chapters, intrinsic to this thesis is exploring the value of bridging ideological divides between neuroscientific knowledge gained from positivistic empiricism and critical interpretive knowledge and practice in the social science world. These sources of knowledge emerge from different paradigms or philosophies of science, which determine the particular research approach that is undertaken based on the assumptions that are inherent in that particular worldview (Haase & Myers, 1988:128).

This focus of this chapter is twofold: the philosophical assumptions underpinning the research and an explanation of the research strategy that has been selected, including setting out the research design and process. The research methodology will provide the framework within which the research is situated, or the epistemological position that describes the lens through which knowledge is gathered and understood (Crotty, 1998:3; Neuman, 2011:68). At the philosophical level the thesis is examining two very distinct fields: the theory and practice of criminal justice, which by its very nature is historical, gendered, and steeped in hegemonic power relations, and a consideration of neuroscientific knowledge, the latter of which is inherently positivist and reductionist in nature.

In Chapter One I outlined that as a social worker I have come from a practice background where I have observed not only inadequacies in the correction system, but also large chasms where knowledge exists but is not being shared between disciplines. Being a social worker that has worked within both the criminal justice and child protection systems, I am aware that knowledge is power, and indeed certain knowledge is privileged in society and therefore has greater power over other forms of knowledge. For example, empirical science has always held a privileged position in western philosophy, exemplified by what Boldeman describes as an *“inherited cultural image of the scientist as a hero overcoming ignorance and bringing reality under control”* (2007:155). The research paradigm that best compliments my worldview is a critical interpretive approach. This paradigm is however far removed from the natural science paradigm within which neuroscience has emerged. It is in part bridging the ideological divide between the natural sciences and social sciences that has motivated this thesis as discussed in Chapter Two.

This chapter will first broadly sketch the apparent philosophical divide between the natural and social sciences and set out the methodological approach I will use in this thesis. Following this the research strategy employed for this thesis will be discussed and analysed before setting out the research design and process. The research employs multiple methods: a systematic review and synthesis of the existing research on neuroscience and chronic childhood maltreatment, and a policy and program review of the rehabilitation approaches in the Australian criminal justice system. Cognisant of the extensive amount of research that exists in fields of neuroscience and childhood maltreatment, it is apparent that there has been a limited filtration of the amassed knowledge between disciplines. It would therefore be redundant to replicate an independent study on either the neurological impact of childhood maltreatment, or the linking of the experience of chronic childhood maltreatment with offending behaviour. Instead the approach taken is a systematic review and synthesis of the existing research. The underlying purpose of conducting a research synthesis is to produce new knowledge by making explicit connections between areas that were not previously visible (Suri, 2011:63). In addition to synthesising the existing research, engaging in a policy analysis of Australia's criminal justice system will assist in deciphering the types of knowledge that are privileged over others within Australian political discourse and which shape contemporary rehabilitation practices.

The philosophical divide

Natural sciences and social sciences have fundamental differences in the way they view the world, which is in part reflective of different ontological positions, or different perceptions of reality (Crotty, 1998:10). Broadly speaking, natural science aims to uncover patterns and find order and consistency through the pursuit of knowledge that is governed by fundamental laws of nature (Novak, 2011:11). Natural sciences examine reality from a realist position, which asserts, "*the physical world exists independently of the observer and his perceptions*" (Novak, 2011:11). The laws and theories that make up scientific knowledge are therefore viewed as accurate descriptions of reality, independent of subjective individual experience (Ellis, 2009:25). For example, research on the impact of childhood maltreatment on the developing brain has largely been undertaken by neuroscience using research designs that are positivist and quantitative in design. Positivist research is based on objectivism, which holds an essentialist view of reality, as noted above (Neuman, 2011:72). A typical research design in this tradition relies heavily on analysing observable differences in results obtained between non-maltreated subjects (dependent variable) and maltreated subjects (independent variable).

In contrast, social work is made up of a much more multifaceted conglomeration of ontologies, the most prominent of which is constructionism, which forms a component of the interpretive paradigm (Scotland, 2012:11; Turner, 2006:3). Interpretivism operates from the belief that reality and knowledge are socially constructed and therefore reality can only be understood from the perspective of the individual experiencing it (Cohen et al., 2007:19; Crotty, 1998:42). As Crotty writes, “*Meaning is not discovered it is constructed*” (Crotty, 1998:8-9). As was discussed in Chapter Two, social work’s positioning of individual experience as central to its value system is reflective of this ideological dominance (Bartlett, 1970:53). Also important to social work is the critical paradigm, which views knowledge as being not only socially constructed, but as inherently influenced by power relations within society (Scotland, 2012:13). In this tradition, the underlying aim of critical research is therefore to expose hegemony and challenge social structures, using social action to overcome oppression and injustice (Crotty, 1998:157). Critical interpretive research combines a critical approach, which argues that there are objective power relationships that shape society and exist independently of subjective perception (Neuman, 2011:83), with an interpretive approach, which explores the way individuals interpret meanings and make sense of the world (Sarantakos, 1998:36).

An interpretive philosophical approach is a crucial component of this thesis, however a critical standpoint is also necessary in being able to examine how certain knowledge is privileged over others through forms of hegemony, power and oppression (Crotty, 1998:157; Humphries et al., 2000:6; Neuman, 2011:81; Sarantakos, 1998:38). This includes how dominant discourses may obscure connections between knowledge disciplines. Engaging a critical interpretive perspective is valuable in interpreting the dominant trends of being ‘tough on crime’ throughout the western democratic countries, as was the theme discussed in the previous chapter. Furthermore, social work inherently works with marginalised groups from diverse backgrounds, and it is through the process of critical research that social work is able to challenge misconceptions and dominant discourse that otherwise may continue to marginalise particular groups in society (Engel & Schutt, 2014:6).

Whilst the critical interpretive paradigm provides the framework for this thesis there are nonetheless inherent tensions within the research. Much of the amassed knowledge in the neuroscientific field is knowledge derived through positivist research in that the results seek to describe an objective truth in terms of how the brain operates without bias or interpretation. Neuroscience research aims to uncover clear cause-effect relationships between the physical brain structure, cognitive function, and neural activity (Domínguez Duque et al., 2010:140). The design of the research involves highly formalised laboratory experiments that seek nomothetic explanations (Domínguez Duque et al., 2010:140). The

positioning of neuroscience research in this context is vastly different to interpretive research designs used in social work, which place emphasis on structure, contexts and relationships (Domínguez Duque et al., 2010:140).

The differing methodological orientations associated with each paradigm impacts on the ability to successfully undertake policy-relevant research that spans these traditional concepts of science and humanities (Oakley, 2004:14). This traditional separation of seemingly opposing philosophical approaches to research is perhaps one reason why the amassed knowledge on the impact of chronic childhood maltreatment on brain development, and the extrapolation of these insights into explanatory models for the link between childhood maltreatment and offending, has not been readily pursued across disciplines.

From the position of a critical interpretive paradigm it can be argued that there is an element of construction in the design of neuroscience research, beyond it being the means to discover an 'objective truth'. The variables can never be completely controlled when using human beings as research subjects, and the construct of research designs are not value-free. No two individual experiences will be the same, nor can the effects of one particular experience be specifically separated from a conglomeration of other experiences such as physical abuse, emotional abuse or poverty. Thus, whilst the research reviewed may aim to find a definitive truth, the ability to do this, in the strict empirical sense of the meaning, and from a critical interpretive perspective, is not possible. In a similar vein, Neuman (2011:76) argues that research linking chronic childhood maltreatment and offending has been largely interpretive, relying on field research and participant observation. Despite this different philosophical approach, much of the research reviewed in this thesis applies a positivist lens when trying to uncover patterns within the data and uncover definitive answers to the problems posed. Again, similar to the neuroscience research there are a number of methodological differences within the body of research that is trying to link chronic childhood maltreatment with offending behaviour that prevent these definitive answers to be realised (this will be discussed in greater detail in Chapter Five).

Elliot and Kiel (1996:2) contend that social work has a long-held ambivalence towards reductionism, which complements a traditional Newtonian worldview of a mechanistic and predictable universe that is reducible down to its smallest parts. As was discussed in Chapter Two, the paradigm changes taking place in the natural sciences with the emergence of chaos theory may in fact provide an opportunity for social work to begin to place greater weight on emerging neuroscience knowledge given that the focus of chaos theory is 'nonlinearity, instability and uncertainty', which characterises social systems that

are the focus of social science research (Elliot & Kiel, 1996:2). In the next section I outline the key methods that are used in this research.

Research Methodology

Systematic reviews

A systematic review is a research method that allows for the collation of a large amount of empirical data, resultant from many studies, and present these findings in a systematic way that both covers the greatest range of searching parameters and limits bias (Higgins & Green S, 2011:online; Petticrew & Roberts, 2006:9). The term 'systematic' is important as it distinguishes the review process from that of a general literature review that does not have clear, replicable methods (Gough, 2012a:2). The use of the systematic review gained momentum with the increasingly popular evidence-based movement that emerged in the 1990s (Pomeroy, 2009:294), as a result of an acknowledgement from the medical fields that in order to make well-informed decisions with the most current information, a synthesis of these vast amounts of research was crucially needed. The Cochrane Collaboration is internationally recognised as providing the highest standard of systematic review for evidence-based health care (Green S et al., 2011:4). The Cochrane Collaboration emerged in 1993 in response to the growing trend of using evidence-based principles to guide decision-making. Initially catering to the medical field the evidence-based movement has now expanded to include many other streams of health service, including social science and psychology. Systematic reviews comply with the production of evidence-based knowledge that has been privileged in the current political climate that focuses on outcomes and obtaining 'value for money' (Evans & Benefield, 2001:530).

Systematic reviews have a clearly stated set of objectives, and importantly, have a reproducible methodology that is both systematic and explicit (Gough et al., 2012a:5; Green S et al., 2011:online). In order to be reproducible there is a framework protocol within which to conduct the review. This framework begins with the specific identification of the problem for which the review is being conducted, followed by an explicit statement of the research questions, a description of the types of research that will be reviewed, followed by the actual mechanism that will be employed in order to search and select data, and finally the techniques that will be engaged in order to analyse and synthesise the findings contained within the collected data (Sandelowski, 2008:105).

Technology and Internet access has dramatically altered the ease with which information is accessed and disseminated. There are now vast amounts of research that can be accessed at the click of a button. Systematic reviews represent a move towards accessible and democratic knowledge management, removing research from its traditional position within the confines of the academic universities and placing it squarely within the public

domain (Oakley, 2004:25). Using contemporary search engine technology allows systematic reviews to access vast amounts of research and the systematic protocol that provides a framework of inclusion and exclusion criteria allows for the methodological quality of the research to be appraised before inclusion in the study (Boaz et al., 2002:5). That is why research synthesis is so important in being able to collate vast amounts of relevant knowledge into an easily accessible form. The difficulty however comes in determining what research is valid, unbiased and relevant, which calls for close examination of how the research has been conducted. Systematic reviews play an important role in analysing authorial bias or explaining why research on the same topic may have conflicting results (Petticrew & Roberts, 2006:3). Additionally, with access to such vast amounts of research, and with resultant opinions often varying, systematic reviews are particularly relevant to politicians, policy makers, and lobby groups because they allow for the presentation of large quantities of data in a systematic and timely fashion, which can then be used to search for solutions and justify policy decisions (Petticrew & Roberts, 2006:11).

One of the questions in this thesis is how to use knowledge to bridge the ideological divide between the natural and social sciences in order to gain a more comprehensive understanding of the impact of chronic childhood maltreatment on life outcomes. The answer may lie in a new theoretical approach that has been proposed by Dixon-Woods and colleagues (2006) through the use of a critical interpretive research synthesis, which is described as being “*sensitised to the kinds of processes involved in conventional systematic review while drawing on a distinctively tradition of inquiry*” (p. 43). Dixon-Woods and colleagues (2006) argue that a failing of traditional systematic reviews is that, whilst being useful for aggregative syntheses that provide a summary of literature findings, they fail to apply to be sufficiently critical to the research that is examined. By failing to examine research through a critical lens, systematic reviews fail to critique normative assumptions inherent in the research studies (Dixon-Woods et al., 2006:43). As opposed to traditional systematic reviews, which focus on having a reproducible searching protocol and findings, a critical interpretive research synthesis focuses on producing “*an interpretation of the evidence that could produce new insights and fresh ways of understanding*” (Dixon-Woods et al., 2006:45).

Systematic reviews are however a relatively new and emerging field of research and methods of conducting them are still being developed for different areas of science (Gough et al., 2012a:10; Petticrew & Roberts, 2006:21). Systematic reviews in turn are not immune to researcher bias and are influenced by the original conception of the research problem, the framing of the questions posed by the researcher, the selection of studies to include, and the way in which the studies are compared and combined (Sandelowski, 2008:105). The labour-intensive nature of systematic reviews can also

influence the reviewer in terms of ensuring that the numbers of reports to include does not exclude the resources and time available to conduct the review (Sandelowski, 2008:106). In their use of the systematic review method, Evans and Benefield (2001:536) also highlighted a number of limitations when performing searches in fields other than medicine. These include the fact that entry of articles into databases can be subject to indexer error in the selection of key words for indexing, that not all databases utilise a list of controlled vocabulary to the comprehensiveness of journals that are covered within a database, meaning that relevant journals may be absent, and that search terms are unable to be used consistently due to varying levels of sophistication between databases (Evans & Benefield, 2001:536).

Much literature on research synthesis is drawn from the dominant positivist methods of synthesis, rather than acknowledging the necessity of reflexively engaging with underlying epistemological assumptions (Suri, 2012:890). It is also worth acknowledging that whilst collaborations such as the Cochrane Collaboration have gathered extensive systematic reviews in their library, and provide important frameworks on conducting research syntheses, there remains concern about the focus on the promotion of specific research methodologies that were largely developed for a medical context and the transferability of these models to other disciplines (Boaz et al., 2002:2). This also raises questions in terms of hegemonic ideas of research and knowledge prioritising particular methodologies over others. A broad concern about the traditional systematic review process is that there is a tendency to prioritise certain research methodologies over others (Boaz et al., 2002:7). From a critical paradigm it is also important to note that, given that some knowledge is privileged over others, there may exist a publication bias in the types of research that are published in the journals (Sutton et al., 2000:1577). This notion of the privileging of some knowledge types over others provides a useful transition into an additional component of this research, which is to critically analyse language and discourse.

The rapid proliferation of the use of systematic reviews in recent years has resulted in the use of a varying and complex web of terminology within which to describe them (Gough et al., 2012b:29). As with any type of research, the research question will determine the type of method that is applied. This is also true for systematic reviews, for which there are varied methods and methodologies to support them. As with general research, which can broadly be grouped into either qualitative or quantitative research, systematic reviews too can be broadly grouped into either configurative or aggregative reviews (Gough & Thomas, 2012:51). Whilst all reviews will involve varying aspects of aggregation and configuration, some systematic reviews will include more of one component than another when synthesizing results (Gough & Thomas, 2012:53). Aggregative reviews tally the findings from amassed literature in order to answer the review question, whilst

configurative reviews aim to piece together research knowledge from different contexts in an attempt to create a coherent whole (Gough & Thomas, 2012:51). The aim of aggregative reviews is to provide a degree of certainty about the degree to which there is agreement or variation of the particular phenomenon that is being investigated (Gough et al., 2012:31). In contrast, configurative reviews do not attempt to undertake an exhaustive search, but rather identify sufficient research to enable the exploration of patterns (Gough et al., 2012:31). The diversity in themes incorporated into a configurative review means that the results cannot be cumulated, as occurs with an aggregative review (Sandelowski, 2012:325). Whilst findings may be thematically diverse, they are still perceived to be related in some way and are therefore important in being able to link research findings that may not have been conceived as part of the initial research (Sandelowski, 2012:325).

Central to the argument of this thesis is the fact that the opposing methodological and philosophical traditions that divide the biological and social sciences have contributed to the difficulties in integrating research knowledge. These methodological difficulties were inherent in this thesis when trying to combine research from two disparate philosophical divides. The underlying purpose of this thesis therefore was not to provide a systematic review in line with Cochrane Review data, nor to undertake an exhaustive review that will provide definitive answers to the questions posed. Instead the aim is to analyse a broad spectrum of data from varying fields in order to ascertain the major themes that emerge and to draw these disparate threads together to create a multifaceted garment of understanding. From there it will be clear what knowledge is excluded or privileged when designing the relevant policies and practices, and how the foundations of our understanding of this topic can be synthesised. In using mixed methods systematic reviews, plus a policy analysis these two seemingly opposing philosophical orientations can be synthesised.

In order to successfully engage in democratic knowledge management systematic reviews must bridge the gap between traditionally opposite paradigms of science and humanities, and develop methodologies that include knowledge from methodologically and epistemologically diverse positions.

For a systematic review to be thorough and complete the researcher is reliant on search engines and databases to be appropriately indexed and precise in its records of abstracts and key words. Inconsistent use of terminology and vocabulary within which the research was sourced further complicated the search strategy. For example the terms child abuse, child trauma, child maltreatment, neglect, sexual abuse, to name just a few, were all used interchangeably. Given the broad range of terminology used in this research topic, the data gathered was not solely limited to the study-designed search terms, as is the usual

procedure for systematic reviews, because it was decided that this may limit the locating of important research documents. Additional research sources were therefore accessed using a snowball type of data gathering by searching for references within the located articles generated by the search engine.

Critical policy discourse analysis

The second method used in this research is an analysis of public policy and practice in the Australian correctional field. In order to extend understanding of responses to Australia's recidivism rates, one must first understand what currently happens within Australia's correctional programs and policies. One way in which this can be achieved is by reviewing current policies and dominant practices within the correctional system. With this in mind, research synthesis is fundamental in being able to disseminate knowledge from an array of research areas in order to influence policy and practice (Suri, 2013:889). Whilst it is recognised that in reality what happens on the ground may vary from what the policy specifically states, what this thesis is looking for are the general trends that are prescribed in legislation and policy direction.

Criminology, in particular, is inherently political, with ideologies profoundly influencing views on inherent causes of crime as being that of either individual pathology or as a result of societal inequalities (Wright J & Cullen, 2012:240). To add further methodological complexity this thesis also uses a critical approach by analysing what knowledge is privileged in correctional policies and practices in Australia. Whilst it may at first appear to be antithetical to also adopt a critical methodological approach, and more specifically critical discourse analysis, in addition to engaging in research synthesis, it is argued that this approach is relevant for policy analysis and for understanding why, despite information available from evidence-based practice on the impact of child maltreatment on the functioning of the developing brain, this information is rarely taken into consideration when designing justice policies and practices. It is for this reason that the critical interpretive research synthesis proposed by Dixon-Woods and colleagues (2006) is particularly relevant. The use of a critical interpretive research synthesis focuses on presenting evidence in such a way as to provide 'new insights and fresh understandings' (Dixon-Woods et al., 2006:45). In doing this, this thesis argues that there is a case for combining the more positivist analysis on neurodevelopment with a critical analysis that is focused on traditional conceptions of law and justice, which are by their very nature, historic, gendered, and hegemonic.

In combining these two methodological approaches it is useful to examine the concept of critical realism as developed by Bhaskar (1997, 1998). Critical realism distinguishes between the actual events that occur, the observations of the event (the empirical), and the

underlying power structures that cause the events (Turner, 2009:65). They argue that the positivist notion of observable causal relationships between events is flawed because systems are inherently interrelated and variables cannot be isolated (Turner, 2009:65). These systems are therefore intrinsically open systems, with constant interchange between variables. Whilst initially it is unclear how the recognition of an open system can be reconciled with the use of empirical research to test and validate the nature of underlying mechanisms and their effects, by acknowledging the synchrony between the actual, and the underlying power structures that influence the actual, it is no longer viable to argue that theories can be tested in a straightforward empirical fashion, because this ignores the premise that all variables and events are inherently interrelated (Turner, 2009:65). By using this epistemological position drawn from critical realism, combining the use of critical discourse analysis with mixed research synthesis becomes logical. Having examined the ideas surrounding this topic, the research will then employ critical discourse analysis to examine underlying power structures and public rhetoric and discourse that directly impact on the way in which criminal justice is conceived and acted upon within society.

Critical discourse analysis does not initiate from a fixed theoretical or methodological stance, but instead emerges from a particular research topic, which is refined in order to target certain objects of research (Fairclough et al., 2011: 358). Policy-as-discourse analysis aims to highlight the generation of meanings in legal and policy debates (Bacchi, 2000:46). It argues that the meanings ascribed to particular issues and the way in which problems are represented within discourse deflects attention from unequal power structures in society and places responsibility on the individual (Bacchi, 2000:46).

The central aim of policy-as-discourse analysis is to identify reasons behind why progressive change has not been accomplished (Bacchi, 2000:47). As Bacchi writes, this is both due to the ability of the dominant discourse to quash any attempts at change, as well as the way in which problems are represented, or indeed created, by the dominant discourse, which allows particular groups to maintain the positions of power and influence they have (Bacchi, 2000:47,55). Policy-as-discourse analysts believe that problems are shaped by the policy proposal responses generated by governments, as opposed to the problem existing as an independent fact (Bacchi, 2000:48). It is through policy-as-discourse analysis, and recognition of the institutional location of the creation of discourse, that attention is directed towards the power that particular actors have in the production of discourse (Bacchi, 2000:52).

As social media and electronic communication play an increasingly central role in society, the use of language inevitably becomes more important. Politics is increasingly being

played out in social media, making political discourse much more accessible to the public. With this increasing accessibility, critical analysis of discourse becomes even more crucial in order to be able to examine aspects of power and hegemony behind the rhetoric, particularly as the politics of funding is often hidden within the language of problematisations (Bacchi, 2000:50). The marketisation of public services forced to compete in a private market, further adds to the importance of language in terms of presentation and appeal (Fairclough et al., 2011: 358). For example, the dominant public discourse, such as ‘tough on crime’ rhetoric that has emerged from neo-liberal politics has important implications for this thesis topic. The use of critical discourse analysis as part of this research design provides the thread that is used to link the somewhat disparate questions together to form a coherent whole.

Research design and process

This investigation is happening at two levels: the examination of ideas and the exploration of policies and practices. As outlined in the introduction, this thesis aims to explore the relationships between chronic childhood maltreatment and recidivistic offending in the context of understanding how current correctional orders and rehabilitation programs can be improved. In order to facilitate this four research questions were developed:

1. In what ways does chronic childhood maltreatment impact on the physiological and functional development of the brain?
2. What role, if any, does chronic childhood maltreatment play in engagement in offending behaviour?
3. How do current offender sentencing legislation and rehabilitation programs recognise and respond to experiences of chronic childhood maltreatment?
4. To what extent does the emerging research about chronic childhood maltreatment provide insights that can be translated into correctional orders and rehabilitation programs for recidivist offenders?

As stated in Chapter One, there appears to be vast amounts of information in the field of neuroscience that has documented the impact of chronic childhood maltreatment on the brain’s physical and functional development. Alongside this, the fields of criminology, psychology and social work have also produced vast amounts of speculative knowledge that links chronic childhood maltreatment with offending behaviour. What has been less obviously linked is the possible relationship between the experience of chronic childhood maltreatment generating architectural and functional abnormalities in the brain, which

may predispose individuals to engagement in criminal behaviour. Following this, the applicability of this emerging neuroscience knowledge on changes in brain structure and function as a result of chronic childhood maltreatment, to Australia's criminal justice policies and practices needs to be examined.

In order to explore the large amounts of literature across the different disciplines the research has been dissected into three components: firstly, examining research from neuroscience on the physiological and functional changes that may occur in the developing brain as a result of chronic childhood maltreatment; secondly, examining research that links the experience of chronic childhood maltreatment with offending behaviour; and finally, a policy and discourse analysis examining whether these links are acknowledged by the Australian justice system and what knowledge, language and ideas are privileged in Australia's justice system in terms of policy and practice aimed at offender sentencing and rehabilitation.

A configurative review method forms the underlying foundation for the research design given that it will be attempting to draw research framed by three distinct components into new focuses for future justice policies and practices. Engaging in the process of research synthesis aims to generate new knowledge by making explicit connections between study reports that have not been visibly connected previously (Suri, 2013:889).

The next section in this chapter separates each research question in order to describe the individual search strategies that were used for each question.

Research questions

Question 1: In what ways does chronic childhood maltreatment impact on the physiological and functional development of the brain?

The research process encountered searching difficulties whilst using the university search engine, "FindIt@Flinders" and some data was lost. A decision was therefore made to utilise SCOPUS as it had the broadest coverage of the topics under review. SCOPUS was selected as the database search engine due to its large coverage of both social science and medical science articles, including having over 49 million core records within which to search (Elsevier, 2012:online). It was very important that the data obtained was from a credible source and therefore information was limited to peer reviewed research only.

Much of neuroscience's knowledge on brain development began to emerge during the 1990s, as a result of the signing of a presidential declaration by George H.W. Bush for the 1990s to be the 'Decade of the Brain', which focused scientific attention and funding

towards greater understanding of how the brain works (Goldstein, 1994:239). Because of this distinct period of research focus, a decision was made to expand the search to cover from 1990 to the present day.

As stated in Chapter One, defining chronic childhood maltreatment was a systematic process. It was important that the research examine chronic maltreatment rather than single incident trauma, as it was the chronicity of the maltreatment that is likely to have the greatest impact on brain development and function. Various terms are used in the literature to describe childhood maltreatment, including abuse, neglect, trauma, and early life stress. The variation in language use made searching the databases in a single systematic search impossible, given that the various ways within which the topic could be phrased dramatically altered the results produced. Instead of solely relying on a systematic search using a search engine the research also used a snowball sampling technique wherein search leads were followed from one study to another to ensure the most valuable and wide-ranging information was covered as part of the review. Not having a specific key term to focus the results also meant that the searches yielded a number of irrelevant studies that had to be eliminated by individual perusal. It was however necessary to use a variety of generic terms in order to adequately scope the research field. The search terms used included various combinations of the following words: childhood trauma, childhood maltreatment, developing brain, brain function, and child abuse. Exclusionary criteria included research that focused on accidental trauma, brain injury, or population samples that focused on a specific comorbid mental illness such as schizophrenia or bipolar disorder. Research was also limited to peer-reviewed studies to ensure only studies of high standards of research practice were included in the systematic review.

In addition to using SCOPUS as a search engine, supplementary searches were also conducted using BioMed Central, PubMed and Science Direct databases, as well as within social work-specific journals, including *Australian Social Work*, *Social Work Abstracts* and *British Journal of Social Work*. Using the search strategy that combined the use of database searches, journal-specific searches, and snowball sampling, a total of 93 articles were sourced that were relevant to the research question. The findings and analysis for this review are detailed in Chapters Six and Seven, with a complete list of references documented in Appendix A.

Question 2: What role, if any, does chronic childhood maltreatment play in engagement in recidivist offending behaviour?

The searching parameters for this question were far too broad to allow for an exhaustive search of the data. This is largely due to the variability of language used, including

combinations of specific phrases. For example, crime, offending, and delinquency were all used interchangeably and in varying combinations. Additionally childhood maltreatment, as previously discussed, also presents in the research under various forms. There are a number of methodological difficulties that make direct aggregation and comparison of results for this question extremely difficult. A detailed analysis of the methodological difficulties associated with the results is presented in Chapter Five.

To find childhood maltreatment and recidivism-specific research was very challenging as much of the research used terms such as ‘juvenile offending’, ‘delinquency’ or ‘adult offending’, which is ambiguous as to whether offending describes singular or multiple incidents. However, to exclude this research however because of mere syntax was to exclude some potentially important pieces of knowledge. Therefore, whilst the thesis question aims to examine recidivism or chronic offending, the literature was not limited to this. Definitions of measures and variables altered from study to study making direct comparisons difficult. Childhood maltreatment was generally defined within the research as abuse or neglect occurring before twelve years of age, however this definition tended to lack precision.

Despite the relative straightforward definition of ‘recidivism’, being “*The action of relapsing into crime, or reoffending, especially habitually*”. (Oxford English Dictionary, 2013), the concept of recidivism has a multitude of interpretations and values when applied to research. For example, an individual may be convicted for assault and may never engage in the same crime again, however may turn to petty theft. Would that therefore be defined as a failure of a program given that the individual has essentially relapsed into crime, or would that be viewed as a success given that the perceived seriousness of the crime is lesser? This variation in defining recidivism makes research analysis complex and does not therefore allow for results to be easily compared and aggregated. Realist enquiry therefore plays an important role in this particular review given that the underlying mechanisms and contexts must first be considered before comparisons and conclusions can be drawn.

For this section, the CINCH database was initially used. This is the Australian Criminology database produced by the JV Barry Library and the Australian Institute of Criminology. It is a bibliographic database that indexes and abstracts articles from published and unpublished material on all aspects of crime and criminal justice, including corrections, crime, crime prevention, criminal law, criminology, juvenile justice, law enforcement, police, and victims of crime (CINCH, 2015:online).

In addition to this database, searches were also repeated using Criminal Justice Abstracts, the FindIt@Flinders search engine, SCOPUS, and ProQuest Central. The search terms

used to elicit the data included various combinations of the following words: child maltreatment, child abuse, trauma, antisocial behaviour, criminal recidivism, offending, delinquency, recidivism, and crime. Numerous results were found focusing on sex offenders specifically. Not wanting to limit results to sex offenders given that this was not the focus of the study an additional search was performed that specifically excluded sex offenders. Again the articles were restricted to peer-reviewed articles only, and the time frame was the same as for the previous systematic review, 1990 to the present day. A total of 79 articles were sourced, a review of which is documented in Chapter Five, with a record of the results presented in Appendix B.

Question 3: How do current offender sentencing legislation and rehabilitation programs recognise and respond to experiences of chronic childhood maltreatment?

Childhood maltreatment is not specifically mentioned in policy and practice documents relevant to Australia's criminal justice system and therefore to answer this question it was necessary to examine the themes and language used within the documents in order to interpret whether neuroscientific understandings of brain development have been incorporated.

As Carol Bacchi (2009:1) highlights in her 'what's the problem represented to be' (WPR) approach to policy discourse analysis, it is useful to analyse the way in which a particular policy conceptualises the policy it is addressing. Bacchi (2009:1) argues that because policies inherently make proposals for change they are therefore implicit in defining the parameters of the problem, which is crucial as this then has implications on the way in which the response to the problem is formulated. As social media and electronic communication play an increasingly central role in society, the use of language inevitably becomes more important. Politics is increasingly being played out in social media, making political discourse much more accessible to the public. With this increasing accessibility, critical analysis of discourse becomes even more crucial in order to be able to examine aspects of power and hegemony behind the rhetoric, particularly as the politics of funding is often hidden within the language of problematisations (Bacchi, 2000:50). For example, the dominant public discourse, such as 'tough on crime' rhetoric, that has emerged from neo-liberal politics has important implications for the topic being explored in this thesis.

There are essentially two components to this question: the first involves an analysis of policy and legislature relevant to sentencing and rehabilitation programs, and the second examines actual practice in terms of rehabilitation programs available to offenders throughout the various jurisdictions across Australia. For this specific research question a more traditional linear literature review was used, particularly as the question sought

answers in the form of a general and temporal trend in responses, rather than an exact truth. Additionally, discrepancies between jurisdictions made access to precise comparable data difficult.

It is useful to clearly state the parameters that define what is meant by the use of the term rehabilitation program. Using a more specific definition, the *Corrections Act 1986* (Vic) defines a correctional order as being either a community-based order, a community correction order, a community work permit, a parole order, an intensive correction order, an undertaking with a condition that a person be supervised by a parole officer, or a combined custody and treatment order (Section 3). Similarly, the *Criminal Law (Sentencing) Act 1988* (SA) defines an intervention program as providing supervised treatment, supervised rehabilitation, supervised behaviour management, or supervised access to support services. Tasmanian sentencing legislation includes parole, custodial sentences, drug treatment orders, community services orders, probation orders, and rehabilitation orders (*Sentencing Act 1997* [Tas]). In their reports, the Australian Institute of Criminology (2009) has defined correctional programs as including, “*corrective services includes prison custody, community corrections and juvenile detention*”.

In order to source the literature relevant to this question a combination of searches were undertaken within the SCOPUS database, SAGE journals, as well as searching extensively within the ABS, AIC and AIHW websites. These websites were selected due to their authority on issues relating to Australian crime and justice, as well as informative statistics. A complicating factor that was encountered while searching for data on rehabilitation programs is that there are dramatic inconsistencies in the operationalisation of the programs. In Australia prisons can be state operated or privately run and rehabilitation programs are often contracted out to Third Sector organisations to operate. This made sourcing the information complicated and time consuming. The results for this research question are presented in Chapter Eight.

Question 4: To what extent does the emerging research about chronic childhood maltreatment provide insights that can be translated into correctional orders and rehabilitation programs for recidivist offenders?

This question is answered in tandem to the previous question and is undertaken using critical analysis of the policy and practice documents related to Australia’s criminal justice system. Answers to this question are included as part of the conclusion in Chapter Nine.

Conclusion

This chapter has explored the philosophical assumptions that underpin the two distinct fields of natural and social science in order to provide a methodological context for

exploring the value of bridging these ideological divides, which is the overall aim of this thesis. By employing a critical interpretive approach to research synthesis, as developed by Dixon-Woods and colleagues (2006), this thesis aims to generate fresh insights and ways of understanding the long-term impact of chronic childhood maltreatment on brain development and its possible links with offending

CHAPTER FIVE:

CHILDHOOD MALTREATMENT AND CRIMINAL RECIDIVISM

Introduction

This chapter presents results from the research synthesis that examined existing research that links childhood maltreatment with offending behaviour. Of relevance is the way in which studies explain and profile chronic offending behaviour, particularly in terms of theoretical models employed and the inclusion or exclusion of the neuroscience knowledge that are discussed in Chapters Six and Seven. Seventy-six studies were included in this section of the review. The terms childhood maltreatment, recidivism and offending were used in various forms in order to elicit this data, the detailed description of which can be found in Chapter Four. To find childhood maltreatment and recidivism-specific research was very difficult as much of the research used terms such as ‘juvenile offending’, ‘delinquency’ or ‘adult offending’, which as previously noted does not differentiate between single or multiple incidents. To exclude this research in its entirety based on mere syntax was to exclude some potentially important pieces of knowledge. Therefore, whilst the thesis question aims to examine recidivism or chronic offending, the literature was not limited to this.

As stated previously, the definition of childhood trauma is very broad, and therefore the term childhood maltreatment has been used throughout this thesis to differentiate accidental and single incident trauma from chronic maltreatment, as well as to incorporate the various uses of the term within the synthesised research. In the research examined, definitions of measures and variables altered from study to study making direct comparisons difficult. Childhood maltreatment was generally defined within the research as abuse or neglect occurring before twelve years of age, however this definition tended to lack precision. Whilst 30 studies differentiated between different types of maltreatment experienced, the majority did not, instead using the blanket term of maltreatment or abuse to cover an array of experiences.

The most significant methodological difficulty in synthesising this research was the fact that much of the data was extracted from government databases, specifically child protective services and juvenile justice. Of the 76 studies examined, 41 relied on data that was extracted from official databases. This limits maltreatment data to only that which was reported and substantiated through a court. It is well documented that many maltreatment circumstances may be unsubstantiated due to a lack of evidence, often because the child is too young or too fearful to testify (see Cobley, 2006; Vieth, 2005).

The reliance on official government databases for information also generates methodological complications as a result of variances in the legislative frameworks that govern these agencies across jurisdictions, the varying timeframes within which the data was drawn from the variances in definition of abuse and neglect, as well as differing thresholds for substantiation of maltreatment. In fact O'Donnell and colleagues (2007:327) assert that data sourced from child protection agencies does not represent an accurate measure of the true prevalence of childhood maltreatment not only due to legislative differences between jurisdictions in how childhood maltreatment is defined, but also differences in the required threshold for successful substantiation in court.

In Australia the AIHW collaborates with individual state and territory child protective services to compile statistics into a database that records the numbers of notifications, investigations, substantiations, care and protection orders, and out-of-home care placements (AIHW, 2014:17). In the 2012-2013 period in Australia there were 272,980 child protection notifications of which 122,496 were investigated and just 53,666 were substantiated (AIHW, 2014:16). Notifications describe contact made to a child protection department regarding allegations of child maltreatment, neglect or harm (AIHW, 2014:17). If there is more than one notification received on an individual child relating to a single event it remains recorded as a single contact, and notifications about different events are recorded as separate notifications (AIHW, 2014:17). Notifications are also collected on individual children not family groups (AIHW, 2014:17). The term investigation describes circumstances whereby the relevant department seeks more detailed information about a notification in order to make an assessment on the risk of harm to the child (AIHW, 2014:17). The substantiation of a notification describes an instance whereby a notification was received and investigated and it was concluded that there were reasonable grounds to suspect that the child was at risk of, or had been, harmed (AIHW, 2014:17). Statistics are not recorded in cases where the perpetrator of the alleged abuse or neglect was a person other than the parent or guardian unless the parent or guardian failed to protect the child from harm (AIHW, 2014:17). This therefore excludes populations of young people who, for example, experience abuse in institutions or foster care

Bromfield and Higgins (2004) also identify limitations involved in relying on statutory child protection data to research childhood maltreatment using Australian examples. In Australia, definitions of maltreatment vary considerably between states, for example Victoria classifies neglect that causes physical harm as physical abuse, whereas Western Australia uses the blanket term 'harm' rather than abuse (Bromfield & Higgins, 2004:21). In contrast, Queensland substantiates physical, psychological or emotional harm but does not specifically define abuse or neglect (Bromfield & Higgins, 2004:21). Bromfield and

Higgins (2004:22) note many potential causes of harm for children and determining what constitutes a protective concern is highly subjective and increasingly complex, leading to inconsistencies in recording of data across and within jurisdictions. For example, the AIHW (1999) found that in situations where sexual abuse was difficult to substantiate, the substantiation of emotional abuse was often easier and therefore the case will be recorded as emotional abuse when the lived experience of the child is primarily sexual abuse. The reliability of child protection statistical data is further compromised when data from multiple jurisdictions is combined (Bromfield & Higgins, 2004:28), largely as a result of legislative differences and interpretative differences in definitions. Difficulty in defining abuse and neglect is compounded by the fact that the research synthesis was not limited by country of origin, further enhancing potential differences in definition.

It is difficult to gauge the severity and individual experiences of maltreatment from statistics in a database. Similarly, criminal justice databases records may only record convictions, meaning that there may have been a number of incidents or recidivist offences for which a criminal conviction was not secured. As will be shown in this chapter, there appears to be consistency in a link between the experiences of childhood maltreatment and later engagement in criminal behaviour. However there was considerable inconsistency within this body of research as to the explanation for this link or association. Contributing to this inconsistency are methodological differences, referred to above, and interpretive differences in the findings of the research.

Link between childhood maltreatment and criminal recidivism

As the research synthesis showed, over the last twenty years, numerous studies have correlated the experience of childhood maltreatment with engagement in criminal activity, particularly juvenile delinquency (Burton et al., 2011; Chu et al., 2009; Grogan-Kaylor & Otis, 2003; Heck & Walsh, 2000; Ireland et al., 2002; Kenny et al., 2007; Lemmon, 2006; Mersky & Topitzes, 2010, 2012; Nyamathi et al., 2012; Reckdenwal et al., 2013; Ryan, 2006; Scudder et al., 1993; Smith C & Thornberry, 1995; Stewart et al., 2005; Stewart et al., 2008). One large study in North Dakota examined substantiated versus unsubstantiated childhood abuse reports and the implications for recidivism amongst a population of 15812 juvenile subjects over a period of three years (Thompson, 2001). The study design was prospective and used three consecutive years of juvenile court records to gather information on recidivism for youths who had also been referred to court for maltreatment investigations and/or services (Thompson, 2001). The study found that adolescents who had a history of substantiated childhood abuse were 55 percent more likely to engage in criminal recidivism than those with unsubstantiated abuse (Thompson et al., 2001). Similarly, an earlier study examining data from child protection and juvenile justice in Florida found strong correlations between childhood

abuse records and delinquency referrals (Scudder et al., 1993). Children who were categorised into both the abused and delinquent group were involved in the protection system at a much younger age, with males being found to be at a greater risk of engagement in delinquent behaviour than females (Scudder et al., 1993).

Of the 76 studies reviewed, just one study overtly disagreed with the correlation between the experience of childhood maltreatment and engagement in offending behaviour. This study by Silva, Larm and colleagues (2012) concluded that child characteristics and parents' involvement in criminality were greater predictors of subsequent criminal activity than childhood maltreatment per se (Silva, Larm et al., 2012). Furthermore, they argue that parent criminality, the experience of hurtful and uncaring behaviours in childhood, and the display of conduct disorder were stronger predictors of offending in adolescence and early adulthood (Silva, Larm et al., 2012). There were however a number of limitations with this study. Firstly, presence or absence of abuse was determined based on self-reports of children aged 10 and 12 years, and was not correlated with child protection reports. This does not therefore take into consideration instances where children may be too fearful to report abuse to a stranger conducting research. Additionally, the children who scored highest for conduct problems were largely absent from the follow-up data collected at age ten and 12 years. It is also significant that the researchers note that there *“were few items assessing maltreatment, the responses were restricted in range, and no information on the duration of maltreatment was available”* (Silva, Larm et al., 2012:411).

Along similar lines, a study by Benda (2005) found that for males, reoffending was more likely for those engaged in alcohol use, carrying weapons, and associating with other criminals than the influence of childhood maltreatment, whereas females were more likely to offend if they had experienced physical and/or sexual abuse, were involved in drug use, or lived with a criminal partner (Benda, 2005). It is important to consider the impact that the selection criteria for participation in this study may have had on the outcome of results given that participants were required to be free from any mental illness or drug addiction. Participants were also first-time offenders who had opted to attend a boot camp training facility in America rather than be incarcerated.

Absent from both the above mentioned studies in the study design and data collection is reference to the impact the environment within which the child is raised can have on brain development and functioning, as well as the impact of parents' criminal behaviour may have on the appropriateness and consistency of care the child experienced during development. These factors will be discussed in greater detail in Chapters Six and Seven. Additionally by only acknowledging substantiated and often overt forms of abuse that are more likely to come to the attention of authorities and therefore appear on a child

protection system, the chronic and persistent forms of maltreatment that are likely to be experienced when parents are involved in criminal activity is overlooked.

Severity versus chronicity of maltreatment

Contradictions emerged in the literature in terms of whether severity or chronicity of maltreatment was more predictive of offending behaviour. This discrepancy largely resulted from variations in methods that were employed to investigate maltreatment, as well as data sources relied on for this information. For example, in their study using child protection data from the Florida Child Protection System, Yampolskaya and colleagues (2011) found that the chronicity of maltreatment not the severity of maltreatment was predictive of offending behaviour. Maltreatment severity was analysed using the maltreatment severity scale that was developed by Yampolskaya and Banks (2006), wherein the severity of maltreatment was calculated by ranking the severity for each type of maltreatment, ascertaining the presence or absence of a particular maltreatment type, and the combination of these types. This classification relied on a ranking system that had been previously developed by Smith B and Testa in 2002, which made the assumption that abuse is a more prominent indicator of severity than neglect or caretaker absence. Examining the study by Smith B and Testa (2002), it is unclear why their ranking system was chosen, given the ranking system was developed by the researchers to rank the risk posed by subsequent child protection notifications for infants whose first notification involved the mother's drug use during pregnancy. This raises questions about the reliability of the research tool as used in this context.

This claim that neglect or caretaker absence is not as damaging as abuse is in direct contrast to a number of other studies, which found strong links between the experience of neglect and negative developmental outcomes (Kingree et al., 2003; Lemmon, 1999; Stewart et al., 2005; Verrecchia et al., 2010; Weatherburn & Lind, 2006). The type of maltreatment was ranked on a scale of one to four, with four being the most severe and being attached to abuse, followed by neglect at three, threatened harm at two and caretaker absence at one (Yampolskaya et al., 2011). Chronicity was ranked according to the number of substantiated and unsubstantiated reports to child protective services (Yampolskaya et al., 2011). To make a judgement on the severity of maltreatment based on statistical data gleaned from a database appears to be a somewhat arbitrary categorisation, particularly the apparent assumption that all forms of abuse are worse than all types of neglect. Given the simplicity and unreliability of the ranking system it is difficult to place much weight on these findings.

In contrast to the above-mentioned findings, Stewart and colleagues (2005) conducted a substantial longitudinal study, examining every child born within the 1983 and 1984 birth

cohorts in Queensland, Australia, and who had contact with authorities for either child protection or juvenile justice authorities. The total sample was 24,305 children. Government administrative datasets were used with data being collected from 1983 until 2001 (Stewart et al., 2005). Results found 26 percent of maltreated children went on to become juvenile offenders, with more severe maltreatment being more predicative of juvenile offending (Stewart et al., 2005). The indicator of severity was identified by whether the child was removed from home (Stewart et al., 2005). Those children who were removed from home were more likely to have been persistently maltreated throughout childhood, were maltreated more frequently, and were more likely to experience multiple types of abuse (Stewart et al., 2005). The number of notifications and substantiations were robustly correlated with an increased likelihood of criminal behaviour in adolescence (Stewart et al., 2005). This could be interpreted as either more severe maltreatment due to a high number of notifications, or more chronic maltreatment, with notifications occurring over a longer period of time. The chronicity-severity nexus is therefore no clearer than with other instances in this topic of research once methodology and definitions are closely scrutinised.

An American study by Smith C and Thornberry (1995) used a five-point scale to determine symptom severity that was based on Cicchetti and Barnett's (1991) scientific nosology classification of child maltreatment. The data for Smith C and Thornberry's (1995) study was obtained from child protective services records and included only those records whose maltreatment was substantiated by authorities. Severity scores appeared more sophisticated than those used by Yampolskaya and colleagues (2011), for example, scores for physical abuse ranged from one being minor marks on the body from spanking, to five being the child being either deceased or requiring hospitalisation (Smith, C. & Thornberry, 1995). The aim of Smith C and Thornberry's (1995) study was to test the hypothesis that exposure to more extensive maltreatment would have a stronger impact on later delinquency. The study concluded that more extreme experiences of childhood maltreatment were more likely to result in increased delinquent behaviour (Smith C & Thornberry, 1995:471). The term 'extreme childhood maltreatment' is used as a measure, indicating severity rather than chronicity, however this distinction was not explicitly stated and therefore this conclusion cannot be specifically drawn.

Studies using offender population samples

Of the 76 studies examined, 40 relied primarily on offender populations as their subject population, 21 studies examined juvenile offenders, eight examined female only offenders, and four specifically examined convicted sex offenders. One study examined 79 convicted young offenders residing in a secure centre in England using information recorded in admission files and through consultation with staff (Hamilton C et al., 2002). They found

that nearly 80 percent had experienced some form of childhood maltreatment, with young people who had experienced recurrent maltreatment by different perpetrators being more likely to commit violent and/or sexual offences in adolescence (Hamilton C et al., 2002). Similar results were found in an Australian study, this time conducted using young offenders serving supervised, community-based orders (Kenny et al., 2007). The sample size was considerably larger, with 800 young offenders participating: 682 males and 118 females (Kenny et al., 2007:128). A series of psychology-based assessment tools were used, including the Childhood Trauma Questionnaire (CTQ) developed by Bernstein and Fink (1998), which is a retrospective self-reporting measure of experiences of childhood abuse and neglect. Questions focus on emotional, physical and sexual abuse, as well as emotional and physical neglect (Bernstein & Fink, 1998). Results from this study found that 72 percent of the young people had experienced some form of childhood maltreatment, with females reporting significantly more abuse that was classified in the severe range than males (Kenny et al., 2007:136).

An examination of 480 adult offenders (292 males and 188 females) serving either intensive correction or probation orders in Queensland found that the population exhibited high rates of childhood maltreatment, particularly extreme neglect, and sexual, physical and emotional abuse (Mazerolle & Legosz, 2007). Approximately two thirds of the sample population were classified as having experienced extreme neglect (Mazerolle & Legosz, 2007:ix). Also prominent were high rates of family trauma and chaotic family experiences, such as parental sexual abuse and violence (Mazerolle & Legosz, 2007:ix). These offenders were also more likely to have poor educational outcomes, have had higher rates of juvenile delinquency, and to have been involved in the juvenile justice system from a young age (Mazerolle & Legosz, 2007:x). Child sexual abuse in particular was correlated with both an increase in the amount and variety of criminal offences (Mazerolle & Legosz, 2007:x). This was particularly true for female offenders (Mazerolle & Legosz, 2007:x).

Research from Singapore examined female adolescents residing in a residential facility who were admitted either due to involvement in delinquency or for child protection reasons (Chu et al., 2009). The study found that two thirds of the subjects reported having experienced at least one type of child abuse, with around 25 percent experiencing multiple forms of abuse (Chu et al., 2009). Six and a half years subsequent to the initial interview around 20 percent had been convicted of a further criminal offence (Chu et al., 2009). Those who had experienced multiple forms of childhood maltreatment self-reported engaging in a greater number of delinquent behaviours, however this was not reflected in the official records, possibly because they were not caught (Chu et al., 2009).

A number of studies specifically examined sex offender populations. In a seven-year longitudinal study in America using a population of male adolescent sexual offenders, with data obtained from a comprehensive intake assessment form administered at a treatment facility, those who had been both sexually and physically abused or who had witnessed violence, engaged in significantly more serious non-sexual crimes (Burton et al., 2011:588). More than 60 percent of these adolescents had committed serious crimes such as theft, burglary or car theft, in addition to sexual offences, with the experience of childhood maltreatment being a significant predictor of engagement in more severe crime (Burton et al., 2011:588).

Amongst a Canadian population of 149 adult male sexual offenders, the experience of childhood physical abuse was found to be a significant predictor of later engagement in recidivist sexual offending, however sexual abuse during childhood was not predictive of later sexual recidivist offending (Dietrich et al., 2007). The research was conducted using a study population that was recruited from an Intensive Program for Sexual Offenders, which is a psychotherapeutic program for sexual offenders with severe antisocial behaviour traits (Dietrich et al., 2007:22). Data was obtained from previously administered PCL-R (Psychopathy Check List – Revised) ratings, with childhood histories obtained and coded from offender case files, and recidivism results obtained from the Royal Canadian Mounted Police files (Dietrich et al., 2007:24,25). A history of antisocial behaviours was found to be more predictive of violent offences than childhood abuse (Dietrich et al., 2007:27). However in a study by Graham and colleagues (2012) using a population sample of sex offenders who were participating in the Sexually Violent Predator Program in Tallassee, America, it was found that those who had a history of childhood maltreatment tended to display higher psychopathy scores, particularly those of impulsivity, irresponsibility, and a tendency towards boredom and the need for stimulation (Graham et al., 2012). Combining the conclusion of these two studies childhood maltreatment has been found to be more predictive of displaying antisocial behaviour, as evidenced by increased psychopathy scores, and engagement in antisocial behaviours has been found to be more predictive of engagement in violent offences.

Relying on offender populations to examine the relationship between offending and the experience of childhood maltreatment does have significant methodological implications. These studies using offender populations clearly demonstrate a greater prevalence of childhood maltreatment than would be expected in the general population, with this being particularly prominent for female offenders. In particular there is a danger that the link between childhood maltreatment and offending may be over-emphasised. A high proportion of childhood maltreatment within offender populations does not necessarily translate into the broader population. In other words, a high incidence of childhood

maltreatment among offenders does not necessarily translate that the majority of maltreated children will become offenders in the future (Widom, 1994). By relying on a study population that has already committed criminal offences the sample population is skewed and therefore any interpretation of results must be taken with caution when applying them to the general population.

Types of maltreatment

Whilst a number of studies used the blanket term maltreatment in examining its association with offending behaviour, many studies also differentiated between the types of maltreatment in an attempt to uncover links between type of maltreatment experience and greater likelihood of offending behaviour. Of the 76 studies examined, 30 studies specifically differentiated between maltreatment types. This particular area of research had the most significant number of contradictions, largely the result of differences in defining and categorising types of maltreatment, study population characteristics, and interpretative differences.

Physical abuse

The AIHW defines physical abuse as “*any non-accidental physical act inflicted upon a child by a person having care of the child*” (AIHW, 2014:132). A number of studies documented correlations between the experience of childhood physical abuse and future engagement in offending behaviour (Allwood & Widom, 2013; Baskin & Sommers, 2010; Benda, 2005; Benda et al., 2005; Burton et al., 2011; Cernkovich et al., 2008; Colman et al., 2009; Dietrich et al., 2007; Graham et al., 2012; Haapasalo & Moilanen, 2004; Klika et al., 2013; Lake, 1993; Nofziger & Kurtz, 2005; Reckdenwal et al., 2013; Spaccarelli et al., 1995; Stewart et al., 2005; Watts & McNulty, 2013). Two studies found no specific link (Grella et al., 2005; Grogan-Kaylor & Otis, 2003), however Grella and colleagues (2005) found that while physical abuse had no direct correlation to offending behaviour it was mediated by conduct disorders and engagement in substance abuse. Similarly, a study by Kenny and colleagues (2007) found that the experience of physical and emotional abuse was associated with an increased score for Conduct Disorder, which in turn had implications for offending behaviour (Kenny et al., 2007).

A longitudinal study conducted in America examined the long-term consequences of childhood maltreatment by studying 457 individuals (209 female and 248 male) from preschool in 1976, with repeated examinations in the early 1980s and 1990s, and finally in 2010 (Klika et al., 2013). The study population was recruited from various settings, including child protection caseloads (n=144 for abuse and n=105 for neglect), Head Start Programs (n=70), day care programs (n=64), and middle-income nursery programs (n=74) (Klika et al., 2013:856). Results demonstrated a significant association between the

experience of physical abuse and the early display of antisocial behaviour (Klika et al., 2013). Exhibiting early antisocial behaviours was predictive of displaying antisocial behaviours in adolescence, which in turn predicted antisocial behaviour in adulthood (Klika et al., 2013). The only moderating effect of these correlations was found to be higher IQ levels (Klika et al., 2013).

An early American study examined violence exposure experienced by 83 female offenders, with 47 women undertaking face-to-face interviews, while the remaining 36 completed self-administered questionnaires (Lake, 1993:44). The research found an association between the experience of childhood physical abuse and earlier engagement with criminal activity (Lake, 1993). For women who had experienced childhood abuse the average age of first arrest was 17.9 years, compared with non-abused age of 22.6 years (Lake, 1993:48). Women abused in childhood also committed an increased variety of crimes compared with non-maltreated women (Lake, 1993:48).

One study did not find any statistical significance in the contribution of physical and sexual abuse to adult offending, however it was acknowledged that childhood neglect was linked with adult offending (Grogan-Kaylor & Otis, 2003). This finding is somewhat anomalous given the above-mentioned research that strongly links childhood physical abuse with later offending behaviour. It is worth noting that data used for this analysis was drawn from a study by Widom published in 1989 (Widom, 1989b). Upon analysis however, it appears that the data used was collected from a metropolitan area in Midwestern America between 1967 and 1971 (Widom, 1989b). Neglect was confined to the child being deemed homeless, living in a dangerous situation, or failure to provide food, clothing, shelter or medical care (Widom, 1989b: 358). Physical abuse referred to “cruelty to children” (Widom, 1989b: 357). Sexual abuse was defined as assault and battery, fondling, touching, sodomy or incest (Widom, 1989b: 357). Data was obtained from criminal court records, thereby only containing instances of abuse where criminal charges were laid and juvenile probation records (Widom, 1989b: 361). Given the data was collected between 1967 and 1971 it is plausible to suggest that child protection practice and policy, as well as the legal procedures for child protection, are somewhat different in 2003 when this study was published and therefore findings will not be truly reflective of the current situation.

It is perhaps pertinent at this point to discuss the social construction of what constitutes child abuse and how this alters geographically and temporally, not just from a legalistic sense but also from a sociological perspective. An example of this social construction can be found in the legal prohibition of incest being enacted in Victoria in 1890, however its underlying purpose was not to protect children from abuse but to prohibit deviant sexual

behaviour (Scott, 1995:118). It was not until the 1980s that there came to be recognition among health professionals of sexual abuse in childhood, and even then it was seen to be largely the result of Oedipal fantasies (Scott, 1995:118). Dorothy Scott (1995) raises the point about recent legislation in western countries outlawing the practice of female genital mutilation that is practised among particular ethnic minorities as reflecting “*the tension between cultural relativism and moral absolutism*” (p. 120). What is seen as child abuse in one particular culture during a point in time can be equally seen as an important cultural rite in a different location at a different point in time. It is widely argued that the concept of child abuse was first recognised when paediatrician Henry Kempe published an article titled ‘The battered child syndrome’ in the Journal of the American Medical Association in 1962, which described the repeated occurrence of physical injury in young children. This is an important point because it highlights the difficulties associated with attempting comparisons between studies that are undertaken in different countries and across different periods of time.

Sexual abuse

The AIHW defines sexual abuse as

“any act by a person, having the care of the child, that exposes the child to, or involves the child in, sexual processes beyond his or her understanding or contrary to acceptable community standards” (AIHW, 2013:133).

A number of studies specifically found links between the experience of child sexual abuse and offending behaviour (Benda, 2005; Burton et al., 2005; Cernkovich et al., 2008; Conrad et al., 2013; Graham et al., 2012; Grella et al., 2005; Mazerolle & Legosz, 2007; Nyamathi et al., 2012; Reckdenwald et al., 2013; Watts & McNulty, 2013), however other studies found that childhood sexual abuse did not contribute to offending behaviour at all (Dietrich et al., 2007; Lake, 1993; Stewart et al., 2005; Widom & Ames, 1994). This particular type of maltreatment had the most notable gender disparities in the findings. Four studies that correlated the experience of childhood sexual abuse with offending behaviour used populations of women only (Benda, 2005; Benda et al., 2005; Cernkovich et al., 2008; Grella et al., 2005) and five studies examined men only (Burton et al., 2011; Dietrich et al., 2007; Graham et al., 2012; Nyamathi et al., 2012; Reckdenwald et al., 2012). Two studies specifically compared gender as a variable; Conrad and colleagues (2013) found that childhood sexual abuse predicted future offending for women but not men, whilst Watts and McNulty (2013) found the opposite results.

Very robust correlations between childhood maltreatment and criminality were found in a study population of females who had experienced childhood sexual abuse (Cernkovich et al., 2008). These females were found to be up to 334 percent more likely to engage in adult criminality, with the additional experience of physical abuse increasing this

likelihood to 605 percent (Cernkovich et al., 2008). There does appear to be gender differences in the impact of childhood sexual abuse. Conrad and colleagues (2013) examined gender differences on risk factors for recidivism using a sample population of 402 juvenile offenders. For females, sexual abuse was found to be the most significant predictor of recidivism, but this was not true for males (Conrad et al., 2013). This may be a significant finding to explain the discrepancy between studies that suggest sexual abuse is a contributing factor to criminal behaviour and those that claim the opposite. Other studies that segregated gender also found startling differences in the pathways to criminality between males and females, however results again were inconsistent. Some studies found that child sexual abuse was more predictive of later criminal activity for females than for males (Benda, 2005; Kenny et al., 2007; Roe-Sepowitz, 2009), with childhood maltreatment being more predictive of violent behaviour for women (Pollock et al., 2006). In contrast, examining the impact of childhood maltreatment and poverty on adolescent offending, it was found that for boys, the combination of maltreatment and poverty increased the risk of arrest for juvenile crime compared with maltreatment alone (Bright & Jonson-Reid, 2008). The additive nature of these risk factors was not true for females (Bright & Jonson-Reid, 2008).

Neglect

Again the contribution of childhood neglect in future offending was somewhat contradictory within the reviewed research. Eight studies found correlations between experiences of neglect and increased risk of offending behaviour. The main contributor to this inconsistency appears to be methodological differences in defining and assessing neglect, with some research specifying emotional neglect whilst others examined neglect in general. There is no universal definition of neglect, with many scholars arguing over the various subtypes of what constitutes neglect. Part of the difficulty lies in the fact that, unlike other forms of child maltreatment, neglect is not an act committed against a child but rather an omission of care (Mennen et al., 2010:648), meaning that there is not a single specific identifiable incident, but rather the cumulative effect of chronic omissions (Hildyard & Wolfe, 2002:680). As Lemmon (1999:373) highlights, “*neglect is ambiguous and often is invoked to specify any violation of normative standards of parenting*”. The AIHW defines neglect as,

“Any serious acts or omissions by a person having the care of a child that, within the bounds of cultural tradition, constitute a failure to provide conditions that are essential for the healthy physical and emotional development of a child” (AIHW, 2014:129).

A study by Verrecchia and colleagues (2010:227) examined 632 males, born in 1975 who had a low-income status and received government income assistance from birth until 18 years of age. Archival data was collected through various databases and coded for analysis

(Verrecchia et al., 2010:229). Databases included the public assistance database, child protection databases; state and country juvenile justice databases, country probation department databases; American census archives, and municipal police statistics. Supervisory neglect was isolated for this study due to its prominence as a form of childhood maltreatment, yet it was stated to be often overlooked as a variable in favour of physical or sexual abuse (Verrecchia et al., 2010:237). The study design allowed for the examination of variations of maltreatment type among maltreated populations, and in isolating the effects of supervisory neglect, found a profound correlation with chronic juvenile offending behaviour (Verrecchia et al., 2010:237).

Lemmon's (1999) American study aimed to examine the relationship between child maltreatment and its negative effect on growth and development. Maltreatment was conceptualised using 18 categories of abuse and neglect. Fifteen types of neglect being physical health care, mental health care, personal hygiene, clothing, nutrition and diet, failure to thrive, instability in living arrangements, abandonment, expulsion, shuttling (a term that was not defined in the article), education, household sanitation, physical safety in the home, supervision, and substitute child care, and three types of abuse being physical, sexual and 'mental' abuse (Lemmon, 1999). These categories were collapsed into either abuse or neglect. The information was collected from databases of juvenile justice and child and youth services. Upon isolating maltreatment factors from sociodemographic variables, Lemmon (1999:371) found 'compelling' evidence to support the negative effect of childhood maltreatment on delinquency (Lemmon, 1999:371). Maltreated youths were found to score higher in frequency, chronicity and severity of delinquent behaviour compared with non-maltreated youths (Lemmon, 1999:372). Maltreated youths were also more likely to be referred to the juvenile justice system. Of the substantiated serious offences, maltreated youths accounted for 78 percent of aggravated assault, 88 percent of sex offences, 83 percent of robberies, 86 percent of weapons offences, and 66 percent of drug offences committed by the study population (Lemmon, 1999:373). Lemmon (1999:373) highlights that neglect, and violent behaviour in particular, was a compelling contributor to delinquency. Neglect was however found to be the most prominent form of childhood maltreatment in the study population, accounting for 78 percent of maltreatment cases studied, and therefore the impact of other forms of abuse cannot be underestimated given the smaller sample size of 632 individuals (Lemmon, 1999:373).

Kingree and colleagues (2003) studied 272 adolescents who were being held in detention and found that emotional neglect was a more potent predictor of recidivism than any other form of maltreatment. Kingree and colleagues (2003) highlight that the role of childhood neglect in contributing to criminal recidivism is often overlooked given that

childhood abuse and neglect are not routinely differentiated. The influence of neglect on criminal recidivism is partly explained by Kingree and colleagues (2003) to be the result of a lack of supervision from caregivers. This does not however adequately explain their findings that emotional neglect is associated with increased recidivism whereas physical neglect was associated with decreased recidivism. Kingree and colleagues (2003) placed little weight on this finding, however if neuroscience were incorporated into understanding why emotional neglect may contribute to recidivist offending in terms of brain function this may contribute further information to this phenomenon. Three other studies found strong correlations between childhood neglect and engagement in offending behaviour (Lemmon, 1999; Stewart et al., 2005; Weatherburn & Lind, 2006). The way in which neglect was defined for these studies was not clearly stated, however Weatherburn and Lind (2006) stated neglect to include reported incidents of neglect or emotional abuse to child protective services. Similarly, Verrecchia et al. (2010) found direct links with supervisory neglect and offending behaviour.

In contrast to previously mentioned results, Burton and colleagues' (2011) seven-year longitudinal study using adolescent sexual offenders found neglect did not influence severity of engagement in criminal activity. This was theorised to be the result of neglect being a passive behaviour and therefore, according to Social Learning Theory, is less likely to lead to engagement in externalising behaviours (Burton et al., 2011:588). Given that neglect was not the focus of their study however, they admitted that further research was needed to draw these conclusions. Also important to note is the fact that the sample population was drawn from juvenile sexual offenders, which is a very specific demographic.

Family dysfunction

Family dysfunction as a specific measure was not routinely addressed within the research, although two studies did examine it as a variable. In a longitudinal study of institutionalised female offenders conducted between 1982 and 1995, it was found that physical and sexual childhood abuse were potent predictors of adult criminality (Cernkovich et al., 2008:23), however high levels of family conflict, combined with lower levels of caring and trust were found to correlate with increased criminality during adolescence (Cernkovich et al., 2008:15). Similarly, an examination of 68 juvenile offenders in Southeast Missouri, found that those who grew up with an alcoholic parent were exposed to much greater levels of family violence and abuse (Leoni & McGaha, 1995). They were then more likely to run away from home and engage in substance abuse (Leoni & McGaha, 1995), which greatly increased the risk of engagement in crime for survival. Forty-three percent of juveniles from alcoholic families scored in the highest range for childhood abuse, compared with 21 percent for juveniles from non-alcoholic

families (Leoni & McGaha, 1995). Of interest is the statistic that 97 percent of juveniles from an alcoholic home scored in the high range for self-reported delinquency, compared with 86 percent of juveniles from non-alcoholic families (Leoni & McGaha, 1995).

A Swedish study used 18083 sets of adult twins who were followed longitudinally from the age of 18 years for officially registered criminal convictions. Childhood maltreatment was obtained from retrospective self-reports in 2005 when participants were between the ages of 20 and 47 years. The study utilised twins from the Swedish Twin Registry born between 1959 and 1985. Data was gathered through questionnaires and telephone interviews. Child maltreatment histories were measured using Life Stressor Checklist – Revised (Wolf & Kimerling, 1997), which uses self-report data that required closed question responses to a series of questions regarding childhood experiences. Criminal conviction data was obtained from the Swedish Crime Register. Links were found between the experience of neglect, physical or sexual abuse and a moderate increased risk for engagement in violent offending in adulthood (Forsman & Långström, 2012). In contrast to many studies that limit research information gleaned from statistical databases, this research demonstrates the beginnings of a link between the surrounding environment within which an individual grows and genetics as a contributing factor to later violent offending. There is no mention of the contribution of neurobiology.

Foster care and placement instability

Foster care and placement instability was another variable that was analysed in a number of studies. Again there were inconsistencies with findings as to whether removal from the primary caregiver increases the risk of offending behaviour. When examining maltreated children placed in out-of-home care one study found that children who had been removed from their primary caregiver were more likely to be involved in the juvenile justice system than those who remained at home, however those who were removed at a younger age were less likely to engage in criminal behaviour than those removed when older (Yampolskaya & Chuang, 2012). Research using adult male sexual offenders found that those who had been removed from their home and placed into foster care during their childhood were more likely to engage in recidivist offending (Dietrich et al., 2007). The age of removal from home was not compared in that study. Similarly, Colman and colleagues (2009) prospectively tracked 499 girls who had been discharged from juvenile justice facilities, documenting adult arrests, convictions and incarcerations between the ages of 16 to 28 years. The study found that those categorised as high or chronic offenders as juveniles were more likely to have been placed in foster care and more likely to have experienced sexual and/or physical abuse. These results were similar to those found by Baskin and Sommers (2010) who found that the most consistent predictors of delinquency were the age of first placement out of home, with a chronologically later first placement

increasing the risk of delinquent behaviour, and placement instability (Baskin & Sommers, 2010). The authors of this research explained this as being the result of a failure of older children to adjust to changes as a result of experiencing a foreshortened sense of future which results in a focus on instant gratification and engagement in delinquent behaviour (Baskin & Sommers, 2010). It is however also plausible to hypothesise that these children were exposed to abuse and dysfunction for a longer duration than those removed at a young age. This idea correlates with findings from Yampolskaya and Chuang (2012).

Ryan and Testa (2005) examined the administrative records of juvenile justice and child protection for 18,676 children in Illinois who had received at least one substantiated report of maltreatment. They found that children who had experienced substantiated maltreatment exhibited delinquency rates 47 percent higher than for those children who had no record of childhood maltreatment (Ryan & Testa, 2005). They also found that placement instability significantly increased the risk of delinquency for males but not for females (Ryan & Testa, 2005). Ryan and Testa (2005) are however careful to acknowledge that it remains unclear as to whether it is the placement out-of-home that contributes to delinquency, or the fact that children removed from parental custody have clearly been removed as a result of a very deleterious environment. There was limited evidence that boys who had minor placement instability and boys who were not removed from home exhibited the same rate of delinquency (11 percent) however those with multiple placements exhibited a 23 percent rate of delinquency, suggesting that instability in placement rather than placement itself may be a greater contributing factor to offending behaviour. It can however also be argued that those children who experienced more severe abuse may display more difficult behaviours resulting in more placement breakdowns.

To link the removal of a child from the primary caregiver to an increased likelihood of later engagement in criminality can be somewhat misleading as it can imply that it is the removal of the child itself that causes this link. For a child to be removed from home indicates the maltreatment was considerable and the child's safety was at risk. The neurobiological implications of this, particularly in terms of brain development and function cannot be overlooked, however this aspect has not been considered as part of the research findings.

Main theories relied upon for explanation

One of the key areas of difference across the studies reviewed for this research synthesis was the theoretical framework employed by the researchers. The theoretical positioning of these studies spans the spectrum of individual-societal explanations for action. Of the 80 studies examined, 27 were from criminology, 24 were from either psychiatry or

psychology, 23 were from the social sciences, four were from medicine, and just two were from neuroscience. Not all studies specified a theoretical framework for their research. Prominent theories used include ecological theory, the cycle of violence hypothesis, social control theory, general strain theory, social disintegration theory, as well as behavioural and psychoanalytic theories. What is clearly absent however is the incorporation of neurobiological theories to explain results.

Behavioural theories

A number of studies mentioned the term ‘externalising behaviour’ or ‘impulsivity’ when discussing contributions toward criminal behaviour. Instead of examining biological or functional reasons behind this, the term ‘impulsivity’ has instead been used as an explanation in and of itself for why individuals engage in criminal or antisocial behaviour. In other words, the studies rely on individual pathology as an explanatory cause rather than going beyond this to determine the explanation for impulsivity in the first place. For example, in a retrospective study of adolescents placed in a juvenile detention facility, the impact of abusive parenting on adolescent criminal behaviour were explained by analysing the way in which the individual converted and expressed shame, either through internalisation or externalisation (Gold et al., 2011). The study concluded that adolescents who demonstrated a high level of expressed shame and less blaming of others were less likely to engage in violent delinquency (Gold et al., 2011). Whilst this may have relevance in the discipline of psychology, it is noteworthy that the neurobiological influence on brain development and function and its contribution to engagement in violent delinquency is crucially overlooked.

In another example, Root and colleagues (2008) examined data obtained from a structured assessment protocol that was administered to the carers of 205 young people aged between four and seventeen years who had been referred to the Arson Fire Prevention Program for Children in Canada. The experience of childhood maltreatment was found to be a risk factor for a more serious course of fire setting behaviour, including more frequent fire involvement, and greater versatility of ignition sources and targets. This was explained by these young people having heightened emotional and behavioural difficulties, particularly a vulnerability towards having difficulties regulating negative affect such as anger (Root et al., 2008:172). Difficulties were also noted in internalising and externalising behaviours, with externalising behaviour in particular leading to increases in fire lighting behaviour (Root et al., 2008:172).

Internalising/externalising behaviour was also used as an explanatory model in two studies by Topitzes and colleagues (2011, 2012), which examined the associations between childhood maltreatment and violent offending in adulthood. The demonstration

of externalising behaviour was stated to fully mediate the maltreatment-violence nexus for males, and partially mediated it for females, however internalising behaviour was stated to be a protective factor for females (Topitzes et al., 2012). Similarly, Kimonis and colleagues (2010) also use personality traits of internalising/externalising behaviour to explain the relationship between chronic childhood maltreatment and lifetime criminal behaviour. In contrast, research by Silva, Graña and colleagues (2014) using juvenile offenders, found that severe physical abuse had no correlation between displays of internalising or externalising behaviour linked with criminality, however emotional abuse was correlated with internalising/externalising behaviour expression (Silva, Graña et al., 2014).

Three studies specifically discussed behavioural links with maltreatment and offending behaviour. De Sanctis and colleagues (2012) examined adolescents who had been diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) over a three year period and found that moderate to severe childhood maltreatment lead to a greater risk of criminal activity, and when this occurred in correlation with diagnosed conduct disorder, criminal activity was more likely to be recidivistic. Maltreated ADHD youth were three and a half times more likely to be arrested than other ADHD youth who had not experienced childhood maltreatment (De Sanctis et al., 2012). Maltreatment was therefore found to be a robust and established risk factor for criminality and engagement in antisocial behaviour among individuals diagnosed with ADHD (De Sanctis et al., 2012). Similar results were found by Yampolskaya and Chuang (2012), with maltreated children with diagnosed ADHD being twice as likely to enter a juvenile justice facility, and children with oppositional defiance disorder (ODD) being five times more likely. Examining female adult offenders who had been referred to a treatment and employment program, Grella and colleagues (2005) found direct relationships between the experience of childhood traumatic events and the display of greater adolescent conduct problems and substance abuse. Adolescent conduct problems in turn were predicative of adult criminal behaviour (Grella et al., 2005). Again, there is no reference to neuroscientific knowledge in these explanations. As will be discussed in Chapter Six, an understanding of the way in which the stress response system and neuroendocrine system is altered from exposure to chronic stress demonstrates that children constantly exposed to threats throughout childhood will develop hypersensitive responses to external stimuli – a hypervigilant state that is a necessary adaption to survive a violent or chaotic environment (Perry, 1997:129). Perry (1997:129) argues that this hypervigilant state can often mistakenly result in children being diagnosed with ADHD (Perry, 1997:129).

A slightly different classification was used in Stouthamer-Loeber and colleagues' (2001) behavioural explanation of the link between childhood maltreatment and delinquency.

They described three pathways to criminality: authority conflict, resulting from stubborn behaviour, defiance, and authority avoidance; the overt pathway, which emerges from minor aggression to physical fighting and serious violence; and finally the covert pathway, which is said to emerge from minor covert behaviour, to property damage and moderate delinquency, and then to more serious delinquency, such as theft (Stouthamer-Loeber et al., 2001:943). The study then linked these behaviours with child protection reports, finding that all victims of childhood maltreatment displayed elements of all three pathways, however those expressing authority conflict were more likely to exhibit this prior to contact with child protective services (Stouthamer-Loeber et al., 2001:952). It would however be remiss to extrapolate from these results that it was the child's behaviour that caused contact with child protective services, particularly given that data was solely collected from agency databases and thus involving the assessments by professionals. It may be that the abuse experienced by these boys was more covert and was delayed in being brought to the attention of authorities.

It is unclear how this behaviourally driven explanatory justification of research findings contributes to the knowledge of exactly *why* childhood maltreatment is correlated with offending behaviour, nor does it do much to advance the knowledge of *why* these behaviour traits may occur. More importantly, it does little to provide any useful information about how this knowledge can alter projected outcomes for this population. To do this successfully I argue that research would have to delve deeper into understanding the contributions of neurobiology to behaviour – a road down which much of the psychology, criminology and social work research seems reluctant to travel.

Cycle of violence hypothesis

The cycle of violence hypothesis was another theory that was used to explain results. The cycle of violence hypothesis argues that individuals learn to victimise others through the experience of victimisation themselves (Reckdenwal et al., 2013:476). Hosser and colleagues (2007), in their examination of 1527 incarcerated young men in Germany, concluded that the experience of childhood maltreatment was associated with early aggressiveness in childhood. The overall findings of the study are somewhat ambiguous, with the authors acknowledging the somewhat contradictory nature of the results (Hosser et al., 2007:330). In part this ambiguity may stem from the quantitative use of aggregating results without providing robust explanatory detail. Overall, it is concluded that childhood maltreatment doubles the risk for experiencing violent victimisation during adolescence, which in turn heightens the risk for later engagement in violent offending (Hosser et al., 2007). Individuals who experience more chronic and cumulative childhood maltreatment and violent victimisation however were said to have a greater propensity towards engagement in casual offending as opposed to frequent offending (Hosser et al.,

2007:330). Regardless of this ambiguity the study recognised, from prior research of Greenwald (2002), that childhood maltreatment likely results in an affective cognitive response pattern characterised by a heightened sensitivity to perceived danger and a hostile attribution bias (Hosser et al., 2007:329). As will be discussed in Chapter Six of this thesis, this theory is confirmed by neuroscience data (see Bufkin & Luttrell, 2005; Dannowski et al., 2012; Perry, 1997, 2006; Perry & Pollard, 1998; Pollak, Vardi et al., 2005; Pollak & Kistler, 2002; Pollak & Tolley-Schell, 2003; Liu J et al., 2012; Toth et al., 2011). This particular study by Hosser and colleagues (2007) makes no reference to this neuroscience data. Thus, once again whilst the influence of neurobiological systems in behavioural alterations is apparent, the research fails to acknowledge its contribution.

In their examination of the impact of the cycle of violence, De Lisi and colleagues (2010) used the cycle of violence hypothesis as described by Widom (1989), which states that early child victimisation is correlated with delinquency, adult criminality and violent criminal behaviour. They found that among juvenile offenders with greater exposure to traumatic events there was an increased level of sexual misconduct, suicidal activity and total misconduct reviewed by the parole board. Again, whether exposure to maltreatment is defined as severity or chronicity is unclear. Using the cycle of violence hypothesis early violent victimisation was linked with increased incidence of interpersonal conflict (De Lisi et al., 2010). Once again however, the neurobiological explanation for this was notably absent.

Psychoanalytic explanations

Another reference point is psychoanalytic theories. Spidel and colleagues (2010) draw on work by Morrison, Frame and Larkin (2003) in their hypothesis that the link between childhood maltreatment and violent behaviour is due to a feeling of vulnerability and perception of the world as being dangerous. Morrison and colleagues (2003) use an interpretive approach to understand the relationship between trauma and psychosis, claiming, “*traumatic experiences contribute to the development of faulty self and social knowledge and the (potentially psychotic) nature of interpretations of intrusions*” (p.344). Whilst this purely psychoanalytical explanation holds a certain degree of logic, it ignores the underlying causes and again the neurobiological explanations are omitted.

Sociological theories

In their research into female juvenile recidivist offenders, Cernkovich and colleagues (2008:6) relied on social control theory and general strain theory to guide them conceptually. Social control theory emerged from seminal work by Hirschi (1969) and assumes that young individuals who engage in antisocial behaviour do so because they are ‘unbonded’ to caregivers, institutions and prosocial activities. Cernkovich and colleagues

(2008:7) argue that this conception of social bonding theory is a useful tool in order to understand female antisocial behaviour. General strain theory identifies three categories of strain that produce antisocial behaviour: failure to achieve positive goals, loss of positive goals, and the presentation of noxious stimuli (Cernkovich et al., 2008:8). General Strain Theory suggests that “*exposure to noxious stimuli, such as abuse, can lead to antisocial adaptations to the strain caused by that abuse*” (Cernkovich et al., 2008:23). Similarly, in explaining the robust link found between childhood physical and sexual abuse and adolescent offending, Watts and McNulty (2013) used General Strain Theory as a useful explanatory framework, arguing that the link occurred through depressive symptoms, low self-control, affiliation with deviant peers, and poor attachment to the mother resulting in offending behaviour.

Weatherburn and Lind (2006) examine social disorganisation theory as a unit of analysis in their efforts to explain the link between levels of child neglect and increased rates of crime in particular neighbourhoods. Social disorganisation theory argues that structural variables influence crime by reducing the level of informal social control in an area (Weatherburn & Lind, 2006:384). Weatherburn and Lind (2006) then compare social disintegration theory with developmental theory and describe an expanded form of developmental theory to explain their findings. Both theories imply that a reduction in crime rates will be assisted by a reduction in poverty levels, and a strengthening of neighbourhood and community bonds (Weatherburn & Lind, 2006:395). Social disorganisation theory argues that incentives for offending are created by factors such as poverty, family resources and more social cohesion (Weatherburn & Lind, 2006:395). In contrast, expanded developmental theory argues that poverty, family disintegration, and geographic mobility have a corrosive effect on parenting, and to mitigate this requires programs to reduce social isolation, strengthen parenting skills and improve parenting support (Weatherburn & Lind, 2006:395).

Bronfenbrenner’s (1977,1979) ecosystems theory states that personality development emerges from the influence of two distinct systemic influences: the child’s direct and indirect environment, and the macrosystem that affects society as a whole (Bronfenbrenner, 1977,1979). Verrecchia and colleagues (2010:238) argue that there is a relational link between maltreatment and delinquency in the context of multiple ecological risks. They hypothesised that four maltreatment dimensions (supervisory neglect, age of onset of maltreatment, recurrence of maltreatment, and severity of maltreatment) will interact with familial functioning and environmental risks to impact on persistent youth offending (Verrecchia et al., 2010:227). While the application of the ecosystems perspective does go some way to addressing interdisciplinary explanations that are so often absent in this research, once again the avoidance of neurobiological systems

and their impact on offending behaviour is starkly missing. Whilst these theories go some way to addressing the multisystemic impact of many factors on human development, again the usefulness of neurobiological research is absent from explanations of the causal link between childhood maltreatment and offending behaviour.

Neurobiology

Neuroscience knowledge provides a crucial body of scientific data that contributes to general strain theory to explain criminal behaviour. A lack of education also links in with increased employment opportunities, which in turn correlates with reduced recidivism rates (Tripodi, Kim & Bender, 2010). Neurobiological findings provide empirical evidence supporting literature from both social work and criminology fields that has equated poor educational attainment with greater risk of engagement in criminal activity (see AIC, 2014:79; Buonanno & Leonida, 2006; Groot & van den Brink, 2010:288; Lochner & Moretti, 2004:183). Similarly, attachment to social institutions, such as education, is critical for integration into society, with these institutions serving as socialising agents and control mechanisms (Thomas S & Shihadeh, 2013:1176). Neuroscientific knowledge of brain development and function provides empirical evidence for previously acknowledged phenomena that have linked the experience of childhood maltreatment and engagement in criminal activity.

From the meta-analysis conducted into the links between childhood maltreatment and recidivist offending, only two studies specifically examined the neurobiological impact of childhood maltreatment in its contribution to criminal recidivism (Brewer-Smyth et al., 2004; Heide & Solomon, 2009). A case study analysis reviewing female juveniles involved in homicide argued that current theories explaining juvenile homicide fail to acknowledge recent scientific findings into the biological effects of childhood maltreatment, particularly on brain development (Heide & Solomon, 2009). The authors argue that traditional rehabilitative therapies fail to target the physiological hyperarousal that continues to result in maladaptive behavioural responses (Heide & Solomon, 2009). The second study examined whether physical and emotional traumas contribute to neurologic and neuroendocrine abnormalities that are associated with violent behaviour (Brewer-Smyth et al., 2004). Examining 113 female offenders, 95 percent were found to have neurologic abnormalities predating their crime (Brewer-Smyth et al., 2004). These neurologic abnormalities were however thought to be largely the result of traumatic brain injuries (with 42 percent of all subjects reporting at least one traumatic brain injury that involved a loss of consciousness), which is different to the brain development abnormalities being discussed in this thesis. Their examination of morning cortisol levels however found on average that the female offenders had low basal morning cortisol levels compared with the average in the general population (Brewer-Smyth et al., 2004).

Overall the explanatory theories that are evident in the research linking childhood maltreatment and offending behaviour range from individual pathology using behavioural and psychoanalytical theories to explain the links, to wider societal influences including General Strain Theory and social disorganisation theory that examine structural contributors, such as poor education, poverty or a lack of social cohesion, in contributing to links between childhood maltreatment and offending behaviour.

Conclusion

Whilst there appears to be general consistency in the link between the experience of childhood maltreatment and later engagement in criminal behaviour, there was considerable inconsistency within this research as to the explanations for this link. Contributing to this inconsistency are methodological and interpretive differences in the findings of the research, making comparison and synthesis of the research difficult. At times sifting through this data for patterns and connections felt more like apophrenia: *“the false detection of patterns or causal connections”* (De Young, Grazioplene & Peterson, 2012:63).

Overwhelmingly the majority of research did support the hypothesis that the experience of childhood maltreatment does significantly increase the risk of engagement in offending behaviour. Explanations for the way in which childhood maltreatment contributes to this behaviour is however much less clear. Almost all the research reviewed relied on psychological or sociological theories when attempting to explain this link, with just two studies mentioning possible neurobiological influences. The paucity of research that acknowledges neurobiological knowledge of the impact of childhood maltreatment on criminal activity is apparent and indicates a lag with the neuroscience knowledge, particularly as this knowledge began to emerge in the early 1990s. As discussed in Chapter Two, criminology and social work fields have been weak in incorporating interdisciplinary research, particularly to the exclusion of biological sciences (Bufkin & Luttrell, 2005:184; Wright J et al., 2008:330; Wright J & Cullen, 2012:248).

This chapter has highlighted the distinct difficulties associated with this particular field of research that have largely emerged from methodological and interpretive differences within the research designs. Could neuroscience in fact be the unifying factor that can transform the analysis of these results from apophrenia to epiphany? For example, adding understandings from neuroscience regarding the impact of childhood maltreatment on learning and cognition to Barn and Tan’s (2012) General Strain Theory explanation of criminal behaviour resulting from school exclusion, unemployment and placement instability, were significant contributors to engagement in criminal behaviour for foster care youth, suddenly the overall picture comes into focus. Without a multisystemic and

interdisciplinary approach to understanding why the experience of childhood maltreatment contributes to offending behaviour, explanations remain ambiguous and contradictory, despite the underlying findings agreeing on the relationship.

Central to this thesis is the exploration of what neuroscience knowledge can offer to understanding the link between the experience of chronic childhood maltreatment and engagement in recidivist offending later in life. This chapter has demonstrated the obvious link that has been made between these phenomena in the research reviewed; however, what is also clear is that there is a limited consensus as to what underlying causes contribute to this increased risk. The review reported upon in this chapter highlights the gap in explanatory understanding within social work and criminology for understanding the increased risk of recidivist offending for individuals who have experienced chronic childhood maltreatment. The next two chapters will explore the neuroscience knowledge that was gathered as part of the systematic review that examined the impact of chronic childhood maltreatment on brain structure and function.

CHAPTER SIX:

THE IMPACT OF CHRONIC CHILDHOOD MALTREATMENT ON THE STRUCTURE OF THE DEVELOPING BRAIN

“The human brain exists in its mature form only as a by-product of genetic potential and environmental history”

Perry, Pollard, Blakely, Baker and Vigilante, 1995, p. 275

Introduction

Central to this thesis is the exploration of existing neuroscience research into the impact of chronic childhood maltreatment on the developing brain. Much of this work began to emerge in the 1990s through the work of neuroscientists such as Bruce Perry, Martin Teicher, Dante Cicchetti, Michael De Bellis, Seth Pollak, and James Bremner. The mere possibility of human behaviour results from a sophisticated series of sensory receptors within a highly plasticised brain that is able to understand and discriminate an unquantifiable number of events occurring in the surrounding environment (Kandel et al., 2000:19). Advances in sophisticated imaging technology have allowed scientists to view the brain in action, when previously knowledge was limited to that which could be gleaned from autopsy (Blakemore, 2012:397). Scientists are only just beginning to uncover some of the secrets of the way our brains develop and function, and from this is emerging an understanding of the pernicious and long-term impact chronic childhood maltreatment can have on the brain. As advances in medical technology allow for greater insight into the complex workings of the brain, neuroscience research too has become increasingly specialised and is now comprised of various specialty areas, including molecular biology, neurochemistry, neurophysiology, neuroanatomy, computational neurology, embryology and cell biology (Pickersgill, 2013:324).

As discussed in Chapter Two, there is not a strong tradition of social work embracing biological explanations of behaviour and emotion, instead placing greater value on paradigms that view human behaviour as a result of socialisation and culture, thereby emphasising the uniqueness of individual experience (Bartlett, 1970) as opposed to normative positions offered by empirical science. It is therefore important to state that this current research does not seek to replicate the individualistic project by blaming individual pathology, nor does it intend to promote biological reductionism at the expense of societal, structural and cultural influences on behaviour. Instead this thesis seeks to present an interdisciplinary analysis of the problem in an attempt to provide a more

comprehensive understanding of the potential impact of chronic childhood maltreatment on brain development and function as a contributor to future criminal recidivism. In order to do this a systematic analysis of research data that examines the physiological and functional effects of chronic childhood maltreatment on the developing brain forms an important conceptual foundation from which a more comprehensive analysis of how this knowledge interacts with social policy and practices, specifically within the judicial system, can then be undertaken.

The following two chapters report on results from the first systematic review which focused on the impact of chronic childhood maltreatment on the structure and function of the developing brain. With such an extensive amount of research within which to delve, these chapters will not exhaustively document every piece of research that has been undertaken on this topic. Rather, they will focus on studies that provide the contextual foundation for the potential long-term impact of chronic childhood maltreatment on brain development in order to generate greater understanding of whether this experience contributes to a greater risk for involvement in criminal recidivism. From there the intention, as noted above, is to seek a better understanding of the ways in which Australia's justice system can better accommodate these insights to provide more optimal rehabilitation outcomes in the correctional system.

This particular chapter will focus on research that describes actual physical changes to the developing brain as a result of chronic childhood maltreatment that has been documented in primary research. As comprehensively outlined in the previous chapter, the search strategy employed to source the literature combined database searches and journal-specific searches, as well as accumulating sources from within the studies themselves. This process generated 93 articles documenting studies that have specifically sought to explore the ways in which chronic childhood maltreatment impacts of brain development. As was discussed in Chapter One, the definition of childhood trauma is extremely broad, often including accidental and single incident trauma, as well as emotional, physical and sexual abuse. The term chronic childhood maltreatment has therefore been used in an attempt to differentiate accidental and single incident trauma from chronic maltreatment and to incorporate the various forms of child abuse, including emotional, physical, sexual abuse and neglect. An overview of basic concepts in brain anatomy and development is presented in Appendix C. The tone of the chapter will be descriptive in order to present the major themes of the systematic review, however at the end of each section I will provide an analysis of how these findings are relevant to the thesis topic. I begin with an overview of developments in neuroscience technology and the significance of brain development, as background for the material presented in this chapter.

Neuroscience technology

The research question explored in the systematic review is in what ways chronic childhood maltreatment impacts on the physiology and functioning of the developing brain. Neuroscience technology has advanced to the point where there are now a variety of non-invasive functional imaging techniques that can be used to study the human brain. The research presented in Chapters Five and Six relies heavily on the use of these imaging technologies. These can essentially be divided into two classifications: techniques that measure the electrical activity of neuronal firing, including electroencephalography (EEG); and those that record neuronal activity by measuring increases in blood flow and metabolic activity, including positron emission tomography (PET) and functional magnetic resonance imaging (*fMRI*) (Bunge & Kahn, 2009:1063). There are advantages and disadvantages to using either technique. For example, as Bunge and Kahn (2009:1065) explain, techniques that measure electrical activity have better temporal resolution in response to changes in neural activity, but poorer spatial resolution, making it difficult to ascertain precisely the origin of the signal.

The ability to scan the brain in three-dimensional images emerged in the 1970s and 1980s with the development of computerised axial tomography (CAT) and magnetic resonance imaging (MRI) (Kandel et al., 2000:366). Both techniques produce static three-dimensional images, however CAT scans detect brain areas that vary in density and use mathematical techniques to reconstruct the three-dimensional image while MRI generates a more detailed anatomical image of the brain through the application of strong magnetic fields and radio waves to brain tissue (Fulham, 2004:459; Kandel et al., 2000:366). Because different brain structures possess different protons in the presence of a magnetic field the protons will resonate differently upon application of a radio frequency (Kandel et al., 2000:366). A further advancement of the MRI machine is the functional MRI (*fMRI*). *fMRI* is a radiographic technique that is used to scan brain activity, and works by detecting changes in blood flow and increases in cell activity (“functional Magnetic Resonance Imaging”, 2009). *fMRI* can therefore be used to measure blood oxygen levels during either sensory stimulation or a task that produces specific neural activity (Dhawan, 2011:129). Similarly, positron emission tomography (PET) measures the changes in blood flow and metabolism within the brain during functional activities, such as reading or writing, by detecting tissue concentration of a radioisotope tracer that is injected into the subject (Fulham, 2004:461; Kandel et al., 2000:13). This technology is therefore very useful in determining the functional workings of areas of the brain whilst undertaking particular tasks and is arguably one of the distinctive factors that have made neuroscientific brain research possible.

The research question explored in the systematic review is in what ways chronic childhood maltreatment impacts on the physiology and functioning of the developing brain, as mentioned above. Because of this the research presented in Chapters Five and Six relies heavily on the use of these imaging technologies.

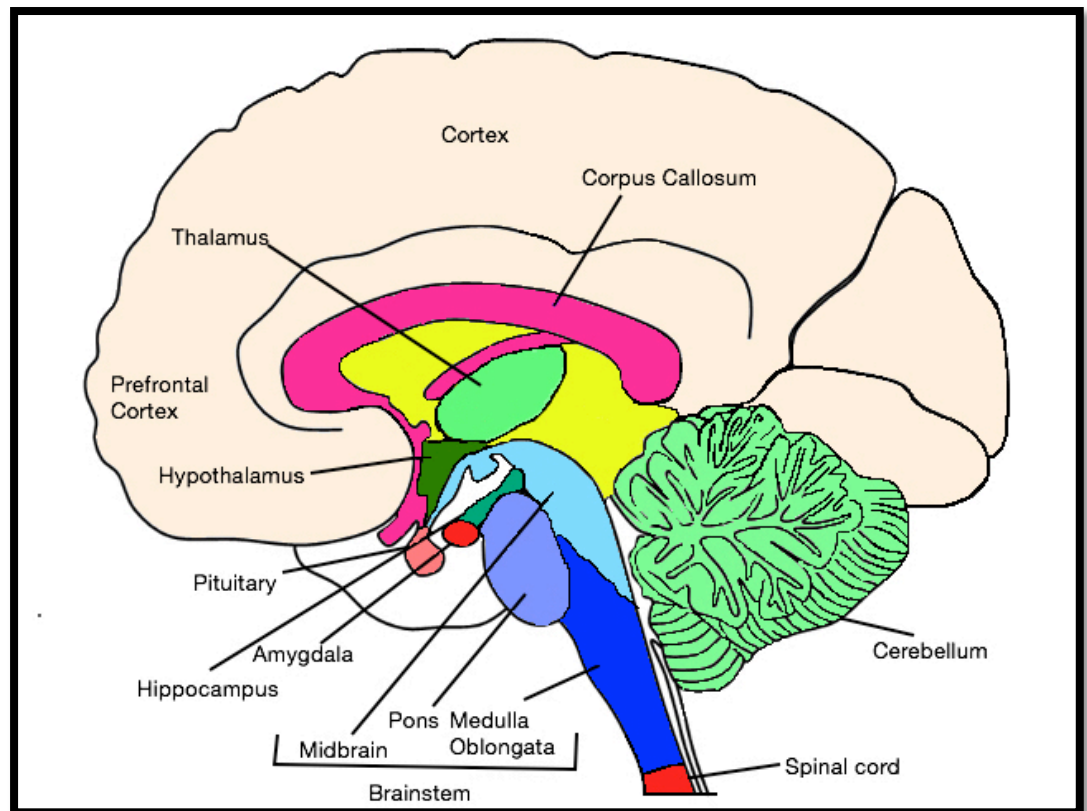


Figure 1 Basic anatomy of the brain

Significance of brain development

As advances in technology allow for greater understanding of how the brain works, the impact of the surrounding environment on brain development is now understood to significantly influence later-life brain structure and function, meaning that the brain develops from a constant interplay between genetic potential and environmental influence (Perry, 2002:80; Weber & Reynolds, 2004). One of the most ancient philosophical debates, the nature versus nurture debate, has now transformed into an examination of the way in which the surrounding environment modulates gene expression (Wright L & Perrot, 2013:1). In fact, Perry (2005:n.p.) asserts that *“during the first four years of life, a child’s rapidly developing brain organizes to reflect the child’s (surrounding) environment”*. This is in part because synaptic connections between neurons increase and strengthen with repetition, but also decrease and die with disuse (Perry, 2005:n.p.). The expression of genetic potential is therefore directly dependent on experience (Perry, 2005:n.p.).

It is now well established that the brain develops in a sequential fashion, beginning in the third week of gestation in the lower more regulatory regions, and continuing at least into early adulthood for the higher, cognitive functioning areas of the cortex (Painter & Scannapieco, 2013:277; Perry, 2009:241; Perry, 1997:126; Stiles & Jernigan, 2010:328; Weber & Reynolds, 2004:117). Prenatal brain development establishes the major components of the nervous system, including the spinal cord, hindbrain and cortical structures (Stiles & Jernigan, 2010:343). The lower brain regions of the brainstem and diencephalon also develop in-utero to be fully functioning at birth to control basic life-support activities such as breathing, heart rate and blood pressure (Farmer R, 2009:89; Gaskill & Perry, 2012:31). The organisation of the neocortex, which is responsible for higher order cognition and interpretation, occurs over a protracted period of development through to adulthood and requires many different forms of input from both within the brain and from the external environment (Stiles & Jernigan, 2010:343).

The most crucial years of brain development occur between birth and six years of age, whereby an infant's brain being approximately a quarter the size of an adult brain at birth, will reach 95 per cent of an adult size by six years of age (Fair & Schlaggar, 2008:218). Optimal brain development is achieved through consistent, stimulating and predictable environments that incorporate multiple relational interactions (Perry 1995; Perry 2005). Whilst short intermittent experiences of stress during early development are necessary for the development of adaptive coping mechanisms, prolonged stress exposure as a result of chaotic and unpredictable environments, abusive caregiving, persistent fear or threatening experiences, or impoverished stimulation and care can result in disrupted brain organisation and adverse brain development (Perry, 1995; Perry, 2005; Perry, 2009; Weber & Reynolds, 2004). The centrality of experiences on early brain development highlights why chronic childhood maltreatment can have such a profound and long-lasting impact over the lifecourse.

The sequential nature of brain development means that there are critical periods of development where particular areas of the brain are most sensitive to certain experiences (Gaskill & Perry, 2012:35). Disrupted development from critical cues can result from either a lack of sensory experiences during critical periods of development (neglect), or extreme experiences resulting in abnormal patterns of neuronal activation (the effects of maltreatment) (Perry, 1995:276). Additionally, younger children also have fewer defensive capabilities and have not yet developed the reasoning and cognitive abilities, which develop as the neocortex matures, that are necessary in being able to adapt to stressful stimuli (Perry, 1997:130).

A key theme in the research reviewed, and which I explore more fully below, is the consistent finding that whilst trauma experienced as an adult can result in hippocampal atrophy (Sapolsky, 2000), trauma and maltreatment experiences during early developmental years can disrupt the development and entire organisation of the brain resulting in extreme or abnormal patterns of neural development and neurohormonal activity (Anda, 2006; De Bellis, Keshavan, Spencer et al., 2000; De Bellis, Keshavan, Shifflett et al., 2002; De Bellis & Keshavan, 2003; Frodl et al., 2010; Perry, 2009:241; Schore, 1996). Perry (1997:128) argues that children are in fact potentially more vulnerable to the experience of chronic stress and trauma due to the immaturity of brain organisation. Extrapolating on this, Perry argues that if the primitive brain areas develop in a dysregulated or asynchronous manner as a result of early childhood maltreatment, the higher brain areas will also organise to reflect these abnormal patterns, manifesting in malorganisation and compromised brain function in areas such as empathy, attachment and affect regulation (Perry, 1995:276; Perry, 1997:128; Perry, 2009:242).

It is the primitive, regulatory areas of the brainstem and diencephalon where much of the sensory input is initially processed external of conscious awareness (Gaskill & Perry, 2012:33). The signals from these areas of the brain automatically stimulating hormonal secretions and activating higher brain regions (Gaskill & Perry, 2012:33). This is an important point because the dominance of this instinctual part of the brain highlights the limitations of the individual to consciously control cognition and emotion (Gaskill & Perry, 2012:34). When a potential threat is identified, the primitive areas of the brain initiate a cascade of patterned neuronal activity, with these signals moving up to higher cortical areas of the brain for interpretation (Perry, 2006:32). Perry (2009:243) therefore argues that a child who presents as overanxious, impulsive or dysregulated may have difficulties in benefitting from educational programs that target higher cognitive functions, such as social skills, self-esteem, or reading, due to the abnormal organisation of the lower regulatory brain areas impacting on the ability to engage in higher cognitive functioning.

A further important concept in contemporary understandings of brain development is the recognition that the brain develops through a complex interplay between three different neural processes: gene-driven, experience expectant, and experience dependent (Black et al., 1998; Greenough et al., 1987:539). Gene-driven processes are somewhat innate and occur independent of individual experience (Black et al., 1998). Experience-expectant processes describe brain development that is common to all humans, and require expected postnatal experiences to occur during a critical time window in order to develop appropriate patterns of neocortical organisation (Greenough et al., 1987:539; Stiles & Jernigan, 2010:344). On the other hand, experience-dependent processes are uniquely

individual to what the child experiences (Black et al., 1998). The quantity, pattern and nature of neural activation are influenced by sensory experiences, with neural systems organising and responding according to these experiences (Perry, 2009:243; Weber & Reynolds, 2004:117).

Much research has been done in the field of experience-expectant and experience-dependent brain development through the manipulation of sensory input via enrichment and deprivation (Stiles & Jernigan, 2010:344). For example, seminal research undertaken by Hubel and Wiesel (1977) found that visual deprivation during the early post-natal period of development in cats significantly altered the organisational patterns of the primary visual cortex in such a way as to prevent the development of brain areas that receive input from both eyes, thereby preventing the ability for binocular vision (the use of two eyes) to occur. In contrast, the provision of environmental enrichment during this period demonstrated an increase in the density of cortical synapses, brain support cells, and the brain vascular system (Stiles & Jernigan, 2010:344). It is the experience-expectant and experience-dependent processes on which this thesis is most focused as it is these processes that will impact most significantly on the way in which chronic childhood maltreatment can directly influence brain development and function. I now turn to comprehensively present the findings of the systematic review.

A generalised impact of chronic childhood maltreatment on brain development

One of the most prominent ongoing studies into potential long-term effects of chronic childhood maltreatment is the Adverse Childhood Experiences (ACE) Study that is being conducted in America. This quantitative study uses extensive data from a large ongoing study conducted by a collaboration between the United States Centers for Disease Control and Prevention and the Kaiser Permanente's San Diego Health Appraisal Center, which is a private hospital that undertakes more than 45,000 standardised examinations each year (Felitti et al., 1998:246). The initial phase of the ACE research used data gathered between 1995 and 1997 and involved an examination of a collection of experiences that were named 'Adverse Childhood Experiences' from a population of 17,337 individuals who voluntarily participated in screening studies through the Health Appraisal Center. The study focused particularly on the long-term effects of chronic childhood maltreatment on the developing brain (Anda et al., 2006). The ACE questionnaire was the primary analysis tool used, grading participant answers to form an overall ACE score. The study was constructed by combining questions relating to the experience of adverse childhood experiences that were adapted from previously validated questionnaires (Felitti, Anda, Nordenberg et al., 1998:248). These questionnaires included questions from the Conflicts Tactics Scale (Straus and Gelles, 1990) to define

psychological and physical abuse, the multi-stage stratified probability study into experiences of childhood sexual abuse by Wyatt (1985), the 1988 National Health Interview Survey (National Centre for Health Statistics, 1991) were used to determine exposure to drug and alcohol abuse during childhood, and questions about health-related behaviours and problems were generated from the Behavioral Risk Factor Survey (Siegel, Frazier, Mariolis, Brackbill and Smith, 1993) and the Third National Health and Nutrition Examination Survey (Crespo, Keteyian, Heath and Sempos, 1996). Finally evidence of depression was gathered through the adaptation of questions from the Diagnostic Interview Schedule of the National Institute of Mental Health (Robins, Helzer, Grougham and Ratliff, 1981).

Adverse Childhood Experiences included in the study were emotional, sexual and physical abuse, as well as household dysfunction, including drug abuse, mental health and family violence (Anda et al., 2006). Respondents were defined as being exposed if they answered yes to one or more questions (Felitti, Anda et al., 1998:248). The Statistical Analysis System was used to analyse the data in addition to the use of logistic regression analysis in order to adjust for potential confounding effects of age, sex, race, and educational attainment on the relationship between adverse childhood exposures and health problems (Felitti, Anda et al., 1998:249). Despite the rigour of the study design, the data is reliant on retrospective self-reports from participants (Felitti, Anda et al., 1998:251). Not only can self-reports result in over- or under-representation of ACEs or disease conditions, but the authors of the study acknowledge that attitudes and perceptions towards health and health care may be influenced by the experience of ACE, including sensitivity to internal sensations or physiologic functioning in the brain and neurotransmitter systems (Felitti, Anda et al., 1998:251).

Results from this study found conclusively that cumulative exposure to stress during childhood development results in impairments in multiple brain structures and functions as well as a number of other adverse health outcomes, including, increased smoking, alcohol and other drug taking, increased obesity, increased somatic disorders and sleep problems, impaired memory, engagement in risky sexual behaviours, as well as increased risk for depression, anxiety, panic attacks and hallucinations (Anda et al., 2006). Research undertaken as part of the ACE study demonstrated strong links between the experience of childhood maltreatment and adverse health and wellbeing outcomes later in life using a sample population that was drawn from the general public (Anda et al., 2006; Dube, Felitti, Dong, Giles et al., 2003). Whilst this finding is significant, results are somewhat generalised. This thesis aims to explore more specifically the ways in which the experience of childhood maltreatment can impact on brain development and function. The following section documents emerging themes of physical or structural alterations in the brain

resulting from childhood maltreatment from the systematic review, and begins with reductions in brain volume.

Reductions in global brain volume

Research using brain imaging technology has found overwhelming correlations between the experience of maltreatment and global adverse brain development as a result of childhood maltreatment (Anda, 2006; De Bellis, Keshavan, Spencer et al., 2000; De Bellis, Keshavan, Shifflett et al., 2002; De Bellis & Keshavan, 2003; Edmiston et al., 2011; Fonzo et al., 2013; Frodl et al., 2010; Mehta et al., 2009; Perry, 2009:241; Schore, 1996; Tomoda, Nevalta et al., 2009). In particular, clear correlations are apparent between earlier age of onset of maltreatment and decreased brain volume, as well as longer duration of maltreatment and decreased brain volume (De Bellis, Baum et al., 1999; De Bellis, Keshavan, Frustaci et al., 2002; De Bellis & Kuchibhatla, 2006; Fonzo et al., 2013; Kumari et al., 2013; Mehta et al., 2009).

American doctor Michael De Bellis, director of the Healthy Childhood Brain Development and Traumatology Research Program, has been involved in a number of studies that have examined brain changes in samples of children with diagnosed pediatric post-traumatic stress disorder (PTSD) as a result of childhood maltreatment (De Bellis, Keshavan, Clark et al., 1999; De Bellis, Keshavan, Shifflett et al., 2002; De Bellis & Keshavan, 2003; De Bellis & Kuchibhatla, 2006). De Bellis's research (De Bellis, Keshavan, Shifflett et al., 2002; De Bellis & Keshavan, 2003) has consistently found correlations between the experience of childhood maltreatment and reductions in corpus callosum volume. The corpus callosum describes the area of the brain that connects the left and right cerebral hemispheres, allowing communication to be transmitted between the two hemispheres, and making cognitive and emotional integration possible (Farmer R, 2009:33).

Reductions in corpus callosum were similarly found in a study by Teicher, Dumont and colleagues (2004) that used magnetic resonance imaging scans of 26 boys and 25 girls who had been admitted to hospital for psychiatric evaluation. Evidence of prior childhood maltreatment was obtained from social services. Of the 51 children in the study, 28 children experienced abuse or neglect, and 23 children had no evidence of abuse or neglect. A comparison group of 115 children with no history of childhood maltreatment or psychiatric incidents were also included in the study. Results found that maltreated children exhibited a corpus callosum volume reduction of 17 percent when compared with healthy control subjects, with neglect being most strongly associated with a reduction in corpus callosum regions across both genders, and sexual abuse being most strongly associated with corpus callosum reduction in girls (Teicher, Dumont et al., 2004).

In addition to reductions in corpus callosum volume, De Bellis's research recorded positive correlations between duration of childhood maltreatment and larger volumes of frontal lobe cerebrospinal fluid (CSF) as well as in the lateral ventricle (De Bellis, Keshavan, Shifflett et al., 2002; De Bellis & Keshavan, 2003). De Bellis, Keshavan, Clark and colleagues (1999:1279) argue that these findings indicate neuronal loss as a result of severe stress. The impact of this neuronal loss was manifested in decreased IQ score among participants who had experienced childhood maltreatment (De Bellis, Keshavan, Clark et al., 1999:1280). Gender differences in the effect of childhood maltreatment on brain volume was also evident in De Bellis's research, with maltreated males exhibiting greater corpus callosum volume reductions and increased lateral ventricle volumes, suggesting that boys may be more vulnerable to the impact of chronic stress on the developing brain (De Bellis, Keshavan, Clark et al., 1999:1279; De Bellis & Keshavan, 2003).

Hippocampus volumes

Being part of the limbic system, the hippocampus forms a crucial component of the emotional regulatory system and for influencing the amygdala and hypothalamus to regulate responses of the autonomic nervous system (Hanson et al., 2015; Farmer R, 2009:33,77). The limbic system describes a group of structures that includes the hippocampus and amygdala and can be roughly understood as the emotional centre of the brain (Farmer R, 2009:33; Clark et al., 2010). The hippocampus also plays a vital role in short-term memory retrieval and storage and is crucial to human functioning due to its involvement in the creation of recent memory and thereby its necessity in creating context for one's surroundings (Anda et al., 2005; Strominger & Demarest, 2012; Watson, 2010:113). A damaged hippocampus can result in an inability to integrate sensory inputs, difficulties with remembering events in their contextual situations, and difficulties processing negative experiences and emotions (Farmer R, 2009:90).

The most prominent study into memory formation was conducted in 1966 by Dr Milner on a patient known as H.M. who was 27 years old and had suffered from untreatable bilateral temporal lobe seizures for over ten years as a result of a brain injury sustained when age nine years of age (Milner, 1966). Milner performed surgery bilaterally on the hippocampal formation, amygdala and parts of the temporal cortex. The surgery resulted in better-controlled seizures, but also specific memory deficit, such that short-term memory over seconds of minutes remained intact, as did long-term memory of events prior to the surgery. Language and IQ also remained unchanged. H.M. was however no longer able to transfer short-term memory into long-term memory, and had profound difficulty with spatial orientation.

A common theme emerging from the systematic review exploring correlations between childhood maltreatment and brain development is the correlation between experiences of high levels of childhood maltreatment on hippocampal volumes, although the more specific impacts are less clear. The majority of research analysed found that the volume of the left hippocampus was most significantly reduced (Bremner, Narayan et al., 1999; Bremner, Randall et al., 1997; Frodl et al., 2010; Hanson et al., 2015; Kumari et al., 2013; Rao, Chen et al., 2010a; Samplin et al. 2013; Stein et al., 1997; Teicher, Anderson & Polcari, 2012; Vythilingam et al., 2002; Whittle et al., 2013). However, this finding has been contradicted by other research using children with maltreatment-related PTSD as subjects, which did not find hippocampal volume loss (Carrion et al., 2001; De Bellis, Keshavan, Clark et al., 1999, De Bellis, Keshavan, Shifflett et al., 2002). Eight out of eleven of these studies were undertaken using adults, and two used adolescents, which may contribute to the apparent contradiction in results. This possibly indicates that exposure to chronic childhood maltreatment during early childhood alters the trajectory of hippocampal development, with volume loss in the hippocampus manifesting during adulthood but not childhood (Andersen et al., 2008; Teicher, Andersen et al., 2003). This idea was suggested by Woon and Hedges (2008) who used a cross-sectional comparison of meta-analyses of hippocampal and amygdala volume from children and adolescents, finding that adults with childhood maltreatment-related PTSD exhibited reduced bilateral hippocampal volume, however maltreated children who were examined during childhood did not (Woon & Hedges, 2008). This interesting result suggests that hippocampal volume deficits as a result of childhood maltreatment may not become apparent until the subject enters into adulthood (Woon & Hedges, 2008). Andersen and Teicher (2003) hypothesise that this is because early life stress prevents the normal overproduction of synapses in the hippocampus, but fails to prevent synaptic pruning, which naturally occurs during late adolescence and early adulthood, thereby resulting in a deficit in synaptic density in adulthood.

This concept was expanded upon in a study by Rao, Betancourt and colleagues (2010), who used a unique longitudinal data set that included measures of early childhood experience between four and eight years of age, high resolution structural brain imaging tests during adolescence, and the effects on brain morphology later in life based on the two dimensions of nurturance and environmental stimulation. Being a longitudinal study design, the research was able to demonstrate a complex pattern of hippocampal expansion and contraction throughout child development (Rao, Betancourt et al., 2010). It was found that high parental nurturance results in accelerated maturation of the hippocampus, with a delay in maturation occurring in the presence of poor parental nurturance (Rao, Betancourt et al., 2010). In fact, level of parental nurturance, rather

than environmental stimulation, was found to be more predictive of hippocampal morphology, indicating the critical nature of appropriate attachment and nurturing from a caregiver between birth and four-years of age (Rao, Betancourt et al., 2010).

Increase in the volume and reactivity of the amygdala

In addition to the hippocampus, the amygdala (located in the temporal lobe of the cerebrum) forms a central component of the limbic system (Watson, 2010:121). It synthesises sensory information from higher-order cortical areas, integrating specific components of the sensory experiences with details from past events, and attaching particular emotional significance to an experience when the event occurs within the context of a previously learned response (Clark et al., 2010:224). It is therefore critical in generating previously learned emotional responses that promote survival by allowing the responses to be issued more efficiently when encountering similar events in the future (Clark et al., 2010:224; Strominger & Demarest, 2012). Whilst the hippocampus is responsible for processing non-emotional memories, it is the amygdala that processes emotional memories (Farmer R, 2009:77). By receiving and interpreting incoming stimuli, the amygdala specifies what action to take, thereby making it particularly important in the role of threat recognition and fear conditioning (Farmer R, 2009:76; Painter & Scannapieco, 2013:278; Teicher, Andersen et al., 2003:37; Weber & Reynolds, 2004:122; Whalan et al., 2001). This concept is important when examining chronic trauma, particularly in terms of the short-circuiting of responses to trauma-associated stimuli. When danger is detected the amygdala reacts by stimulating autonomic and endocrine responses before the message reaches conscious awareness in the higher cognitive areas of the brain. This results in a reduced ability to consciously control emotional, physiological, and behavioural reactions (Watson, 2010:121). Whilst increased sensitivity to threats can be an adaptive response in combat situations, it is not adaptive in benign environments, instead being linked with anxiety disorders (Van Wingen et al., 2011).

Compelling research has found larger amygdala volumes in children who experience early neglect (Maheu et al., 2010; McCrory et al., 2011; Tottenham et al., 2010; Tottenham et al., 2011; De Bellis, Keshavan, Shifflett et al., 2002). In research comparing children who experienced prolonged institutional care in Romania (and who had since been internationally adopted) with children not raised in institutions, Tottenham and colleagues (2010) found that those who had experienced longer institutional periods, and thereby longer periods of neglect, exhibited larger amygdala volumes, poorer emotional regulation and increased anxiety.

A number of studies have used *fMRI* to measure amygdala response to threat-related facial expressions. These studies have consistently found strong associations between the experience of childhood maltreatment and an increased responsiveness of the amygdala (Bremner, Narayan et al., 1999; Dannlowski et al., 2012; Maheu et al., 2010; Shin et al., 1999; Tottenham et al., 2011). De Bellis (2005:161) hypothesises that chronic amygdala activation found in neglected children compromises the development of the Prefrontal cortex (PFC) resulting in deficits of behaviour and emotion regulation, particularly impulsivity. A Canadian study undertaken by Maheu and colleagues (2010) examined amygdala and hippocampal reactivity when exposed to threatening faces using a specific population of young people who had experienced caregiver deprivation. The study comprised of a relatively small sample size of 30 youths, eleven of who had experienced caregiver deprivation and/or emotional neglect, and nineteen of who had no exposure to caregiver deprivation or neglect. Youths with a history of caregiver deprivation had experienced foster care either in America, Russia, Serbia, China or Korea. The study population underwent an *fMRI* to measure temporal lobe responses to emotional faces. The design of this study meant that brain activity was measured during the processing of cognitive emotional cues as opposed to measuring the brain in a resting state (Maheu et al., 2010:44). Results indicated that neglected youths demonstrated greater left amygdala activation with exposure to angry versus neutral and fearful versus neutral faces when compared with the control group (Maheu et al., 2010:43). The left anterior area of the hippocampus also demonstrated increased reactivity, which correlated with previously mentioned studies on the hippocampus (Maheu et al., 2010:43).

In a similar English study, the neural reactivity to threatening faces in children who had been exposed to familial violence was examined using a population of 20 children recruited through social services who had documented exposure to family violence, and 23 matched control subjects (McCrorry et al., 2011). The study found an increase in right amygdala and anterior insula activation when angry faces were contrasted with neutral faces (McCrorry et al., 2011). It is believed that the amygdala and anterior insula form part of a network that detects threats (Pinchon et al., 2012) and anticipates pain (Wiech et al., 2010). The study therefore hypothesises that exposure to family violence results in neurological adaptations that result in heightened threat sensitivity (McCrorry et al., 2011).

The amygdala is particularly vulnerable to stress-dependent disruptions during brain development, particularly as it undergoes rapid development early in life (Pechtel et al., 2014:236). Being the response system, the amygdala stimulates the release of cortisol while the hippocampus inhibits its release (Watson, 2010:115). As a result of neural plasticity the size of the amygdala is therefore enhanced by sustained stress, and thereby sustained cortisol release, however the size of the hippocampus is impaired by chronic

stress due to the increase in cortisol causing a reduction in dendritic branches within the hippocampus and eventually causing permanent impairment to memory function (Davidson & McEwen, 2012:693; Watson, 2010:115). Watson (2010:122) posits that stress negatively impacting the hippocampus but enhancing the amygdala results in the loss of conscious memory of the trauma, but intensifies anxiety and fear responses due to an enhancement of the amygdala function. Additionally, a hyper-reactive amygdala as a result of prolonged exposure to stress can lead individuals to be at an increased risk of alcohol and drug addiction in an attempt to dampen the hyper-reactive amygdala (Nutt et al., 2012:4).

Research reviewed as part of the systematic review consistently found that chronic childhood maltreatment adversely impacts on the hippocampus and amygdala, with the hippocampus exhibiting decreased volumes while the amygdala exhibits enhanced growth with prolonged stress exposure. Both these areas are fundamental components of the limbic system, meaning that abnormalities in these areas are likely to impact on learning, memory and emotion regulation (Farmer R, 2009:33).

Morphologic changes impacting on social and emotional processing

Whilst specific areas of the brain appear to respond differently to experiences of chronic childhood maltreatment, reviewing the literature has consistently found correlations between the experiences of chronic childhood maltreatment and morphologic alterations in areas of the brain that govern behavioural and emotional control (Choi et al., 2009; Dannelowski et al., 2012; Edmiston et al., 2011; Fonzo et al., 2013; Peng et al., 2013; Tomoda, Suzuki et al., 2009; van Harmelan et al., 2010). Emotions generate a coordinated experiential, behavioural, and physiological response tendencies that directly impact on how an individual responds to challenges and opportunities (Gross, 2002:281). Emotion dysregulation essentially describes a deficit in either the generation of emotion or the ability to control and modulate emotion, and deficits have been linked with a number of psychopathological conditions, including depression, ADHD, anxiety, self-harm and substance abuse (Berking & Wupperman, 2012:129; Sheppes et al., 2015:393). These results are not distinguished by type of maltreatment experienced, however neglect emerged as a specific focus for a number of studies.

Smaller grey matter volumes have been found in areas governing impulse control and emotion regulation (De Bellis, Baum et al., 1999; Matsuo et al., 2009; Schilling et al., 2012; Schilling et al., 2013; Edmiston et al., 2011). The research reviewed here shows that these areas of the brain are structurally altered by chronic childhood maltreatment. Children constantly exposed to threats throughout childhood have been found to develop hypersensitive responses to external stimuli – a hypervigilant state that is a necessary

adaption to survive a violent or chaotic environment (Perry, 1997:129). Their hypervigilance to external stimuli, as a result of spending so much time in a low level state of fear that is mediated by the midbrain, results in these individuals being highly attuned to non-verbal stimuli, but having difficulty processing more cognitive (higher brain) verbal stimuli (Perry, 1997:129). They are therefore also often diagnosed with learning difficulties or ADHD (Perry, 1997:129).

A recent American study by Edmiston and colleagues (2011) also recorded gender differences in response to stress when examining the relationship between cerebral grey matter morphology and exposure to chronic childhood maltreatment. MRI imaging of 42 adolescents was administered to determine grey matter morphology and a childhood trauma self-report questionnaire was administered to determine exposure to childhood maltreatment. The participants were recruited from a sample of children who were identified at birth to be at high risk for experiencing childhood maltreatment. The study found that in girls, volume reductions were present in regions of the brain that were associated with emotion regulation, whereas in boys, volume reductions were apparent in brain areas that are believed to govern impulse control (Edmiston et al., 2011:1072). These findings are supported by a number of other studies that found correlations between high levels of impulsive behaviour and smaller grey matter volumes in the frontal lobe, particularly the orbitofrontal cortex (Matsuo et al., 2009; Schilling et al., 2012; Schilling et al., 2013).

A study undertaken by Tomoda, Suzuki and colleagues (2009) examined whether the experience of harsh corporal punishment during childhood was associated with alterations in grey matter volume. As part of the study 23 young adults from a group of 1455 volunteers were identified through a series of online questions as having experienced harsh corporal punishment during childhood of at least three years duration. These participants were compared with 22 healthy control subjects. MRI scans revealed considerable grey matter volume reductions in areas of the brain that form part of the medial rostral prefrontal cortex (MRPFC) (Tomoda, Suzuki et al., 2009). This area of the brain is believed to be involved with social cognitive processing (Amodio & Frith, 2006; Gilbert et al., 2007). The common theme of activity in this area of the brain involves social cognitive tasks that require reflection on either mental states of the self or mental states of others (Amodio & Frith, 2006). Amodio and Frith (2006) argue that these meta-cognitive representations are important for high-level interpersonal interactions, and therefore deficits in these areas is likely to impact on social processing and interpersonal relationships.

Similarly, Fonzo and colleagues (2013) also found reductions in grey matter volume using MRI scans to examine the relationship between childhood maltreatment, grey matter volume, and patterns of activation and connectivity. The experience of childhood maltreatment was found to result in altered brain structure and emotion-processing functioning in 33 women who had diagnosed PTSD as a result of intimate partner violence, and who had additionally experienced childhood maltreatment (Fonzo et al., 2013). Whilst the subject population was characterised by the experience of intimate partner violence in addition to the experience of childhood maltreatment, Fonzo and colleagues (2013) differentiated that the severity of childhood maltreatment was negatively correlated with grey matter volume in the PFC.

Alterations in areas of the brain that govern emotion regulation were also found in a study conducted by Teicher, Anderson and colleagues (2014). The study involved MRI scans of 265 right-handed individuals aged between 18 and 25 years. Maltreatment was assessed using six different psychological assessment tools designed to provide a comprehensive analysis of childhood maltreatment experiences (Teicher, Anderson et al., 2014:298). Neuroimaging found compelling differences in the architecture of the cortical networks in young adults who had experienced childhood maltreatment (Teicher, Anderson et al., 2014). Specifically, childhood maltreatment was associated with decreased connectivity in areas of the brain that are involved with emotional regulation and ability to empathise and accurately attribute thoughts or intentions to others, and monitor their own behaviour within a social context (Teicher, Anderson et al., 2014).

A study by Dannlowski and colleagues (2012) examined the neurobiological underpinnings of childhood maltreatment using 148 healthy subjects who were screened for psychiatric disorders. Experiences of childhood maltreatment were analysed using the Childhood Trauma Questionnaire, whilst amygdala responsiveness was measured using fMRI. Reductions in grey matter volumes were found in various areas of the hippocampus, orbitofrontal cortex and anterior cingulate gyrus for subjects with high scores of childhood maltreatment. Additionally, results found strong associations between the experience of childhood maltreatment and increased responsiveness of the amygdala to threat-related facial expressions. The experience of physical neglect during childhood was found to result in reduced gray matter volumes in the hippocampus, insula, orbitofrontal cortex, anterior cingulate gyrus and caudate (Dannlowski et al., 2012). These are areas of the brain that regulate memory, emotional processing, learning and elements of executive functioning (Farmer R, 2009:89). These structural and functional changes were found to be observable a number of years into adulthood (Dannlowski et al., 2012), lending support to the concept that these changes have a degree of permanency

and therefore childhood maltreatment can potentially impact on functioning throughout the lifecycle.

White matter is a product of myelination and occurs as a result of myelin coating axons in order to provide electrical insulation and speed up impulse connectivity (Fields, 2010:768). Degree of myelination is therefore directly related to patterns of use and is often a characteristic that is studied due to it being an indicator of areas of the brain that are used repetitively (Perry, 2002:85; White & Perrot, 2013:13). MRI scanning has revealed the importance of white matter increases after successfully learning complex tasks (Fields, 2010:768). Examining the impact of parental verbal abuse on white matter volume, Choi and colleagues (2009) used 1271 healthy young adults and screened them for exposure to childhood adversity. Based on the screening results 16 young adults who had experienced high levels of parental verbal abuse were compared with 16 healthy young adults. Brain imaging results found deteriorations to the intensity of neural pathways, particularly the arcuate fasciculus, cingulum bundle and fornix. The arcuate fasciculus connects Broca and Wernicke areas, which are crucial areas for the production of speech and language comprehension (Farmer R, 2009:32). The cingulum bundle connects the limbic system with the neocortex, and deterioration to this area can result in dissociation, depression and limbic irritability, which is a term used to describe a pattern of experiences that stem from increased excitatory neurotransmission, resulting in limbic dysfunction, including somatic disturbances, hallucinations, automatisms (unconscious behaviours) and dissociative disturbances (Choi et al., 2009:231; Dackis et al., 2012:1237). The fornix is a bundle of axons that conduct nerve impulses from the hippocampal formation, around the thalamus, and ending in the diencephalon (Farmer R, 2009:33). Changes in this area correlated with increases in experiences of somatisation and anxiety and plays a major role in modulating anxiety (Choi et al., 2009). Deteriorations in the cingulum bundle and fornix can therefore have implications for anxiety and mental health later in life, while deteriorations in the arcuate fasciculus can impact learning and cognition through deficits in speech production and language comprehension.

Much research into emotion and behavioural regulation by the brain has stemmed from the study of individuals who have sustained traumatic brain injury (Bufkin & Luttrell, 2005:177). A famous case was documented in 1868 by Harlow, involving a construction worker, Phineas Gage, who survived a large rod being accidentally driven through the left frontal lobe of his brain as a result of a rock blasting accident. Later, using neuroimaging techniques, researchers were able to determine that the injury resulted in damage to the ventromedial and orbitofrontal areas of the PFC (Damasio et al., 1994). Following the accident, Gage exhibited profound behaviour changes, becoming irreverent, irresponsible and socially dysfunctional (Damasio et al., 1994:1102). The area of the PFC that was

injured is believed to be responsible for rational decision-making in personal and social matters, however the ability to comprehend abstract problems and perform calculations remained intact (Demasio et al., 1994:1104).

In summary, by using neuroimaging technology to scan for physical changes in the architecture of the brain there appears to be a body of research that can now correlate difficulties in emotion regulation with actual physical alterations in brain structure. The hippocampus and amygdala appear to be particularly vulnerable to physical alterations in response to prolonged stress. Another area of the brain that appears to be compromised by exposure to childhood maltreatment is the coherence between left and right hemispheres, which is discussed in the following section.

Left and right hemisphere differences

At a basic level the brain is divided into the left hemisphere and the right hemisphere. Both hemispheres have relevance to chronic childhood maltreatment but for different reasons. In his extensive research synthesis of cerebral lateralisation in relation to pro- and anti-social tendencies, Hecht (2014) found that the right hemisphere of the brain exhibited significant specialisation for social information processing, while the left hemisphere specialised in mediating antisocial actions. In fact, consistent research has linked the right hemisphere with the processing of social signals and mediation of empathy (see Bolognini et al., 2013; Fournier et al., 2008; Greene D & Zaidel, 2011; Miller S et al., 2006; Ono, Fujita & Yamada, 2012; Yovel, Tambini & Brandman, 2008).

Ito and colleagues (1998) examined 15 hospitalised children between the ages of ten and thirteen years who had experienced severe physical or sexual abuse, and compared them to 15 control subjects using electroencephalography (EEG). EEG coherence is a type of medical technology that is used to investigate the degree of interconnectivity between the two EEG leads, with this degree increasing with greater myelination of neural pathways and increased development of association pathways (Ito et al., 1998:299). It is a useful tool with which to measure cortical maturation and laterality (Ito et al., 1998:299). When analysing hemisphere coherence, non-maltreated children exhibited lower levels of left hemisphere coherence, whereas maltreated children exhibited a reversal of this natural asymmetry (Ito et al., 1998). There were also differences in the rate of decay of left hemisphere coherence over electrode distance, which suggested that maltreated children exhibited a deficit in left cortical specialisation (Ito et al., 1998). Ito and colleagues (1998) hypothesise that early abuse has a significant deleterious effect on left cortical development in such a way as to impede hemispheric integration. Findings of reduced left hemisphere development in children who experienced childhood maltreatment may have implications for increased likelihood of engagement in antisocial behaviour (Ito et al.,

1998). This is consistent with Hecht's (2014) assertion that the left hemisphere is specialised in moderating antisocial behaviours.

Differences in hemisphere activation have been linked with elements of resilience and emotion regulation. Curtis and Cicchetti (2007) examined 87 children aged between six and twelve years of age attending a summer research camp for low-income families. Forty-four children had experienced childhood maltreatment according to child protection records and 43 children had no record of maltreatment experiences. Curtis and Cicchetti (2007:811) defined resilience as being "*characterized by relatively good adaptation despite the experience of significant adversity*". The study found that maltreated children exhibited decreased left hemisphere activity compared with non-maltreated children. Interestingly, maltreated but resilient children did not exhibit decreased left hemisphere activation. Curtis and Cicchetti (2007) therefore posited that this increase in left hemispheric activity in the resilient group may indicate a greater ability for emotional regulation, better peer interaction, and a bias towards perceiving emotion positively, which would then be of greater benefit when forced to negotiate hostile and high-risk environments. This point is crucial for this thesis as it indicates the unique plasticity of the brain and forms important evidence that the experience of childhood maltreatment does not automatically result in behavioural deficits or definitive morphology of the brain in the future. That said, the plasticity of the brain is not absolute and there are some aspects of brain development that are less adaptable to change at certain points in the lifespan, particularly those aspects of development that are reliant on secure attachment between an infant and caregiver (Egan, Combs-Orme & Neely-Barnes, 2011:272).

Raine and colleagues (2001) also observed correlations between the experience of childhood maltreatment and decreased left hemisphere activation. In their study they used a population of 23 male participants who were recruited from temporary employment agencies in Los Angeles, America, located in an area where there was a high percentage of violence perpetration. The aim of the research was to examine brain correlates of adults who suffered severe childhood physical abuse and who went on to perpetrate violence as an adult, and secondly, to examine what brain correlates are different in those who suffered severe childhood physical abuse but who did not go on to perpetrate violence as an adult (Raine et al., 2001). Using a self-report interview technique, history of severe violence perpetration and history of child abuse was recorded. Specific tests and interviews were administered to obtain demographic and educational data, verbal, performance, and total IQ scores, as well as handedness¹. Participants underwent fMRI whilst performing a visual/verbal memory task, which allowed for

¹ Handedness refers to the preferred hand used by the individual. It is relevant in that it can impact on what side of the brain is specific for certain functions (lateralisation) (see Dunham & Davenport, 2012).

assessment of brain dysfunction. Irrespective of whether individuals engaged in violence as adults, subjects who experienced abuse during childhood showed decreased cortical activation, particularly in the left hemisphere, during working memory tasks (Raine et al., 2001).

Furthermore Raine and colleagues (2001) found that individuals who experienced severe physical abuse but refrained from engaging in violence as an adult exhibited lower left and higher right superior temporal gyrus activation (Raine et al., 2001). Reduced right hemisphere functioning, particularly in the right temporal cortex was found amongst violent offenders who had suffered severe childhood maltreatment (Raine et al., 2001). They therefore concluded that childhood maltreatment and its associated decrease in left hemisphere activation, combined with a reduction in right hemisphere function creates a greater predisposition for engagement in violent behaviour later in life. In contrast, reasonable right hemisphere functioning was considered a protective factor for physically abused children engaging in violence later in life (Raine et al., 2001). This lends credence to the idea that the right hemisphere is important in tempering antisocial behaviour (Hecht, 2014:5).

Of prime importance to this thesis, differences in hemisphere coherence between maltreated and nonmaltreated children has clear implications for potential engagement in recidivist offending, largely due to the specialised roles each hemisphere plays in processing social information and mediating antisocial behaviour.

Neglect

The majority of studies that were included in the research synthesis did not specifically differentiate between types of abuse experienced, but instead relied on generally accepted conceptions of child maltreatment and abuse. Neglect was however one area that was differentiated in a number of studies. This may be largely the result of much research being undertaken using children who had experienced prolonged institutional care in Romanian orphanages, and who had subsequently been internationally adopted. These children were raised in severely deprived conditions, providing an opportunity to study possible associations between very early negative experiences and brain development (Mehta et al., 2009:943).

The experience of childhood neglect appears to be of particular significance to physical brain development. Neglect has been identified in a number of nations as being the most common form of child abuse (Lemmon, 1999; Mennen et al., 2010; Hildyard & Wolfe, 2002; House of Commons Education Committee, 2012:20). Despite this, there is no universal definition of neglect. Part of the difficulty lies in the fact that, unlike other forms

of child maltreatment, neglect is not an act committed against a child but rather an omission of care (Mennen et al., 2010:648), meaning that there is not an single specific identifiable incident, but rather the cumulative effect of chronic omissions (Hildyard & Wolfe, 2002:680). As Lemmon (1999:373) highlights, *“neglect is ambiguous and often is invoked to specify any violation of normative standards of parenting”*. The AIHW defines neglect as,

“Any serious acts or omissions by a person having the care of a child that, within the bounds of cultural tradition, constitute a failure to provide conditions that are essential for the healthy physical and emotional development of a child” (AIHW, 2014:129).

Similarly, the United Kingdom’s child protection guidelines define neglect as being

“The persistent failure to meet a child’s basic physical and/or psychological needs, likely to result in the serious impairment of the child’s health or development” (Her Majesty’s Government, 2013:86).

From a neurodevelopmental perspective, neglect is the absence of timing, frequency, pattern and nature of necessary sensory experience that is required for the individual to express the genetic potential of a core capability (Perry, 2009:244). As stated previously, timing of experience is crucial to brain development and is of particular relevance to neglect given that the developmental needs of the child alter considerably with age and therefore what may be neglectful in infancy may not be in adolescence (Perry, 2002:89).

A study by Perry and Pollard (1997) examined brain growth in a sample of 122 neglected children who had been referred to a specialty clinic by Child Protective Services for psychiatric evaluation. Units of analysis included various measures of brain growth. The children were divided into four cohorts: global neglect, global neglect with prenatal drug exposure, chaotic neglect, and chaotic neglect with prenatal drug exposure. Global neglect was used to describe a history of relative sensory deprivation in more than one area, including minimal exposure to language, touch or social interactions (Perry & Pollard, 1997). Chaotic neglect was used to describe a history that was consistent with physical, emotional, social or cognitive neglect (Perry & Pollard, 1997). Comparisons were also made with standard norms used in pediatric settings. Perry and Pollard (1997) found that those who experienced global neglect during the first three years of life were at greater risk of exhibiting abnormal brain growth, with the most startling differences being the enlargement of the ventricles and cortical atrophy. This is indicative of decreased brain growth in neglected children and was particularly prominent in children exposed to global neglect (Perry & Pollard, 1997). Children exposed to chaotic neglect did not demonstrate as marked cortical atrophy of the brain as globally neglected children; however, Perry and Pollard (1997) hypothesised that it is reasonable to suggest that these children were likely to exhibit organisational abnormalities in the brain but this cannot be examined through patterns of brain growth.

Hanson and colleagues (2013) examined the relationship between the experience of early childhood neglect and the organisation of white matter in the PFC. As stated previously, the term white matter describes myelinated pathways in the brain. White matter develops significantly in the first two years of life (Gao et al., 2009:290). Given that white matter describes myelinated pathways, its absence can indicate cognitive deficits associated with early neglect (Hanson et al., 2013:1567). Using MRI and the administration of neurocognitive functioning tests, 25 children who had experienced early childhood neglect were compared with 38 children who had not experienced early childhood neglect. Hanson and colleagues (2013) found that the experience of early childhood neglect resulted in decreased white matter directional organisation in both the PFC and the white matter tracts that connect the temporal lobe with the PFC. These structural differences were still present long after the adversity was experienced, and in terms of function, was indicative of poorer neurocognitive performance, particularly in tasks that involved spatial planning, visual learning and memory tasks (Hanson et al., 2013:1574).

Severe institutional neglect and brain development

Charles Nelson and colleagues conducted the most prominent research into the long-term impact of severe institutional neglect as part of the Bucharest Early Intervention Project (BEIP). After the execution of Communist dictator Nicolai Ceausescu in 1989, approximately 170,000 abandoned children were discovered living in deplorable conditions in state-run institutions (Nelson et al., 2009:222). The BEIP is an ongoing examination that began in 2000 where a randomised control trial was conducted into the different outcomes between children placed in foster care in comparison with institutionalised children in Romania (BEIP, 2014:online). The longitudinal research essentially compared the development of children placed in foster care with those who remained in institutional care using neuroimaging and psychological testing techniques (BEIP, 2014:online). In his summary of findings from studies undertaken as part of the BEIP, Charles Nelson (2009:226) asserts that cognitive development was particularly impaired, with institutionalised children measuring IQ scores of approximately 74 at thirty months of age (a score that qualifies the title of ‘mental retardation’), compared with children of the same age living in the community who scored 103, which is normal for that age. EEG analysis also confirmed significant delays in cortical maturation of institutionalised children, primarily in the frontal, temporal and occipital regions of the brain (Nelson, 2009:226).

One study that formed part of the BEIP involved the comparison of 93 children who had been institutionalised in orphanages, at an average age of three months, with 48 children who had never been institutionalised. When eight years of age, participants underwent a series of tests to examine visual memory and executive functioning (Bos et al., 2009).

Results demonstrated that in nearly every measurable domain, children who had spent long-periods in institutionalisation, where they experienced profound emotional and physical neglect, exhibited marked developmental deficits, particularly in terms of visual memory and executive functioning (Bos et al., 2009:6). These impairments were pinpointed to specific neural structures, namely the medial temporal lobe, including the hippocampus and the PFC (Bos et al., 2009:6).

The timing of the experience plays a significant role in determining the effect of abuse on the brain. For example, leaving a six-month old infant unattended for five hours would have a completely different impact than leaving a 14 year old unattended for five hours. The research undertaken as part of the BEIP is particularly relevant given its ability to study a large population who experienced extensive neglect whilst in institutional care. This research made significant contributions to understanding the critical role timing of childhood maltreatment plays in altering the effects of neglect on the brain. Their research has revealed that children removed from institutions and placed into foster care prior to two years of age had significantly better outcomes in terms of overall development and IQ scores, and those placed before 15 months also demonstrated better language outcomes than those remaining in institutions (Nelson, 2009:224).

Another study, not part of the BEIP but still using a similar population group of Romanian children who were adopted at the average age of 38 months from orphanages by American families, studied the impact of global deprivation on brain development (Chugani et al., 2001). The study compared ten Romanian children aged between 7 and 11 years with two control groups: 17 normal adults aged between 21 and 36 years, and seven children aged between 7 and 13 years with epilepsy (Chugani et al., 2001). The study employed *f*MRI and PET in order to identify abnormalities in brain glucose metabolism that may result from early global deprivation. It was found that global deprivation was associated with dysfunction of medial temporal structures, including the amygdala and hippocampus, and bilateral dysfunction in the inferior temporal cortex, evidenced by decreased glucose metabolism in these areas of the brain. These are limbic areas of the brain that are closely involved in the brain's response to stressors (Chugani et al., 2001). Disturbances in the development of these limbic structures alter the functional connections within these limbic circuits and represent the mechanism through which persistent behavioural disturbances can occur throughout the lifetime (Chugani et al., 2001).

Interesting results were found by Rutter and colleagues (1998) in terms of the importance of timing of maltreatment. The study compared 111 Romanian children who were adopted into the United Kingdom before the age of two years with 52 children from the

United Kingdom who were adopted prior to six months of age. Various cognitive assessments, undertaken when all children were four years of age, found that the Romanian children who were adopted from institutional care prior to six months of age were almost cognitively comparable to children in the United Kingdom who were adopted at the same age. In contrast, children who were adopted after the age of six months their cognitive improvement was significant however there remained some deficit in cognition, with the average cognitive index score being 92 compared with 109 for United Kingdom adopted children (Rutter et al., 1998). The children were then followed up at six years of age and data suggested that there was no further evidence that this group of children had progressed any further in their cognitive catch-up (O'Connor et al., 2000). The authors concluded that it was the psychological deprivation that was more harmful than the nutritional privation (Rutter et al., 1998).

In summarising the research specifically related to the experience of neglect the PFC appears to be an area that is particularly impacted by the experience of early childhood neglect, as evidenced by observable reductions in grey matter volume (Bos et al., 2009; Frodl et al., 2010; Hanson et al., 2013; Perry & Pollard, 2007; Nelson, 2009). The PFC is located in the frontal portion of the brain and is broadly responsible for executive functioning, including regulating emotional behaviour, cognitive function, and memory encoding and retrieval (Bufkin & Luttrell, 2005:177; Campbell-Sills et al., 2011; Jacobson & Marcus, 2011:178; Kandel et al., 2000:1238; van Harmelen et al., 2010).

As has been demonstrated, a number of studies have found profound implications on the effect of neglect on brain development. Much of what is known about the impact of neglect has been undertaken in extreme settings with study populations who have experienced significant global neglect. Whilst it is unlikely that this profound and widespread level of neglect will be experienced in Australia, the research provides startling evidence on the significant impact neglect can have on the developing brain, particularly in terms of deficits in cognitive function, IQ, memory, and emotion regulation. As previously stated, neglect is difficult to define given that it is not as overt as physical or sexual abuse and can be easily overlooked in the absence of obvious physical indicators. The impact that neglect can have on brain development however makes this all the more concerning.

Conclusion

Using a systematic approach to search for literature, this chapter has uncovered evidence that highlights that the experience of childhood maltreatment can indeed impact on the structural architecture of the developing brain. There are obvious trends that have emerged, namely measureable volume reductions in grey and white matter, hemispheric

differences in brain activation, reductions in corpus callosum sizes, and alterations in amygdala and hippocampal volumes. Smaller grey and white matter volumes indicate neuronal loss, which can have implications for lower IQ levels and cognitive functioning (De Bellis, Keshavan, Clark et al., 1999; Nelson et al., 2009; Tomoda, Suzuki et al., 2009).

The limbic system also appears to be physically altered by experiences of childhood maltreatment, with consistent findings demonstrating reduced volumes in the hippocampus (Andersen & Teicher, 2008; Bremner, Randall et al., 1997; Bremner, Narayan et al., 1999; Frodl et al., 2010; Hanson et al., 2015; Kumari et al., 2013; Rao, Chen et al., 2010; Samplin et al. 2013; Stein et al., 1997; Teicher, Anderson & Polcari, 2012; Vythilingam et al., 2002; Whittle et al., 2013) and increased volume and activity in the amygdala (Bremner, Narayan et al., 1999; Dannlowski et al., 2012; Maheu et al., 2010; Shin et al., 1999; Tottenham et al., 2011). A decrease in hippocampal volume appears to have implications for learning and memory deficits (Anda et al., 2006; Bremner, 2006; De Bellis, Hooper et al., 2010; Heim & Nemeroff, 2009; Lupien, McEwen et al., 2009; Strominger & Demarest, 2012; Thomas E & Elliott, 2009; Watson, 2010:113). The amygdala's role in threat recognition and fear response means that increased amygdala function can result in hypervigilance and an over-identification of threatening stimuli (Liu J et al., 2012; Maheu et al., 2010; McCrory et al., 2011; Perry, 1997:129; Pollak & Tolley-Schell, 2003; Tottenham et al., 2011).

Findings that maltreated children over-identify threat-related stimuli are not surprising. If a child's environment is characterised by unpredictability and exposure to stressful stimuli, it is logical to expect that the brain will adapt to that environment meaning that these children are likely to focus heavily on non-verbal cues, facial expressions and be hypervigilant to threatening stimuli (Perry, 2005). Unfortunately, while this is an adaptive response for survival in the home environment it is ill-suited to school and wider social environments given that attention is diverted away from learning and cognition and instead focused on threat identification (Perry, 2005).

This chapter has demonstrated the existence of a significant body of research identifying physical alterations in brain development as a result of childhood maltreatment. The majority of these studies used an experimental research design using control groups for comparison, relying on a cross-sectional design by comparing individuals with a similar experience with individuals who had not had this experience. Whilst positivist in their methodological approaches, the unique population groups and phenomenon that are being studied means that the researcher's ability for absolute control over variables is compromised. For example, the aim of a study may be to compare brain alterations in a

group of physically abused children with non-abused children, however the researcher has no control over the extent or type of abuse experienced, particularly given that the experience of one particular form of abuse cannot be isolated from other types of abuse and that childhood maltreatment experiences are rarely confined to simply one form of abuse.

Additionally, the extent of abuse cannot be easily compared given the uniqueness of individual experience. Whilst a strictly experimental research design would utilise random assignment to either control group or experimental group, this is difficult to achieve given that a specific previous experience is required for participants to be included in the experimental group. By not adhering to a strictly experimental research design there is a danger of selection bias, and neither can the researcher have complete control over what is individually perceived as abuse or neglect (Neuman, 2011:251). When relying on self-reported abuse, an individual may have grown up in a violent household with significant emotional abuse but because they never experienced any physical injury they may declare that they have never experienced abuse. Problems also present when relying on official data records for childhood maltreatment given that each jurisdiction will define and codify abuse and neglect differently (this will be discussed in greater detail in Chapter Five).

There are a number of methodological differences that may account for differences in results: the type of imaging technology used, age of sample population, differing inclusion and exclusion criteria for sample population, types of maltreatment studied, and definition of childhood maltreatment, to name just a few. It is however important to emphasise that our understanding of the brain is still very much in its infancy and whilst there are general trends in our understanding of the impact of various experiences on the brain, the precise understanding and explanation of this is still being developed. Despite this, one cannot overlook or dismiss the amount of research that has emerged from the field of neuroscience that has found a strong relationship to the deleterious effects of childhood maltreatment on physical brain development.

By focusing on physical brain alterations, the study designs have relied heavily on neuroimaging for data analysis. As previously stated, advances in medical and imaging technology have provided a way in which the human brain can be safely studied through images whilst in action. It is however crucial to recognise that scientific understanding of the complexity of the brain are still very much in its infancy. Because of the extreme plasticity of the brain and the ability of the brain to compensate and adapt, we cannot necessarily assume that just because the physical image of the brain appears different there must be some deficit. The next chapter will continue the exploration of the impact

of childhood maltreatment on brain development but will do so by focusing on alterations in brain function rather than physical structure.

CHAPTER SEVEN:

THE IMPACT OF CHRONIC CHILDHOOD MALTREATMENT ON THE FUNCTION OF THE DEVELOPING BRAIN

Introduction

The previous chapter explored research findings synthesised from the systematic review on the actual structural changes to the physical anatomy of the brain as a result of childhood maltreatment. The extraordinary plasticity of the human brain means that physical alterations of the brain do not necessarily translate into actual functional deficits, due to the brain's dynamic ability to rewire itself to compensate for any damage sustained (for example see Zelikowsky et al., 2013). In light of this, this chapter will present research gathered from the systematic review that focuses on alterations in brain function as a result of childhood maltreatment. The term function is used to describe the operation of the brain in order to complete specific tasks. In order to examine the functional alterations of the brain, it is first necessary to provide a brief outline of the peripheral nervous system, and in particular the stress response system.

The peripheral nervous system supplies the brain with a continual stream of information from both the external and internal environment (Kandel et al., 2000:335). It consists of two divisions: the somatic division, comprised of sensory neurons that innervate the skin, muscles and joints; and the autonomic division, which mediates visceral (intuitive) sensation and muscle control (Kandel et al., 2000:335). The autonomic nervous system is further divided into the sympathetic system, which initiates the body's response to outside stressors, and the parasympathetic system, which restores the body's homeostasis after reacting to stress (Kandel et al., 2000:335; Porges, 2011:64). It is the autonomic nervous system that is most relevant to research on the brain's response to stress.

From a biological perspective, the term stressor is used to describe any incoming stimuli, whether real or perceived, that results in the activation of the body's stress response system (Wright L & Perrot, 2013). Put simply, the purpose of the stress response system is to alter the brain's functioning so as to promote the greatest chance of survival (Smith S & Vale, 2006:383; Weber & Reynolds, 2004:116). The stress response system responds to sensory, blood-borne, limbic, and cortical information, using various adaptations of bodily organs to increase the chances of survival, including increased alertness, arousal, body temperature, analgesia, cardiovascular and respiratory function, as well as

suppression of appetite, sexual behaviour, digestive function and immunity (Smith S & Vale, 2006:383).

The hypothalamus integrates the autonomic response with the endocrine response by regulating blood pressure, electrolyte composition, body temperature, energy metabolism, reproduction and, importantly, controlling emergency responses to stress (both physical and immunological) (Kandel et al., 2000:975). These responses are regulated by accessing sensory information from both the intrinsic and extrinsic environment and comparing this information to biological set points (Kandel et al., 2000:975). When a deviation from the norm is detected the hypothalamus adjusts the body's responses to bring it back to within the normal range (Kandel et al., 2000:975).

The primary component of the stress response system is the hypothalamic-pituitary-adrenal (HPA) axis (Smith S & Vale, 2006:383). At a basic level the HPA axis is initially activated by a group of neurons located in the hypothalamus, which synthesise and secrete corticotropin-releasing hormone (CRH) and vasopressin, projecting them into the pituitary, which stimulates the secretion of adrenocorticotrophic hormone (ACTH) into the blood stream (Aguilera, 2012:176; Smith S & Vale, 2006:383). Once this reaches the adrenal cortex it stimulates the production and secretion of glucocorticoids, which are the body's stress hormones, comprised mainly of cortisol (Aguilera, 2012:176; Strelzyk et al., 2012:616). Glucocorticoids modulate the various psychobiological processes during periods of stress by mobilising energy from storage, blocking energy from being stored, increasing cardiovascular tone, and suppressing non-essential processes such as immunity, growth and reproduction (Strelzyk et al., 2012:616; Weber & Reynolds, 2004:122). The result is a cascade of organ-specific changes that occur throughout the body (Smith S & Vale, 2006:383).

The HPA axis response is more commonly described as the 'fight or flight' response, a term first coined by American physiologist Walter Bradford Cannon in 1914 to describe the adaptive response of the sympathetic nervous system to threatening stimuli (Cannon, 1914). This adaptive response, produced by a series of neural and neuroendocrine activations prepares the body to either 'fight' the threat or 'flee' from it (Perry, 2008:108).

The regions of the brain involved in the stress response system (particularly the amygdala and hypothalamus) are highly vulnerable to chronic stress during the early developmental period (Farmer R, 2009:89). Research indicates that critical developmental windows exist within which the neurocircuitry of the central nervous system is particularly susceptible to external environmental influences (Ladd et al., 2000:97; Schore, 1996:80). For children exposed to chronic maltreatment their bodies are essentially in a persistent state of 'fight

or fight', which can result in permanent alterations to this system (Perry, 1997:32). The following section documents research uncovered through the systematic review that examined the impact of childhood maltreatment specifically on the function of the developing brain.

Increased reactivity of the stress response system

Behavioural ecology has developed a term known as predictive adaptive response to describe particular biological adaptations that innately occur during sensitive periods of development in response to anticipated environmental circumstances (Miller G et al, 2011). The primary function of PARs is to regulate the body's physiology in order to meet the demands of the environment in which the individual will reside (Miller G et al, 2011). A number of studies have consistently demonstrated that a prolonged hyperarousal response to stress results in altered homeostasis of the adrenergic, noradrenergic and HPA axis responses (Hart et al., 1995; Kaufman, Birmaher et al., 1997; Kaufman, Plotsky et al., 2000; Perry & Pollard, 1998; Rao, Hammen et al., 2008). This prolonged activation of the stress response system results in a predisposition toward hyperarousal symptoms, including hypervigilance, anxiety, impulsivity, sleep difficulties, and conduct disorders (Perry & Pollard, 1998:45). This is a use-dependent adaptive response to a threatening environment that will enable a quick triggering of the stress-response system, which is necessary for survival (Shenk et al., 2010:758; Teicher, Andersen et al., 2003:39; Weber & Reynolds, 2004:116). Chronic stress can therefore impact on the developing brain by altering the neurochemical and micro-architectural functioning of the brain in such a way as to result in an inability to return to previous homeostasis (Weber & Reynolds, 2004:116).

Christine Heim has conducted a number of studies examining the impact of early adverse events on the stress response system by comparing adults who have experienced a specific form of childhood maltreatment with healthy matched comparison groups. These studies have consistently found that adults with a history of childhood maltreatment have more reactive stress response systems (Heim, Newport, Bonsall et al., 2001; Heim, Newport, Heit et al., 2000; Heim, Newport, Wagner et al., 2002). These findings are consistent with a number of studies examined as part of the research synthesis that correlated experiences of childhood maltreatment with an increased reactivity of the stress response system (Bernard, Butzin-Dozier et al., 2010; Bugental et al., 2003; Cicchetti & Rogosch, 2001; Cutuli et al., 2010; De Bellis, Baum et al., 1999; Doom et al., 2013; Hiem, Newport, Heit et al., 2000; Hiem, Newport, Bonsall et al., 2001; Hiem, Newport, Wagner et al., 2002; Kaufman, Birmaher et al., 1997; Liu J et al., 2012; Tyrka et al., 2008; Rao, Hammen et al., 2008).

The hormone cortisol is a fundamental glucocorticoid that is released as part of the stress response system. The ability of the body to respond to stress by elevating cortisol levels is an important adaptive survival mechanism as it plays a fundamental role in mobilising energy resources, regulating inflammation, and influencing the cardiovascular system (Cicchetti & Rogosch, 2001; Dickerson & Kemeny, 2004:356). Recent research by Strelzyk and colleagues (2012:616) suggests that, during periods of stress, cortisol acts to suppress the processing of non-relevant background information in order to focus on adapting to the challenges presented by the stressor. Cortisol also negatively impacts on the size and plasticity of the brain by atrophying the dendritic branches of the neurons, particularly in the hippocampus (Davidson & McEwen, 2012: 693; Watson, 2010:115).

Research into neuroendocrine functioning of maltreated children has found that maltreated children who experienced high levels of internalising psychopathology exhibited increased levels of morning, afternoon and average daily cortisol levels, placing them at greater risk of developing neurobiological abnormalities (Cicchetti & Rogosch, 2001; Hart et al., 1996). Cutuli and colleagues (2010) also recorded higher levels of morning cortisol in children with cumulative negative lifetime stressors. Increased levels of cortisol have been found to result in physical brain alterations such as shrinkage of the thymus gland, cell death, and atrophication of the hippocampus (Sapolsky, 2000:755; Weber & Reynolds, 2004:121). This is consistent with research discussed in the previous chapter that correlated the experience of childhood maltreatment with smaller hippocampal volumes (Andersen & Teicher, 2008; Bremner, Randall et al., 1997; Bremner, Narayan et al., 1999; Frodl et al., 2010; Hanson et al., 2015; Kumari et al., 2013; Rao, Chen et al., 2010a; Samplin et al. 2013; Stein et al., 1997; Teicher, Anderson & Polcari, 2012; Vythilingam et al., 2002; Whittle et al., 2013). These findings may well be explained by the hypersecretion of cortisol that occurs in response to stress causing cell death in the hippocampus, largely due to the increased number of glucocorticoid receptors in the limbic area of the brain (Bernard, Lind & Dozier, 2014:207).

The negative effect of cortisol on neuronal tissue was also evidenced by decreased IQ scores. Research into the impact of exposure to domestic violence on children's IQ found that children exposed to high levels of domestic violence during development displayed IQ scores that were eight points lower than non-exposed children (Koenen et al., 2003:305). Koenen and colleagues (2003:307) hypothesised that this is likely to result from elevated cortisol levels from stress adversely impacting on brain development by either causing neuronal death or interfering with neuronal growth.

Bugental and colleagues (2003) recognised that there are some parental behavioural responses that are not traditionally seen as abusive but may still have detrimental effects.

Accordingly, they designed a study that examined hormonal responses in infants who experienced either maternal spanking or maternal emotional unresponsiveness/unavailability. The study, undertaken in America, examined subtle forms of maltreatment on the HPA-axis function of a sample of 44 toddlers. The Conflict Tactics Scale (Strauss, 1979) was administered to determine physically coercive tactics (abusive or non-abusive), which were combined to determine a 'harsh parenting' score and 'emotional unavailability' score. Infants of mothers who exhibited a high degree of emotional unavailability exhibited higher baseline levels of cortisol, and infants of mothers who used physically harsh discipline were hyper-reactive to stress (Bugental et al., 2003). Even subtle forms of maltreatment such as using emotional withdrawal as a controlling technique and spanking during infancy were found to alter the functioning of the HPA-axis of the infant, elevating their baseline levels of cortisol (Bugental et al., 2003).

In an examination of the impact of maltreatment-related PTSD on the stress responses system De Bellis, Keshavan, Clark and colleagues (1999) studied measurements of urinary-free cortisol (UFC) and urinary catecholamine excretion in a sample of 18 maltreated children with PTSD, ten maltreated children with Overanxious Disorder, and 24 healthy control subjects. Research found that severely maltreated children, even years after the abuse disclosure, excreted significantly increased concentrations of baseline stress response hormones, including urinary norepinephrine (NE), dopamine, (DA), urinary free cortisol (UFC), and catecholamines, with the measures positively correlating with the duration of the PTSD trauma (De Bellis, Keshavan, Clark et al., 1999). This is significant given that during development, catecholamine neurotransmitters and stress hormones (such as cortisol) modulate critical neurodevelopmental processes including neuronal migration, differentiation and synaptic proliferation thereby potentially impacting permanently on brain development (De Bellis, Keshavan, Clark et al., 1999:1268).

Hart and colleagues (1996) examined the impact of stress on physiological and affective functioning using 131 maltreated school-age children who attended a summer camp in America. Results were compared with 66 non-maltreated children who attended the same camp. Salivary cortisol levels were measured daily and the Child Depression Inventory and Child Behavior Checklist was administered to determine depression classification and internal and external behavioural problems respectively. The normal functioning of the HPA-axis system follows a circadian rhythm whereby cortisol levels peak upon waking and decline throughout the day to low levels in the evening to allow for a regular sleeping pattern (Kirchbaum & Hellhammer, 1994). Maltreated children without depression exhibited morning cortisol levels that were within the normal range, however afternoon cortisol levels increased, demonstrating a reversal of the expected trend (Hart et al., 1996). For maltreated children with concurrent depression, morning cortisol levels were lower

than average and they too exhibited a rise in afternoon cortisol levels, which again is contrary to normal trends (Hart et al., 1996).

Gender differences in cortisol responses to stress also emerged from the systematic review. Doom et al. (2013) examined how gender interacts with neuroendocrine responses to stress by comparing cortisol reactivity in 137 maltreated and 110 non-maltreated children. They found that maltreated boys exhibited greater cortisol reactivity than maltreated girls, and in fact, maltreated girls demonstrated a down-regulation of the cortisol response, which is similar to results found by De Bellis, Chrousos et al. (1994) and Shenk et al. (2010). Girls also demonstrated higher dehydroepiandrosterone (DHEA) levels and lower cortisol/DHEA levels compared with boys (Doom et al., 2013). DHEA is an adrenal steroid that is believed to protect the body from high levels of cortisol (Charney, 2004). Doom and colleagues (2013) hypothesise that these results may indicate that girls have a protective mechanism that operates in adverse conditions of chronic stress. As discussed in the previous chapter, gender differences were also observed by De Bellis, Keshavan, Clark and colleagues (1999) who found that boys appeared to exhibit more adverse effects of childhood maltreatment on brain development than girls, suggesting that they may be more vulnerable to the experience of chronic childhood maltreatment.

Chronic exposure to stressors during development appears to have significant impact on the stress response system, which in turn has implications for brain development and organisation. In these situations the stress response system is required to be persistently active, resulting in over-activity and hypersensitivity to stimuli (Perry, 1997). Not only are these children in a persistent state of hypervigilance, but the increased levels of stress hormones (including cortisol) has a detrimental effect on neural structures, particularly those with a high density of glucocorticoid receptors (Bugental et al., 2003; Cicchetti & Rogosch, 2001; De Bellis, Keshavan, Clark et al., 1999; Doom et al., 2013; Hart et al., 1996).

Blunted reactivity of the stress response system

Not all research examined as part of the systematic review found an increased reactivity of the stress response system. A number of studies found the reverse of this, with results indicating a blunting of overall cortisol reactivity (Carpenter, Shattuck et al., Carpenter, Tyrka et al., 2009; 2011; De Bellis, Chrousos et al., 1994; Hart et al., 1995; Heim, Newport, Heit et al., 2000; Fries et al., 2005; Ford et al., 2010; Mangold et al., 2010; Shenk et al., 2010). This finding is hypothesised to be the result of sustained stress down-regulating cortisol secretion in response to stressors in order to protect particular brain structures, including the hippocampus and prefrontal cortex, from the negative effects of

cortisol (Carpenter, Carvalho et al., 2007; De Bellis & Kuchibhatla, 2006; Hart et al., 1995; Shenk et al., 2010; Susman, 2006).

Both De Bellis, Chrousos and colleagues (1994) and Shenk and colleagues (2010) recorded a blunting of the cortisol response in sexually abused girls. Similarly, a study conducted by Hart, Gunnar and Cicchetti (1995) examined salivary cortisol concentrations and social behaviour by comparing 33 maltreated children with 16 non-maltreated children who all attended a preschool for economically disadvantaged families. Maltreated children were found to exhibit less cortisol reactivity and also exhibited diminished social competence, including higher internalising and externalising behaviours. Additionally, on days where there was increased conflict in the classroom and therefore where children would be expected to produce higher levels of cortisol, maltreated children failed to show increased levels of cortisol. Hart and colleagues (1995) concluded that a reduction in cortisol reactivity in maltreated children also correlated with diminished social competence.

A blunting of the stress response system is likely associated with the dysregulation of this system as the body tries to restore homeostasis in the wake of chronic stress. For example, Bernard, Butzin-Dozier and colleagues (2010) used samples of children aged between two months and 13 months of age in order to examine differences in waking to bedtime cortisol production between children who remained with their birth parents and children who were placed in foster care. Comparison groups included 155 children who had been involved with child protective services but who remained with their birth parents, 184 children involved with child protective services who had been removed from birth parents and placed in foster care, and 96 comparison children from low-risk environments. They found that children who had experienced childhood maltreatment displayed a decrease in waking cortisol levels and flatter patterns of cortisol production throughout the day compared with low-risk children. A blunted pattern of cortisol production has been thought to increase the risk of substance abuse problems and psychopathy, including aggressive behaviour, conduct disorder, and antisocial personality disorder diagnoses (see McBurnett, Lahey, Rathouz et al., 2000; Shirtcliff et al., 2009; Shoal et al., 2003; van Goozen et al., 2007). In part this is thought to be due to the stress reactivity in the individual's own body replicating a blunted arousal to distress in others, thereby resulting in the display of psychopathic-like constructs (Shirtcliff et al., 2009:137).

A number of studies have correlated low basal cortisol levels and persistent antisocial behaviour (Bergman & Brismar, 1994; McBurnett, Lahey, Frick et al., 1991; Moss et al., 1995; Susman, 2006; Susman et al., 1997; Tennes & Kreye, 1985; van Goozen et al., 1998; Vanyukov et al., 1993). According to Susman (2006) the reduction in response of endocrine physiology of the SRS is hypothesised to be a key mechanism in engagement in

antisocial behaviour and Susman (2006) highlights the importance of the role the external environment plays in early establishment of biological systems.

It is believed that the underlying purpose of this down-regulation of the autonomic response is firstly to allow for increased attention to be focussed on the surrounding environment in order to scan for threats, and secondly, to initiate tonic immobility, which emerges involuntarily through autonomic deceleration, muscle paralysis and immobility (Ford et al., 2010). This down-regulation of the autonomic response is thought to be a final biological defence against life-threatening attacks when flight or fight is not available (Ford et al., 2010). Whilst the increased cortisol response found in the previous section has implications for the integrity of brain structures and thereby brain functioning, this down-regulation of the stress response system appears to have significant implications for antisocial behaviour and ability to empathise.

Confounding factors

It is possible that there are confounding population sample factors of gender, age, type of abuse, the presence of coexisting psychiatric diagnoses that may contribute to contrasting results of the reactivity of the stress response system. Additionally, differences in methodology, definition, research design, and measuring strategies also contribute to differences in results. Morris and colleagues (2012) highlight methodological flaws that exist in research that links the experience of traumatic stress with HPA-axis dysfunction, largely due to the inclusion of trauma-exposed individuals without diagnosed PTSD as part of the control group, as well as a failure to consider comorbid Major Depressive Disorder as a variable. They conducted a thorough meta-analysis of the existing research to determine whether trauma-exposed individuals without PTSD, with PTSD, or with PTSD and comorbid Major Depressive Disorder differed from the control group in terms of HPA function. Results suggested that exposure to trauma resulted in an enhancement of the HPA-feedback mechanism regardless of PTSD status, whereas decreases in daily output were particularly associated with PTSD (Morris et al., 2012).

Overall, the differing results in cortisol production indicate that, despite extensive research in this field, there remains no clear consensus regarding the specific regulation and response to chronic stress on the HPA-axis. Either way, cortisol dysfunction appears to be one conspicuous consequence of childhood maltreatment, with blunted cortisol responses being linked with aggression and antisocial behaviours, and increased cortisol responses being linked with hypervigilance and atrophy of particular brain regions (Teicher, Andersen et al., 2003).

Learning and cognition

In addition to dysregulating the stress response system, a number of studies also found strong associations between the experience of childhood maltreatment and deficits in learning and cognition. Analysis of the literature from the systematic review found strong correlations between the experience of childhood maltreatment and learning and cognitive deficits. In a study that aimed to compare illogical thinking and thought disorder between maltreated and non-maltreated children, Toth and colleagues (2011) used a sample of 91 maltreated and 43 non-maltreated school-age children. Maltreated children were identified through the Department of Human Services. The study found that on average maltreated children displayed levels of illogical thinking in the clinically pathological range (Toth et al., 2011:664). Maltreated children who had experienced multiple subtypes of maltreatment, and children who experienced chronic maltreatment over multiple developmental periods, demonstrated significantly greater levels of illogical thinking than maltreated children, highlighting the long-term impact of chronic maltreatment on language-related areas of the brain and the ongoing development of higher-level linguistic skills (Toth et al., 2011:665). Maltreated children were found to be more likely to interpret ambiguous situations as threatening (Toth et al., 2011:665). As a result of this negative bias, maltreated children were more likely to divert their attention away from positive situations and focus on negative stimuli, and additionally had a limited ability to formulate ideas and present them logically (Toth et al., 2011). The tendency to negatively interpret ambiguous situations and over-identify threatening stimuli also has negative consequences for appropriate social interactions and interpersonal relationships.

The brain's cortex has a relatively low threshold for becoming overwhelmed, and when exposed to extreme stress the cortex shuts down and the lower brain regions assume control (Gaskill & Perry, 2012:34). The functional response of this means that during periods of perceived threats the brain will focus on non-verbal stimuli, including body language, tone of voice and facial expressions, at the expense of actual verbal content, which is a higher cognitive function (Perry, 1997:130). Individuals in a persistent state of hyperarousal are therefore not easily able to comprehend complex cognitive information (Perry, 1997:130). A state of hyperarousal activates the lower brain areas of brainstem and midbrain, leaving the cortex inactive and unable to store this cognitive information (Perry, 1997:130). This explains findings by Majer and colleagues (2010) who demonstrated that emotional neglect and/or physical abuse during childhood correlate with an under-performance in cognition, specifically in tasks that utilise the hippocampus, which is important in memory retrieval. Similarly, in their research into the impact of chronic domestic violence exposure, using a population sample of 1116 twin pairs aged five years, children that were exposed to high levels of domestic violence had IQs that were an average of eight points lower than non-exposed children (Koenen et al., 2003), highlighting the long-term impact.

The persistent focus on negative stimuli was also recorded in a number of studies undertaken by Seth Pollak who has examined responses to facial displays of emotion in maltreated children. The recognition of social signals including facial expressions is an important developmental milestone for children (Pollak & Sinha, 2002). Results found that maltreated children employed greater attentional resources to negative stimuli and have consistently found that maltreated children over-identify angry faces compared with control subjects (Pollak, Cicchetti et al., 1997; Pollak, Klorman et al., 2001; Pollak, Vardi et al., 2005; Pollak & Kistler, 2002; Pollak & Sinha, 2002; Pollak & Tolley-Schell, 2003).

One study investigated attention to facial emotional cues using fourteen physically abused children, comparing them with fourteen non-abused children (Pollak & Tolley-Schell, 2003). Abused children were selected from Department of Human Service records of substantiated cases of physical abuse. EEG tests were administered whilst children participated in a selective attention task and recognition memory test involving facial expressions. Results found that physically abused children experienced difficulties disengaging their attention from angry facial cues and also employed more processing resources when exposed to angry versus happy faces (Pollak & Tolley-Schell, 2003). Pollak and Tolley-Schell (2003) found that maltreated children demonstrated difficulty processing angry cues and used more processing resources when attempting to disengage their attention from angry cues. They also found that maltreated children exhibited difficulty controlling attention whilst processing threatening stimuli, leading to difficulties accurately perceiving and regulating their emotions in a social context (Pollak and Tolley-Schell, 2003). A similar study used EEG measurements of children's responses to facial displays of emotion on 24 physically abused children and 23 non-abused children (Pollak, Klorman et al., 2001). Again, results demonstrated increased allocation of attentional resources towards angry faces, indicating an adaptive response leading to hypersensitivity to processing negative stimuli (Pollak, Klorman et al., 2001). Pollak hypothesises that this is an adaptive response that allows the child to meet the challenges they experience within their surrounding environment. This adaptive response can however result in social-cognitive difficulties and presents an increased risk of psychopathology later in life (Pollak, Cicchetti et al., 1997:784).

Studies using offender populations also found correlations between childhood maltreatment and an increase in threat-related focus. Domes and colleagues (2013) examined emotional processing anomalies associated with antisocial personality disorder (ASPD) by comparing 35 violent sexual offenders with ASPD, 34 violent sexual offenders without ASPD, and 24 healthy non-criminal control subjects. Violent sexual offenders were sourced from a German prison and forensic-psychiatric hospital. Psychological tests

were administered, including the Sexual Violence Risk-20 Assessment, Structured Clinical Interview for DSM-IV, and the Emotional Stroop Tests, which assesses emotional processing (Domes et al., 2013:79). Offenders with diagnosed ASPD who had experienced childhood maltreatment displayed increased interference with the cognitive process of colour matching when presented with violence-related words, compared with healthy controls (Domes et al., 2013:83). Domes and colleagues (2013:83) argue that this demonstrates the potential impact of childhood maltreatment on emotional processing, as well as the impact of cognitive representation of violence-related stimuli on brain functioning. They also found that offenders with a history of childhood maltreatment demonstrated stronger violence-related emotional bias than non-maltreated offenders, regardless of psychopathic traits (Domes et al., 2013:83).

Hypersensitivity to threat interpretation can lead to the misinterpretation of environmental or social cues and can result in impulsive reactions and aggressive behaviour (Bufkin & Luttrell, 2005:179). In their review of seventeen neuroimaging studies, Bufkin and Luttrell (2005) found two important consistent findings: PFC dysfunction was associated with aggression and violent behaviours; and temporal lobe dysfunction, particularly left-sided dysfunction, was associated with aggression and violence.

Activation of the hippocampus and amygdala

As discussed in Chapter Five, the hippocampus and amygdala form central components of the limbic system and thereby for emotion regulation. Among the studies examined as part of the literature review, six studies examined how childhood maltreatment affected the activation of the hippocampus and amygdala. Three studies found alterations in hippocampal reactivity: Maheu and colleagues (2010) and Bremner, Narayan and colleagues (1999) found correlations between increased hippocampal reactivity during the processing threatening information; however, Liu and colleagues (2012) found diminished left hippocampal reactivity to faces depicting fear for adolescents at risk of chronic exposure to high levels of stress. Whilst the study sample consisted of adolescents at risk of chronic exposure to high levels of stress, the experience of childhood maltreatment was not specifically articulated and may therefore contribute to the differences in findings.

Three studies found that childhood maltreatment resulted in increased amygdala activation in response to angry or fearful faces or threatening stimuli (Bremner, Vermetten et al., 2005; Maheu et al., 2010; McCrory et al., 2011). A study by Taylor and colleagues (2006) examined whether there is altered neural activity for tasks that require responses to emotional stimuli between adults from 'risky' families and adults from 'non-risky' families. Classification of participants into risky and non-risky was done through the

use of a questionnaire that involved participants rating aspects of their childhood family environment on a scale of one to four (Taylor et al., 2006:297). Examples of questions include whether the individual felt loved, felt threatened, experienced physical abuse, had been pushed, observed violence, or lived in a well organised home (Taylor et al., 2006:297). Results found that participants from risky families exhibited decreased amygdala activation when observing negative and fearful faces, suggesting that they may be either habituated to these stimuli, or may be reflective of them avoiding threatening stimuli. When participants from risky families were forced to interact with the image by labelling what they saw they demonstrated greater activation than the control group. Taylor and colleagues (2006) argue that these results demonstrate that individuals from risky families have ineffective threat detection and emotion regulation skills.

Vulnerability to drug abuse

The neurobiology of addiction is an immense topic in itself but it is valuable to briefly mention the relationship between childhood maltreatment and engagement in drug use, particularly given its potential for involvement in the criminal justice system. A number of studies have found correlations between the experience of childhood maltreatment and an increased risk for engagement in substance abuse (Anda et al., 2006; Anderson et al., 2002; Benschley et al., 1999; De Bellis, 2002; Dube Felitti, Dong, Chapman et al., 2003; Ellason et al., 1996; Kendler et al., 2000; Simpson et al., 1994; Wilsnack et al., 1997). Sensitisation of the stress response system has been found to correlate with individuals being more responsive to drugs of abuse, which in turn makes them more vulnerable to drug addiction (Burke & Miczek, 2014: 1557; Marinelli & Piazza, 2002:387). Drugs of abuse induce large, rapid increases in dopamine levels which then particularly impacts on the nucleus accumbens in the amygdala where there exists a large number of dopamine receptors (Farmer R, 2009:142). Upon initial use, drugs of abuse increase the amount of dopamine in the brain, causing feelings of euphoria (Farmer R, 2009:142). Repetition of use however results in a decrease in both levels of dopamine and dopamine receptors, meaning that a larger amount of the drug is required in order to feel a reward (Farmer R, 2009:142). With the impairment of the dopamine system, brain processes that control reason and cognition also become impaired, including over-valuing drug rewards (Farmer R, 2009:146). Another possible contributing factor is that early childhood maltreatment may increase dopamine activity in an area known as the nucleus accumbens, the net effect of which is the experience of a baseline state of anhedonia (blunting of the capacity to experience pleasure), which in turn predisposes individuals to drug seeking behaviour (Matthews & Robbins, 2003).

Animal studies have used maternal separation/handling models to induce early-life stress (Moffett et al., 2007:321). Research has found that early-life stress in rat pups results in

profound neurochemical and behavioural alterations that persist into adulthood (Moffett et al., 2007). An examination of drug self-administration behaviour in rats uncovered neurochemical changes in neurotransmitters, particularly dopamine and serotonin, which may explain these profound changes in neurochemistry and behaviour (Moffett et al., 2007). Other animal studies have found that early-life stressors result in increased activity in a part of the brain called the locus coeruleus, as well as increased releases of norepinephrine (Abercrombie & Jacobs, 1987). Depressants such as heroin or alcohol work on the brain by decreasing the firing of the locus coeruleus (Bremner, Southwick et al., 1996). Individuals who experience increased activity in the locus coeruleus may therefore find relief in the self-medicating use of depressant drugs given their action on reducing the firing of this area of the brain. Unfortunately, withdrawal from the drug increases the activity of the locus coeruleus (Bremner, Southwick et al., 1996), thereby creating a vicious circle of addiction and withdrawal.

Whilst the precise neurological mechanisms of drug addiction are not entirely clear, it is hypothesised that early-life stress increases the risk of later engagement in substance abuse in three possible ways: changes to gating of the hippocampus as a result of early stress, elevated dopamine in the accumbens as a result of early stress or synaptic alterations in the PFC as a result of adolescent stress (Andersen & Teicher, 2009; McEwen, 2000; Rodriguez de Fonseca & Navarro, 1998; Sinha, 2001, 2008). Alterations in levels of catecholamines and CRF, as well as dysregulated HPA-axis that occurs during development, has been found to enhance the risk for engagement in substance abuse (De Bellis, 2002:164). This is thought to result from the dysregulating effect of chronic childhood maltreatment on the biological stress response system, increasing the vulnerability for engagement in drug abuse (De Bellis, 2002:164).

The neurobiology of addiction represents a growing area of research that is developing its understanding of the complex processes involved in the cycle of addiction. A precise neurobiological explanation of addiction is not only highly complex, but also beyond the scope of this thesis. The growing evidence on the influence of dysregulation of the stress response system makes it salient to experiences of childhood maltreatment given the evidence presented in this chapter of the impact of childhood maltreatment on the stress response system. It is clear that dysregulation of the stress response system results in a potential vulnerability to drug addiction, which in turn has implications for offending.

Maternal drug abuse

In addition to a vulnerability to drug use as a result of childhood maltreatment, research is emerging regarding the neurological impacts on newborn infants from antenatal maternal drug abuse (see Cass, 1997; Chang et al., 2004; Cloak et al., 2009; Frost &

Cadet, 2000; Golub et al., 2005; Oei et al., 2010; Ornoy & Ergaz, 2010; Sowell et al., 2008, 2010; Won et al., 2001). Research has discovered teratogenic effects of prenatal methamphetamine exposure result from an interference with the roles of monoaminergic transmitters, specifically dopamine, during brain development, which in turn can result in physical deviations in brain structures (see Cass, 1997; Frost & Cadet, 2000). There remains however a limited amount of controlled research regarding brain-behaviour relationship for prenatal methamphetamine exposed (PME) infants, particularly a lack of available brain imagery studies (Kwiatkowski et al., 2014:250). The effects of PME on the developing neurocircuitry and brain architecture therefore remain speculative at this point in time. There are numerous ethical issues that surround the undertaking of research into prenatal drug exposure, making this area of research difficult to explore (Kwiatkowski et al., 2014:250). Despite these difficulties, in their systematic review of the available literature Kwiatkowski and colleagues (2014) uncovered consistent patterns of abnormalities in brain development. These include abnormalities in the development of brain areas that are responsible for attention and memory regulation, visual-motor integration, and executive functioning (Kwiatkowski et al., 2014:251).

Due to the extensiveness and complexity of this issue, this thesis does not focus on this particular area of child maltreatment. This is also in part due to the difficulty in being able to separate the prenatal effects of drug exposure with the social and environmental stressors that are likely to exist after birth. For example, one study found that pregnant women engaged in amphetamine use were more likely than other drug-using pregnant women to be subject to domestic violence, to be homeless, to be involved with correctional services, and to have comorbid psychiatric illness (Oei et al., 2010). Additionally, amphetamine-using mothers were at greater risk of having preterm infants and less likely to breastfeed their infants, which has further implications for growth and development (Oei et al., 2010). It is therefore beyond the scope of this thesis to address the neurophysiological implications of maternal drug abuse on infant brain development.

Conclusion

Through reviewing the relevant literature collected as part of the first systematic review, two overarching themes have emerged as recurring themes: the impact of chronic childhood maltreatment on emotion regulation, which in turn has associated implications with social interaction, inhibitory control, and aggression; and its impact on cognition, including learning ability, memory, and higher cortical functioning. Both these areas can be considered elemental in placing individuals on the path towards criminality and incarceration. Poor education and disruptive interpersonal relations increases the likelihood of social isolation and engagement in antisocial behaviour. Additionally, learning and cognitive deficits result in difficulties in learning, limited education and poor

employment opportunities, which also increases the risk of engagement in criminal activity.

The major journals publishing this data were centred around neuroscience, psychiatry and developmental psychology, the American-based journal *Biological Psychiatry* publishing 22 of the studies relied upon in this review. It became apparent during this systematic review that social work has been reluctant to acknowledge neuroscience knowledge of the impact of childhood maltreatment on brain development and function, with no research papers being from social work-specific journals.

The overwhelming majority of the studies applied some form of comparison between maltreated and non-maltreated subjects. This application of positivist methodology is complicated by the fact that, unlike other scientific experiments, human experience and memory cannot be easily categorised into control groups. There remain a number of limitations that prevent the ability to undertake a strict cumulation of results, primarily due to methodological and definitional differences. For example, some studies relied on records from child protection agencies to categorise population subjects into either maltreated or non-maltreated, whilst others relied on self-report or the administration of standardised psychological questionnaires. Study populations also differed in terms of specification of abuse type, with some studies specifically studying an explicit type of abuse whilst other studies classified all forms of maltreatment under a general construct. Not only do concepts of what constitutes child maltreatment vary between studies, it is also impossible to tease apart other risk factors such as poverty, or exposure to parental violence, substance abuse, or familial psychopathology. Additionally, types of abuse may not occur in isolation. For example, a child may experience multiple forms of abuse or neglect and therefore being able to ascertain what experience results in a particular brain response is impossible. What is clear however is that regardless of the specific types of maltreatment experienced, childhood maltreatment in itself appears to produce definite alterations in brain development and function.

Building on the knowledge that was established in Chapter Five regarding the link between childhood maltreatment and offending behaviour, albeit with little regard for possible biological explanations, the next chapter will examine rehabilitation options for offenders as part of Australia's criminal justice system.

CHAPTER EIGHT: PRISONER REHABILITATION PROGRAMS

“Law, policy and practice that are biologically respectful are more effective and enduring... If society ignores the laws of biology, there will inevitably be neurodevelopmental consequences”

Dr Bruce Perry (2005, p. 4)

Introduction

As demonstrated in Chapter Five, consistent research within the field of social science has linked the experience of chronic childhood maltreatment with increased likelihood of engaging in offending. This link is perhaps more evident when examining offender populations specifically. For example, one Australian study using a sample of 800 young offenders established that 72 percent had experienced some form of childhood maltreatment. Given this link, and indeed the apparent profusion of childhood maltreatment experiences within offender populations specifically, it would seem intuitive that this knowledge be incorporated into offender rehabilitation programs. Furthermore, given the increased understanding of the neurobiological impact of chronic childhood maltreatment on the brain as discussed in Chapters Six and Seven, it would also seem intuitive that this knowledge too would be invaluable to the rehabilitation process. The relatively high rates of reoffending in Australia signal that correctional programs may not be fulfilling a primary purpose of our justice system, which is to rehabilitate offending behaviour. Preventing recidivism and reducing re-incarceration remain central priorities for state and federal governments, particularly given that research has demonstrated that a minority of repeat offenders are responsible for the majority of crime (Payne, 2007:100). This, combined with the increasing expenditure on criminal justice, makes addressing recidivism a central topic in Australian public policy.

This chapter will describe and analyse the current state of rehabilitation programs in Australia using official statistics and program evaluation reports, which overwhelmingly rely on recidivism as its measure of success. The differences in policy and practice across the various jurisdictions in Australia means that each jurisdiction responds differently and there is no one depository of information. This chapter is therefore not intended to provide an exhaustive description and analysis of all correctional rehabilitation programs currently available in Australia, but rather provide a summary of overall trends in offender rehabilitation and the theoretical underpinnings that advise them. After examining offender rehabilitation available in Australia, I will then discuss the emergence of therapeutic justice and its implications for alternative sentencing options, focusing on the emergence of specialist courts, and examining drug courts as an example. Finally, I

will critically analyse offender rehabilitation programs commonly available in Australia in light of the neuroscience knowledge uncovered and explored in previous chapters.

Influencing the framework for the analysis of this policy and program literature is Carol Bacchi's (2009) work analysing 'what the problem is represented to be' (WPR). In this work, Bacchi (2009) focuses on identifying dominant discourses and analysing how they are applied, enacted, and problematised, in order to challenge dominant assumptions and understandings within society. This type of discourse analysis is based on the presumption that the way in which a problem is represented will benefit certain groups over others. Bacchi (2009:1) argues that because policies inherently make proposals for change they are therefore implicit in defining the parameters of the problem, which is crucial as this then has implications on the way in which the response to the problem is formulated.

As social media and electronic communication play an increasingly central role in society, the use of language inevitably becomes more important. Politics is increasingly being played out in social media, making political discourse much more accessible to the public. With this increasing accessibility, critical analysis of discourse becomes even more crucial in order to be able to examine aspects of power and hegemony behind the rhetoric, particularly as the politics of funding is often hidden within the language of problematisations (Bacchi, 2000:50). The marketisation of public services forced to compete in a private market, further adds to the importance of language in terms of presentation and appeal (Fairclough et al., 2011: 358). For example, the dominant public discourse, such as 'tough on crime' rhetoric, that has emerged from neo-liberal politics has important implications for this thesis topic. The use of critical discourse analysis as part of this research design provides the thread that is used to link the somewhat disparate questions together to form a coherent whole.

The use of recidivism as a measure

As noted earlier, there are difficulties associated with relying on recidivism as a measure of program effectiveness, not least of which is the lack of universal clarity in defining the parameters of the measurement. It is important to clearly state that, as a critical researcher, I recognise that relying on recidivism as a measure of program effectiveness is incomplete and does not appropriately cover the multiple layers that comprise rehabilitation for offenders. For example, after completing an intervention an individual may have desisted from violent offences or break-and-enter crimes, and may have obtained education that has allowed for regular employment and stable housing, but may commit a minor traffic offence. By the application of recidivism as a measure of success this would be considered a failure. However, when taking considering other measures

such as education, employment, civic engagement or housing stability the outcome would be considered successful.

Bacchi's (2000:46) formulation of policy-as-discourse analysis that aims to highlight the generation of meanings in legal and policy debates is important here. The central aim of policy-as-discourse analysis is to identify reasons behind why progressive change has not been accomplished (Bacchi, 2000:47). This is both due to the ability of the dominant discourse to quash any attempts at change, as well as the way in which problems are represented, or indeed created, by the dominant discourse, which allows particular groups to maintain the positions of power and influence they have (Bacchi, 2000:47,55). Policy-as-discourse analysts believe that problems are shaped by the policy proposal responses generated by governments, as opposed to the problem existing as an independent fact (Bacchi, 2000:48). It is through policy-as-discourse analysis, and recognition of the institutional location of the creation of discourse, that attention is directed towards the power that particular actors have in the production of discourse (Bacchi, 2000:52).

The dominance of the meanings ascribed to rehabilitation and recidivism indicate that successful rehabilitation is largely measured by recidivism rates. This representation of success within the policy discourse ignores potential broader aims of rehabilitation such as housing stability, education, employment or improved interpersonal relationships. The policy discourse in this context represents the problem as being criminal activity but ignores the larger social, structural and political context that surrounds engagement in crime. In contrast, a more holistic approach would encompass the biological, social, structural and power influences on criminal behaviour.

Relying on recidivism as a measure of program success can also have significant implications for funding. The United Kingdom's Ministry of Justice released a position paper in 2013 titled *Transforming Rehabilitation – A Revolution in the Way We Manage Offenders*. The core proposals for rehabilitative reform centre around opening the provision of community-based offender rehabilitation services to the third sector for competition (Ministry of Justice, 2013:10). This was said to allow the public sector to focus on protecting the community rather than rehabilitation (Ministry of Justice, 2013:10). These third sector rehabilitation organisations “*will be paid by results according to achieving reductions in reconviction rates*” (Ministry of Justice, 2013:11). This has implications in terms of the likelihood that reporting offending would result in funding reductions and may therefore compromise the organisation (Guilfoyle, 2013:39). Whilst payment by results does promote a greater focus on program outcomes, the defining and measuring of these outcomes is more complex and controversial (Maguire, 2012:489). For example, higher

risk offenders with more complicated life circumstances may not be provided the same service as those who are easy to engage and more likely to succeed (Maguire, 2012:489).

Despite recognising this insufficiency in relying on recidivism as a measure of success, it remains the most extensively used measuring tool in order to analyse the effectiveness of the crime prevention strategies being used in Australia's criminal justice system. Recidivism represents an important measure to evaluate interventions, particular offender groups, or the constitution of a prison population (Payne, 2007:100), all of which generate important knowledge for criminal justice policy development and crime prevention strategies. Recidivism data is a simple and cost-effective form of data collection, given that other measurements of success would entail investigating individual circumstances in terms of employment, housing, relationships and other aspects of the offenders' lives, all of which take considerable time and money to evaluate (Maltz, 1984:24).

Recidivism rates in Australia remain consistently high despite increasing expenditure on the sector (an increase by 49 percent since 2002 [AIC, 2014:129]), not only by the state through correctional services, but also through heavy third sector reliance. Data gathered by the Australian Bureau of Statistics on 30 June 2014 provides a statistical picture of individuals in Australian prisons at a given point in time (ABS, 2014). This data found that 60 percent of prisoners had served a sentence in an adult prison prior to the current custody period being served (ABS, 2014). The rate of return to prison represents an important measure of recidivism. According to statistics gathered by the Australian Institute of Criminology, this rate has remained relatively consistent in Australia over the last five years (AIC, 2014:120). Of those prisoners released in the 2009-2010 period, 39 percent had returned to prison by 30 June 2012, and 46 percent had returned to some form of corrective services during the same time period (AIC, 2014:120).

Research undertaken by Smith P and colleagues (2002) into what is effective in reducing recidivism found evidence that incarceration is in fact associated with higher rates of recidivism in comparison to the imposition of community-based sanctions. Similar research also found that the longer the prison term, the higher the rate of future recidivism (Gendreau & Goggin, 1999). Imprisonment can have serious criminogenic effects on later criminal activity through a number of pathways, including prison acting as a teaching ground for crime due to exposure to more experienced criminals, the severing of familial and social relationships, the stigma of labelling after release, deskilling, increased reliance on criminal networks formed in prison, and reduced employment opportunities (Brown, 2010:141). Additionally, research has found corresponding negative effects of incarceration of large numbers of adult men on the social fabric of neighbourhoods, essentially resulting in an increase rather than decrease in crime in these

neighbourhoods (Przybylski, 2008:2). When large sections of particular populations experience imprisonment, the consequence becomes normalised with prison thereby losing its deterrent effect (Brown, 2010:142). All of these factors indicate the inadequacy of current prison and rehabilitation programs, particularly the trend of increased punitivism and imprisonment.

The Australian prison system

There are currently 113 custodial facilities across Australia; 85 government-operated prisons, fourteen 24-hour court cell complexes, nine privately run prisons, four transitional complexes, and one periodic detention centre (Steering Committee for the Review of Government Service Provision [SCRGSP], 2014:s.8.5). Consistent with changes in policy rhetoric towards a more punitive system, as discussed in Chapter Three, Australian incarceration rates have grown from 86 per 100,000 in 1984 to more than double at 185.6 per 100,000 in 2014 (ABS, 2014; Wood, 2014:100). This is reflected in budgetary responses where, for example, the 2014 Victorian budget allocated an additional \$447 million to expand around 900 beds in Victorian correctional facilities (Naphthine & O'Brien, 6 May 2014). Similarly, in South Australia an additional \$780,000 was allocated in the 2014-2015 budget to commission an extra 58 beds across a range of prison sites, in addition to \$6.7 million for the construction of prisoner accommodation at Port Lincoln Prison, 32 beds, and the Adelaide Women's Prison, 20 beds (Koutsantonis, 2014:30).

When a term of imprisonment is imposed, in addition to punishment and incapacity, an important aim of imprisonment, as stated in the legislation, is rehabilitation (see for example *Sentencing Act Vic* [1991]). Despite this objective, an examination of the health of Australia's prisoners in 2012 undertaken by the Australian Institute of Health and Welfare, found that just 35 percent of all prison discharges had participated in a correctional program whilst in prison (AIHW, 2012: 141). Twenty-eight percent of prison discharges specified that they had wanted to participate in a prison-run rehabilitation program but were unable to, mainly due to either being on remand or the prison term being too short (AIHW, 2012: 142). Other reasons included programs being unavailable at the prison (17 percent), waiting lists being too long (14 percent), or the individual not satisfying eligibility requirements for entry into the program (17 percent) (AIHW, 2012: 143). A clear factor impacting on rehabilitation is the very lack of availability of such programs.

Despite offender legislation that is focused on rehabilitation, this priority is generally held as secondary to community safety. For example the *Criminal Law (Sentencing) Act 1988* (SA) states,

“In determining the sentence for an offence, a court must give proper effect to... the need to protect the safety of the community” (s.10.2.1). Similarly, in NSW the *Crimes (Sentencing Procedure) Act 1999* states that the purpose of imposing a sentence on an offender is: *“(a) to ensure that the offender is adequately punished for the offence, (b) to prevent crime by deterring the offender and other persons from committing similar offences, (c) to protect the community from the offender, (d) to promote the rehabilitation of the offender, (e) to make the offender accountable for his or her actions, (f) to denounce the conduct of the offender, (g) to recognise the harm done to the victim of the crime and the community”* (s.3A).

Additionally, whilst most legislation does incorporate the concept of rehabilitation, specific reference to the actual aims of rehabilitation is less clear. For example, the *Sentencing Act 1995 (WA)* does not make any specific reference to the aim of rehabilitation, however section 33G.1(b) allows for a program requirement *“to provide an opportunity for the offender to recognise, to take steps to control and, if necessary, to receive appropriate treatment for [personal] factors”*.

The role of social work within the Australian criminal justice system

Social work has had a long history of engagement in the criminal justice system, spanning from the 1800s, not only in terms of advocacy of prisoner and victim rights, but also in formulating pre-sentence reports, risk assessments, and various forms of counselling and therapy (Brownell & Roberts, 2002:1). In fact, social work has been instrumental in advancing the rights of offenders despite ongoing challenges from conservative policy makers (Brownell & Roberts, 2002:10). In America the link between social work and corrections was first recognised in 1879 with the formation of the National Conference of Charities and Corrections, which eventually led to the formation of the first juvenile courts (Brownell & Roberts, 2002:5). Similarly, in 1885 the Prisoners Aid Association was formed in Adelaide to provide food, clothing and practical assistance to offenders upon release from prison, as well as relief services with prisons (Glanville, 1991). This convergence has continued up to the present day with the role of social work being expanded to include not just welfare and aid, but also assessment and rehabilitation. Social work therefore plays a pivotal role within the criminal justice system, not only in terms of prisoner advocacy, counselling and mental health services within prisons, but also in the provision offender rehabilitation services.

Continuing the neo-liberal trend that has been influencing government policy and practices since the 1990s, correctional rehabilitation services are increasingly being contracted out to third sector organisations that fall under the auspices of the social work profession (Maguire, 2012:483; Mills, Meek & Gojkovik, 2012:393). The Western Australian Annual Corrections Report for 2012/2013 reported spending \$27 million on the third sector, with 54 organisations being contracted to provide services assisting with

parenting skills, accommodation, drug and alcohol rehabilitation, re-entry from prison to the community, and life skills programs (Dept. of Corrective Services WA, 2013:77). The increasing reliance of government on third sector (social work) organisations to provide prisoner rehabilitation services places social work front and centre of the offender rehabilitation debate.

Offender rehabilitation

The complexity of variation in criminal sentencing legislation across Australia makes it a difficult task to tease apart the sentencing and rehabilitation options available to offenders. When applying Bacchi's (2009) framework of analysis for what the problem is represented to be within the policy discourse, McNeill (2012:22) provides an interesting summation of the history of rehabilitation. Historically incarceration was used as a form of confinement of 'sinners' in order to enforce a place for self-reflection on their behaviour, towards reform (often with the aid of 'divine intervention') (McNeill, 2012:22). In modern times there has been an incorporation of psychological and medical models of rehabilitation, which emphasise the need for the application of treatment to correct individual pathology causing deviant behaviour (McNeill, 2012:22). It is clear that the dominant discourse represents the problem of criminality as one of individual pathology or failure, largely ignoring the social, economic, and structural influences on criminal behaviour.

According to Sarre (2001:38), Robert Martinson's 1974 seminal article entitled '*What works?*' has been instrumental in creating a socially constructed reality that attempts at prisoner rehabilitation were doomed to fail. In his prominent article Martinson is quoted as stating,

"It may be... that there is a more radical flaw in our present strategies – that education at its best, or that psychotherapy at its best, cannot overcome, or even appreciably reduce, the powerful tendencies of offenders to continue in criminal behavior" (Martinson, 1974:49, cited in Sarre, 2001:39).

Despite Martinson publishing an article in 1979 that recanted his original position on the futility of prisoner rehabilitation programs, this article has received much less acclaim (Sarre, 2001:41). Hence, as Sarre argues, the scene was set for a perpetuation on behalf of policy makers to mistrust the effectiveness of prisoner rehabilitation programs (Sarre, 2001:42). This perception was further reinforced when the US Supreme Court removed the goal of rehabilitation from serious consideration when sentencing offenders (Sarre, 2001:42). Sarre (2001:42) contends this mistrust of the effectiveness of investing in prisoner rehabilitation programs is evident in Australia today where, despite legislation acknowledging rehabilitation as being an aim of sentencing, the specific terminology surrounding the concept is ambiguous. For example, the Victorian *Sentencing Act 1991*

(Part 1 (d) (ii)) states that the purpose of the act is to provide “*sentences that facilitate the rehabilitation of offenders*”. Similarly, in the NSW *Crimes (Sentencing Procedure) Act 1999* the acknowledgement of rehabilitation as a purpose of sentencing is positioned after other goals of ensuring the offender is punished, deterring the offender or other potential offenders from committing the same offence, and protecting the community from the offender (Section 3A(d)). Similarly in South Australian sentencing legislation, the purpose of the act positions rehabilitation as the thirteenth out of fifteen purposes (*Criminal Law (Sentencing) Act 1988* [SA] Section 10.1 (m)). The positioning of rehabilitation as secondary to punishment and deterrence highlights the framing of the problem as being one which resides within the offender, reiterating the dominance of punishment as a priority in criminal legislation.

The dominance of neoliberal ideology within correctional program discourse can be witnessed with the emergence of programs designed to redress ‘cognitive distortions’, which are described as the rationalisation of criminal behaviour through offence-supportive attitudes and excuses for offending (Kramer, Rajah & Sung, 2013:537; Barriga et al., 2000:54; Maruna & Mann, 2006:155). Treatment programs that address this ‘cognitive distortion’ are designed to encourage the offender to take responsibility for his/her actions and to address cognitive schemas that are linked to reoffending behaviour (Maruna & Mann, 2006, 155). This concept emerged from what has become known as Gresham Sykes and David Matza’s (1957) ‘neutralisation theory’, which argues that the cognitive justifications used by offenders is implicated in the etiology of deviant behaviour itself. Neutralisation theory has been integrated into a number of different theories and explanations, including learning theory (Akers, 1985:60), control theory (Hirschi, 1969:199), rational choice theory (Clarke and Cornish, 1985:160), reintegrative shaming theory (Braithwaite, 1989:24), as well as elements of cognitive therapy (Ross & Fabiano, 1983). It is a concept that has had considerable influence on criminology in modern times, and as Maruna and Copes (2005:3) note, Sykes and Matza’s paper is one of the most frequently cited articles in its field. The dominance of cognitive change interventions in offender rehabilitation discourse in Australia is reflective of its influence. Again, in applying Bacchi’s (2009) ‘WPR’ methodology it becomes clear that Australian policy discourse frames the ‘problem’ as inherently within the individual with criminal behaviour being the result of ‘cognitive distortions’.

As was highlighted in Chapter Three, the neoliberal agenda of privatisation is prevalent in the correctional system, with there currently being nine privately run correctional facilities across Australia (SCRGSP, 2014). Whilst in part it may be argued that this is a necessary response to the swelling prisoner numbers across Australia (ABS, 2015), by transitioning prisons over from state-run facilities that serve the public towards private

enterprises whose primary goal is profit, the 'tough on crime' response transforms into an entirely different agenda given that increased prison numbers equal increased profits for the privately run prisons. In fact, in their 2010 Annual Report America's largest privately run prison company, Corrections Corporation of America, stated,

“The demand for our facilities and services could be adversely affected by the relaxation of enforcement efforts, leniency in conviction or parole standards and sentencing practices or through the decriminalization of certain activities that are currently proscribed by our criminal laws” (CCA, 2010: 20).

This therefore begs the question as to whether private correctional facilities are genuinely committed to providing effective rehabilitation given that this is likely to result in a reduction of offenders and therefore a reduction in profits.

Whilst offender rehabilitation programs may differ in terms of focus area, these programs remain largely underpinned by cognitive behaviour models, which locate the cause of offending as within the individual (Day, 2011: 349). The use of cognitive behaviour skills in offender rehabilitation emerged from Canada 1985 when Ross and Fabiano introduced their work titled, *Time to Think: A Cognitive Model of Delinquency Prevention and Offender Rehabilitation*. A major theory underpinning cognitive behavioural models is the Personal, Interpersonal, Community Reinforcement Perspective on Deviant Behaviour (PIC-R), which directs attention towards factors that actively encourage or discourage deviant activity (Andrews, 1982). It is argued that personal, interpersonal, and community factors interact to develop, maintain and modify behaviours and emphasises the influence of rewards and costs on deviant behaviour (Andrews, 1982:iv). Cognitive behavioural models focus on changing maladaptive cognitions, which are identified as being criminogenic factors leading to criminality that are either self-centred attitudes or blaming or minimising actions (Day, 2011:350). Since that time cognitive skills programs have emerged as a core feature of offender rehabilitation programs in the USA, UK and Canada, with Australia now beginning to follow this trend (Heseltine, Day & Sarre, 2011:24). There have been a limited number of critical evaluations of cognitive skills programs in correctional facilities, however despite early promise, recent research has generated mixed results (Heseltine, Day & Sarre, 2011:24).

Early research into the efficacy of cognitive skills programs (CSP) demonstrated a reduction in recidivism rates (see Robinson, 1995; Friendship et al., 2002), however subsequent evaluations showed no statistical significance in recidivism rates between comparison groups two years post-release (see Falshaw et al., 2003; Cann et al., 2005). In reviewing the available evaluation literature for cognitive skills based programs, Heseltine, Day and Sarre (2011:25) conclude that program completion is generally associated with a reduction in recidivism one-year post-release, however this does not appear to be

maintained across a longer period of time. In terms of efficacy of cognitive skills programs for female offenders in particular, there is a paucity of information (Heseltine, Day & Sarre, 2011:25), however Cann's (2006) research into cognitive skills programs designed for men and adapted for women found no significant differences between program participants and matched comparisons for recidivism rates in a one and two year post-release period.

Whilst prison programs vary across jurisdictions, prison rehabilitation programs adhere to similar principles that underlie the foundations of these programs. In reviewing the various rehabilitation programs within Australian prison systems, I refer extensively to the key work of Heseltine, Day and Sarre (2011), and their insights into Australia's prison-based correctional rehabilitation programs. In reviewing the literature there appears to be two main schools of thought underpinning correctional programs in Australia: the Risk-Needs-Responsivity Model (RNR) and the Good Lives Model. Neither model overtly incorporates language and knowledge drawn from neuroscience.

Offender rehabilitation programs are still in their infancy having emerged in the 1990s with the dominant theoretical discourse of the Risk-Needs-Responsivity (RNR) Model that was developed by Canadian psychologists Andrews and Bonta (1998) (Polaschek, 2012:1). This model emerged out of a punitive climate within correctional systems that were mainly focused on punishment and was an attempt to understand the psychology behind offending behaviour through the application of general personality and social learning theory (Ogloff & Davis, 2004:230,236). In response to this climate the model presented empirical research advocating that appropriate assessment and rehabilitative intervention reduces recidivism as opposed to incarceration alone (Ogloff & Davis, 2004:236). The model is essentially comprised of three principles: risk, need, and responsivity. The risk principle uses previous research to identify static risk factors (for example, offence history, age of onset of criminal behaviour, or family structure) and dynamic risk factors, which are factors amenable to change through rehabilitation. The needs principle targets criminogenic needs that contribute to offending behaviour, and the responsivity principle focuses on creating a therapeutic intervention that meets the needs of the target population (Day, Howells & Rickwood, 2004:2).

The Good Lives Model of offender rehabilitation (Ward, 2002; Ward & Stewart, 2003; Ward & Maruna, 2007) has emerged as an alternative to the RNR model, arguing that the RNR model places too much emphasis on risk assessment at the expense of other psychologically relevant factors (Ogloff & Davis, 2004:236). In the Good Lives Model, offending is not seen as a deficit in cognitive skills but as a moral issue, with the emphasis being placed on improving the psychological wellbeing of offenders (Day, 2011:355;

Ogloff & Davis, 2004:236). Ward and Stewart (2003) argue that the primary goal of offender rehabilitation should be to promote a fulfilling lifestyle through *“friendship, enjoyable work, loving relationships, creative pursuits, sexual satisfaction, positive self-regard, and an intellectually challenging environment”* (p.142). They argue that both internal (psychological characteristics) and external (social, cultural and interpersonal) conditions impact on the attainment of an individual’s basic needs, and barriers to the attainment of one’s basic needs result in the development of criminogenic needs in order to compensate. A major criticism of the RNR model is that it lacks empirical evidence to support its efficacy (Bonta & Andrews, 2003). There are also concerns that the model removes the focus from criminogenic needs of the offender that exacerbate offending behaviour and places too much emphasis on promoting psychological wellbeing, which may then reinforce pro-criminal attitudes (Ogloff, 2002:249).

Overall, in terms of program areas, rehabilitative legislation concentrates on four main areas that are believed to be significant in promoting rehabilitation: cognitive change programs, drug and alcohol treatment and education, the promotion of ‘pro-social’ networks, and the development of life and vocational skills. Each jurisdiction develops their own programs loosely based on these same focus areas. For example, ACT’s prison, the Moonachie Centre, has specific treatment components, including group counselling, alcohol and other drug education and cognitive skill-building activities to address criminogenic risk factors (Hargreaves, 2009:150). Treatment areas include socialisation, the promotion of a pro-social lifestyle, and assistance with developing drug-free social networks (Hargreaves, 2009:152). Furthermore, to assist in rehabilitation of prisoners a pre-release Transitional Release Centre has been developed that provides opportunities for prisoners to develop their life skills in activities such as group living, budgeting and cooking, as well as assisting with finding employment, maintaining family relationships and readjusting to life outside prison (Hargreaves, 2009:152).

Specific rehabilitation programs available within Australian prisons

In addition to more generalist rehabilitation programs there are also specific offence-type programs. Sex offender programs are routinely incorporated into mainstream prison programs across Australia (Heseltine, Day & Sarre, 2011:14). Therapeutic treatments are informed by cognitive and behavioural strategies and are generally delivered in mixed groups of up to twelve offenders (Heseltine, Day & Sarre, 2011:15). In their examination of prison-based correctional services throughout Australia, Heseltine, Day and Sarre (2011:15) acknowledge that these programs aim to

“develop insight (both historical and proximal) into the offending cycle, increase understanding of the effects of the offence on the victim, challenge cognitive distortions, modify deviant arousal, explore the role of fantasy in offending, develop intimacy and relationship skills, enhance problem

solving and to develop an individualised relapse prevention plan” (Heseltine, Day & Sarre, 2011:15).

Furthermore, the introduction of dangerous offender legislation in various jurisdictions across Australia has resulted in increased media attention and focus on rehabilitation of these offender groups as a distinct focus group (Heseltine, Day & Sarre, 2011:18). An examination of prison populations in June 2014 found that 21 percent had committed acts intended to cause injury and 12 percent had committed sexual assault (ABS, 2014). As a result of these high numbers of violent offences significant resources are directed towards rehabilitation of this particular population group (Heseltine, Day & Sarre, 2011:17). Violent offender treatment programs are delivered coherently across jurisdictions and are theoretically underpinned by Cognitive Behavioural Theory (Heseltine, Day & Sarre, 2011:19). In their systematic review of data, Heseltine, Day and Sarre (2011:19) state that whilst pre- and post-program measures are established as part of program delivery, publications from this data are not publically available, making it very difficult to establish the efficacy of such programs.

Within rehabilitation programs there are also programs that are tailored to domestic violence offenders. Social learning and behaviourist theories have now replaced feminist theoretical orientations that originally underpinned domestic violence programs, particularly the use of cognitive behavioural strategies (Heseltine, Day & Sarre, 2011:23). Current domestic violence programs aim to develop offender insight into the nature of abuse, providing strategies to manage negative emotions and enhance affect regulation, altering attitudes associated with violent behaviour and aggression, as well as increasing understanding of consequences of behaviour and victim impact (Heseltine, Day & Sarre, 2011:23). Offenders are also assisted with enhancing interpersonal relationship skills and developing a relapse prevention program (Heseltine, Day & Sarre, 2011:23).

There are four categories of substance use programs offered to offenders in Australia: harm reduction programs, which aim to educate offenders about reducing high-risk behaviours, such as overdose and infection transmission, and enhance awareness of the physiological effects of substance abuse; psycho-education programs, which aim to highlight the connection between substance use and offending behaviour; therapeutic programs, which aim to develop coping mechanisms, alternative behaviours, problem solving, and relapse prevention programs; and finally prison-based therapeutic communities, which are the most intensive type of program with offenders engaging in a dedicated therapeutic environment (Heseltine, Day & Sarre, 2011:26).

This brief review of offender rehabilitation options available within Australia's correctional system has highlighted the permeation of neoliberal ideology not only in terms of increased punitiveness in sentencing and punishment, as discussed in Chapter Three, but also in the placement of blame on individual pathology. Given the influence of this dominant paradigm it is not surprising that cognitive behavioural models have secured their own dominance within offender rehabilitation discourse. Despite this however there are alternative options coming to the fore, born out of the emergence of therapeutic jurisprudence. The following section discusses the growing trend of therapeutic jurisprudence and what it can offer in terms of successful rehabilitation.

Therapeutic jurisprudence and alternatives to incarceration

Since 2009 there is growing advocacy in favour of the implementation of justice reinvestment initiatives (Brown, 2010:138; Wood, 2014:101). Justice reinvestment argues that the current pattern of financial expenditure on prisons and incarcerated populations is not necessarily being managed and allocated in the most cost-effective way, in terms of reducing crime, reoffending, and managing public safety (Wood, 2014:102). With that in mind, despite the trend towards punitive sentencing measures, there are also a number of early prevention, intervention, and diversion programs available in Australia; however, the impact of these is limited by inadequate and sporadic funding, as well as geographical barriers (NACLC, 2013:12). Examples of alternative sentencing options include community-based correction orders, which are non-custodial orders issued as a sentencing option by criminal courts (ABS, 2012), as well as Intensive Correction Orders (ICO), which is a term of imprisonment that is served by way of intensive correction served in the community rather than prison (Ringland, 2012:1). As part of an ICO the offender is required to engage in a specified number of hours of community service work each month, must participate in programs to address offending behaviour, and must submit to drug testing (Ringland, 2012:1).

A recent Australian study by Ringland and Weatherburn (2013) compared the risk of reoffending between individuals who received Intensive Corrections Orders (ICO) and those who received a sentence of periodic detention and suspended sentence with supervision. Results demonstrated that offenders who receive an ICO were 33 percent less likely to reoffend compared with offenders sentenced to periodic detention (Ringland & Weatherburn, 2013). There were however no significant differences in risk of reoffending compared with those who received ICOs and those on supervised suspended sentences (Ringland & Weatherburn, 2013). This suggests that periodic detention is relatively ineffective compared with other sentencing options.

Other alternative sentences include options such as Drug Treatment Orders (DTO) or the Magistrates Early Referral Into Treatment (MERIT) program. Legislation for referral to a Drug Court exists in New South Wales, Victoria, Queensland, Western Australia, and Tasmania (*Sentencing Act 1991* [Vic] s.18Z; *Sentencing Act 1997* [Tas]). There are two components involved in drug courts: the custodial sentence of up to two years, which is suspended upon entering the drug court, and the treatment and supervision component. If the order is suspended prior to completion the suspended sentence is revoked. Drug Treatment Orders will be discussed in greater detail later in this chapter. The (MERIT) Program aims to provide focused treatment for offenders with drug and alcohol problems whilst on bail for offences (NSWLRC, 2013:131). Referral to the program requires magistrate's approval and consent from the offender, and defendants with physical violence and sexual assault charges are ineligible (NSWLRC, 2013:131). Program completion can alter sentencing outcomes for offences (NSWLRC, 2013:133). Similar programs to this are offered across other jurisdictions: QMERIT in Queensland, Court Referral for Eligible Defendants into Treatment (CREDIT) Program in NT, Tasmania's Court Mandated Diversion Program, ACT's Court Alcohol and Drug Assessment Service (CADAS), Victoria's Court Referral for Evaluation for Drug Intervention and Treatment/Bail Support Program, and South Australia's Treatment Intervention Program (NSWLRC, 2013:135).

Whilst these sentencing options represent alternative options to imprisonment, there are definite inequalities in their accessibility. For example ICOs are not accessible for rural or regional offenders (Ringland, 2012:9). A study by Ringland (2012:9) found that many ICO facilities are inaccessible by public transport. In 2006 the Standing Committee on Law and Justice in NSW released a report examining the availability of community-based sentencing options in rural and remote areas and disadvantaged populations. The report highlighted that there is inequitable access to sentencing options due to the number of geographical areas throughout the state where no form of community based sentencing was available (p.61). This inequality is summarised succinctly in comments made by Magistrate David Heilpern in regard to presiding over matters in regional courts;

"If I sit in the city... I have options such as the Drug Court, the Magistrates Early Referral Into Treatment Program, home detention, periodic detention, sex offender programs – a whole range of sentencing options that I do not have here, and have never had at any of the courts in which I have sat" (2006:36, 3.18).

Therapeutic jurisprudence is *"the use of social science to study the extent to which a legal rule or practice promotes the psychological and physical well-being of the people it affects"* (Slobogin, 1995:196). Therapeutic jurisprudence describes the way in which the law can act as a therapeutic agent (Wexler, 1997:233). There are two basic approaches to undertaking

therapeutic jurisprudence: a Law-Based Approach examines the therapeutic or anti-therapeutic effects of a law, while a Psychology-Based Approach examines the ways in which a particular psychological advance can be enacted into law and the legal system (Wexler, 1997:233). Therapeutic jurisprudence emerged from the acknowledgement that legal rules and their application ignore the underlying causes for offending, and does little to achieve long-term solutions (Winick, 2003:1063). It therefore focuses on analysing the therapeutic impact of legal rules and procedures by relying on insights from psychology and the behavioural sciences (Winick, 2003:1063, 1064).

Therapeutic jurisprudence underpins the development of problem-solving courts. The philosophical underpinning of the development of problem-solving courts is to increase the scope of legal proceedings from simple adjudication towards promoting behaviour change and improving the well-being of communities (Berman & Feinblatt, 2001:126). Common features of specialist courts include a greater focus on individual case outcomes, active use of judicial monitoring and collaboration between non-government providers of service (Bartels, 2009:3). Whilst specialist courts have therapeutic objectives, traditional goals of criminal justice, such as punishment, deterrence and community protection are still central (Lim & Day, 2013:37). Strict eligibility requirements exist for offenders to access specialist courts, including geographical restrictions, current offence type, prior offending history, capacity to participate, and drug and alcohol dependency (Payne, 2006:4). In Australia, the legislative context for offender rehabilitation programs is varied across jurisdictions, which generates difficulties in creating a coherent and nation-wide strategy (Heseltine, Day & Sarre, 2011:4). Additionally, each jurisdiction has different sentencing legislation within which to work, leading to gross variations in the options available for sentencing and rehabilitation. Even within jurisdictions, geographical location of the commission of the crime or offender's residence will determine whether particular sentencing and rehabilitative option are available. For example, Family Violence Courts and Drug Courts will only service the geographical area within which they are located. Various diversion programs operate across Australia, including pre-arrest and pre-trial initiatives that aim to divert the offender away from the criminal justice system, while pre-sentence, post-conviction and pre-release programs aim to concurrently treat the offender whilst being dealt with by the criminal justice system (Pritchard, Mugavin & Swan, 2007:xv). Many offenders are excluded from these options for a number of reasons: alcohol misuse alone rarely meets the criterion for diversion programs, many offenders are excluded due to past or present violence, and offenders with concurrent mental illness are often deemed unsuitable for participation programs (Pritchard, Mugavin & Swan, 2007:xv, xvi).

Problem solving courts seek to more effectively combat the underlying causal factors to criminal behaviour. These courts first emerged in America with the creation of the first drug court in Dade County, Florida, in 1989 (Berman & Feinblatt, 2001:126). This largely emerged in an effort to address criminal recidivism that was directly linked to substance use, and operated by judicially imposing drug treatment programs as an alternative to custody (Berman & Feinblatt, 2001:126). Whilst there has been an increasing emergence of problem-solving courts throughout the world, there is no research that incorporates the physiological impact of trauma on the developing brain into a therapeutic legal response. Problem-solving courts in Australia have emerged in response to specific needs of offenders, in particular drug and alcohol misuse, mental illness and family violence (Pritchard, Mugavin & Swan, 2007:15), and are underpinned theoretically by the concept of therapeutic jurisprudence (Winick, 2003:1062).

A number of alternative court structures have been introduced across some jurisdictions in Australia, including Koori courts, family violence courts, drug courts, and neighbourhood justice centres. Another example of problem-solving courts has been the emergence of community courts. These courts target misdemeanour crimes, such as prostitution, shoplifting or low-level drug possession (Berman & Feinblatt, 2001:127). Offenders are sentenced to perform community restitution in order to 'pay back' the community for the harm caused by their criminal behaviour (Berman & Feinblatt, 2001:127). As part of the order offenders are provided with social services, such as drug treatment or employment training, in order to address underlying issues that contribute to engagement in criminal activity (Berman & Feinblatt, 2001:127). Concurrently the local community also participates in the justice process with involvement in aspects such as advisory boards, community mediation, or victim-offender impact panels (Berman & Feinblatt, 2001:127). Whilst much research has been completed examining the effectiveness of drug courts, there is less literature on the effectiveness of the newer problem solving courts, such as community courts, domestic violence courts, family treatment courts, or mental health courts (Berman & Feinblatt, 2001:133).

Family violence courts

There are currently Family Violence Courts in operation in Victoria, South Australia, Western Australia, Queensland, and the ACT. The primary aims of these courts are to improve responses of the criminal justice system to domestic violence by increased prosecution of offenders, providing victim support and enhancing community awareness (Payne, 2006: 3). In 2006 the Victorian Government established two Family Violence Divisions within the Heidelberg and Ballarat Magistrate's Courts. These courts only serve individuals who live within the postcode for which the court covers or where the crime

was committed within the postcode. Other jurisdictions have similar geographical restrictions.

Mental health diversion courts

There are three Mental Health Diversion Courts that have been established in Australia, existing in South Australia, Tasmania, and Victoria (Lim & Day, 2013:36). Mental Health Courts are problem-solving courts based around treatment (Lim & Day, 2013:37). There is a paucity of tangible evidence as to whether adult mental health courts are successful in reducing recidivism, with the majority of evaluations emerging from the United States (Lim & Day, 2013:37). This lack of evaluative research makes it difficult to develop evidence-based public policy (Lim & Day, 2013:43). Lim and Day (2013:37) argue that available evaluations are methodologically flawed, for example not using comparison groups, or not establishing a base rate for which recidivist offending can be compared. There has been one study of the South Australian MCDP by Skrzypiec, Wundersitz, and McRostie (2004), which concluded that approximately two thirds of the participants in the program had not reoffended 12 months post-program completion, compared with just seven percent who had not reoffended in the 12 months prior to undertaking the program. Unfortunately participants with at least five previous convictions, with substance abuse issues, physical health problems, housing instability and comorbid mental health diagnoses were more likely to reoffend (Skrzypiec, Wundersitz & McRostie, 2004).

Victoria's Neighbourhood Justice Centre

This problem-solving court is available in one location and provides a community justice model of corrections that promotes restorative justice and problem-solving between the offender, the victim and the community in order to support individuals not to reoffend (NSWLRC, 2013:144). An initial evaluation of the program found that recidivism rates reduced from 41 percent to 34 percent and compared with matched offenders who attended other courts, offenders who participated in the NJC were 14 percent less likely to reoffend (Neighbourhood Justice Centre, 2010).

Drug courts

Traditional responses to drug use and crime have involved the introduction of severe penalties, resulting in increased prison populations, compulsory treatment centres or labour camps, however this response has had little impact on drug-related crime or drug dependence (Gerra & Clark, 2010:9). The increasing number of offenders engaged in drug and alcohol abuse have resulted in some countries across the world investing in drug courts in order to divert offenders away from imprisonment and instead receive supervised drug treatment orders (United Nations Office on Drugs and Crime

[UNODC], 2007:64). International drug control conventions promote this alternative as it is found to be far more effective in reducing drug-related crime and drug dependency (Gerra & Clark, 2010:9). Drug courts are problem-solving courts that are designed to incorporate treatment and rehabilitation programs as supervised by the court for offenders whose criminal offences have been related to drug addiction (Loxley et al., 2004:216).

Alternative sentencing options are emerging in Australia based on concepts of therapeutic jurisprudence, including a number of specialist courts. There are three main arguments against the establishment of specialist courts in Australia. Firstly, there is contention that specialist courts overlap with various jurisdictions thereby creating a duplicating effect (Moore, 2001:np). Secondly, the creation of different courts may result in the fragmentation of the court system and thereby undermine the overall legitimacy of Australia's justice system (Moore, 2001:np). Finally, scholars have argued that focusing on the development of specialist courts may be a reaction to failures of the general court system and may therefore be viewed as an easier option than embarking on overall reform of the general court system (Moore, 2001:np). As Justice Moore highlights,

“Fragmentation of the court system may undermine the appearance of an independent court system and weaken the whole fabric of what ought to be an integrated and all-embracing system of general courts with ultimate responsibility for protecting the democratic rights and freedoms of citizens” (2001:np).

A closer look at Australia's drug courts

Having discussed the emergence of specialist courts as a result of increasing adherence to therapeutic jurisprudence, the following section will examine in greater detail Australia's drug courts in order to more closely analyse the actual approaches underpinning these programs. In particular this section will focus on the operation of the Victorian Drug Court, although the objectives of the programs and eligibility and exclusionary criteria for participation are reasonably consistent across jurisdictions.

The first drug court in Australia was created under the *Drug Court Act 1998* (NSW) and began operating in Parramatta in 1999 (Pritchard, Mugavin & Swan, 2007:45). This was in response to the increasing harm caused by illicit drug proliferation in society and government attempts to combat this problem (Swain, 1999). Conceptually, drug courts operate for offenders who are charged with a drug-related offence. These offenders are required to plead guilty and instead of receiving a sentence of incarceration, they are court-ordered to participate in a drug treatment rehabilitation program (Moore, 2001:np).

In Australia, drug courts are currently in operation in all states and territories except Tasmania and the ACT, and operate as either specialist courts or specialist divisions of the magistrates' courts (NSWLRC, 2013:143). Tasmania does however have the legislative capacity to impose Drug Treatment Orders through the general magistrate's court (NSWLRC, 2013:143). Drug courts impose treatment orders that include judicially supervised detoxification and drug treatment programs, however they are only currently available in limited geographical locations within jurisdictions (NSWLRC, 2013:143), meaning that referral to a drug court will also depend on the geographical location of the crime or offender's residence.

Comparative evidence of reoffending rates between offenders who complete drug treatment orders and those who do not consistently show a reduction in reoffending rates (see Ziersch & Marshall, 2012; Makkai & Veraar, 2003; Payne, 2005, 2008). A meta-analytic review of evidence of the effectiveness of drug courts on recidivism in America found that adult drug courts are effective at reducing recidivism rates with the average effect on recidivism being a reduction from 50 percent to 38 percent, with these results lasting for up to three years post-release (Mitchell et al., 2012). These reductions were found mainly in courts that had a high successful graduation rate and in those who did not accept violent offenders (Mitchell et al., 2012). Another meta-analysis conducted in Canada similarly found that drug courts reduced recidivism rates by 14 percent compared with matched non-participants (Latimer et al., 2006). Programs of at least 12 to 18 months duration were found to be more effective in reducing recidivism than short-term programs (Latimer et al., 2006:14).

Longshore and colleagues (2001) have developed a conceptual framework consisting of five dimensions in an attempt to explain the effectiveness of drug courts. These dimensions include leverage in the use of sanctions and rewards to promote pro-social behaviour, population severity, with drug courts generally excluding more problematic offenders such as violent offenders or those with mental health issues, program intensity, with the more intense the program the greater the impact on recidivism, predictability, with consistency of rewards and sanctions and time relevant application of response to non-compliance being important, and the emphasis on rehabilitation, with a more holistic focus on treatment rather than emphasizing punishment being more effective (Longshore et al., 2001).

There are few comprehensive evaluations of Australia's drug courts, with evaluations of the NSW drug court in 2002 (Freeman, 2002; Taplin, 2002) and 2008 (Weatherburn et al. 2008), Queensland in 2003, 2005 and 2008 (see Makkai & Veraar, 2003; Payne, 2005, 2008), and South Australia in 2007 (see Harkin, Fletcher & O'Brien, 2007) and 2012 (see

Ziersch & Marshall, 2012). Completed evaluative research demonstrates that post-completion offending is significantly reduced with successful completion of the program, with reoffending rates 17 percent lower than offenders given conventional sanctions (Weatherburn et al., 2008), and time taken to reoffend being significantly longer (Payne, 2005:13; Makkai & Veraar, 2003:8), and offenders who do not complete the program reoffend sooner than graduates (Ziersch & Marshall, 2012:4). Successful completion rates across jurisdictions stand at a little over a third of total participants (36.1 percent in SA, 34.8 percent in North Queensland, and 40.2 percent in NSW) (Ziersch & Marshall, 2012:4; Payne, 2005:13; Makkai & Veraar, 2003:8). In a study conducted at the South Australian Drug Court into retention rates, key differences emerged between ‘completers’ and ‘terminators’ (Skrzypiec, 2006:1). Completers were more likely to express feelings of social isolation and financial hardship, and were more likely to have begun abusing alcohol prior to adulthood (Skrzypiec, 2006:1). In contrast, terminators reported greater familial isolation and a lack of support (Skrzypiec, 2006:2). While offences of theft were similar across comparison groups, terminators were more likely to have more recorded offences and to have engaged in additional offences involving weapons (Skrzypiec, 2006:2).

In their review of drug treatment courts Olson, Lurigio and Albertson (2001:192) found that it is important that practices of determining eligibility are often only based on a review of the individual’s criminal record, which does not provide a very comprehensive picture of the needs of that individual. The fact that problem-solving courts exclude individuals with prior convictions for violent offences is also of concern and highlights the need for further exploration and research (Olson, Lurigio & Albertson, 2001:192), particularly given that it is the recidivism of these more serious offences that would be most important to reduce.

Victorian Drug Court

The Victorian Drug Court was operationalised in 2002 as part of the Dandenong Magistrates’ Court (Magistrates’ Court of Victoria [MCV], 2013:59). The Court is responsible for the sentencing and supervision of offenders whose drug and alcohol misuse has contributed to their offending (MCV, 2013:59). Section 18Z of the *Sentencing Act 1991 (Vic)* sets out the eligibility requirements for referral to the Drug Court. The offender must plead guilty to the charge(s), must reside within a restricted postcode area, be likely to have a sentence of immediate imprisonment and must consent to the order. In addition to these eligibility requirements set out in the *Sentencing Act 1991 (Vic)*, the offender will not be accepted if they have committed a sexual offence or an offence that has caused actual bodily harm (MCV, 2013:59). If offenders are accepted into the Drug Court program they are placed on a Drug Treatment Order (DTO), under which the magistrate will

sentence the offender to a period of imprisonment not exceeding two years, which is wholly suspended whilst on the DTO, and not activated unless the offender fails to comply with the DTO (MCV, 2013:59). The aims of the DTO are to facilitate drug and/or rehabilitation through treatment and supervision, to reduce the level of criminal activity, and to reduce the overall health risks associated with drug and alcohol misuse (MCV, 2013:59). As part of the DTO the offender is required to submit to alcohol and drug screening tests, to attend regular supervision sessions, and regular court hearings with the magistrate (MCV, 2013:59). A system of rewards and sanctions are used to motivate behavioural change (MCV, 2013:59). When the offender does not comply with the DTO, for example by engaging in drug or alcohol use, committing further offences, or failing to attend supervision, sanctions are applied (MCV, 2013:59). If a certain number of sanctions have accumulated the offender will be required to serve a short period of incarceration.

Upon acceptance of a referral by either a Magistrates' Court or County Court, a screening interview is conducted by a Drug Court Case Manager (MCV, 2013:59). If accepted, the matter is adjourned for a period of three weeks to allow for assessments to be carried out by a Drug Court Clinical Advisor, who manages the treatment component of the DTO, and the Drug Court Senior Case Manager, who manages the corrections component of the DTO (MCV, 2013:59). This will provide background information that will inform the treatment plan (MCV, 2012:online). Each offender is managed by a multi-disciplinary team, which includes the Drug Court Case Manager, who is employed directly by the Department of Justice and manages the correctional component of the order, the Drug Court Clinical Advisor, who is also employed directly by the Department of Justice and manages the treatment component of the order, a drug and alcohol counsellor, who is contracted from third sector organisations, and if necessary a homelessness assistance officer, also contracted from a third sector organisation (MCV, 2012:online). In addition, conferencing sessions will also include a dedicated Magistrate, a dedicated police liaison officer, a dedicated police prosecutor, and legal aid (representing the offender) (MCV, 2012:online). The number of offenders on a DTO cannot exceed 60 at any particular time (MCV, 2013:60). All drug treatment programs in Victorian corrections are based on cognitive behavioural therapy (Department of Justice and Regulation, 2015).

A place for neuroscience

A stark absence within Australia's criminal justice systems is an acknowledgement and incorporation of neuroscience research into policies and programs, particularly that research which is centred around the impact of chronic childhood maltreatment on brain development. Given the number of offenders with reported childhood maltreatment

histories (as discussed in Chapter Five), this is an omission of potentially valuable research evidence. In reviewing the main options available for sentencing recidivist offenders there appear to be two main paths. The punitive path, underpinned by the belief in rational choice theory, which assumes that offenders will act in a rational manner by weighing up the costs and benefits of committing a crime, are indeed informed of the consequences of committing a particular offence. The second path believes the deficit lies within the offender and advocates rehabilitative programs that teach pro-socialisation skills, cognitive behavioural skills and vocational skills. Whilst it is understandable to urge offenders to focus on how they would like their lives to be different and assist them with making these changes, this assumes that offenders have the capacity to engage in the required higher-order brain functions that involve complex cognitive processing. Research has however demonstrated that this level of functioning is often not available to highly traumatised individuals who utilise more primitive, instinctual, lower-brain areas when processing social situations, and are more likely to focus on non-verbal stimuli at the expense of cognitive information. There is furthermore a focus on the offence as a defining characteristic, not the person's accumulated life experiences which result in the offence.

Emerging criminological research from Finland provides an interesting example of the way in which knowledge from the neurosciences can be incorporated into offender rehabilitation. One Finnish study acknowledges the frequency of neurocognitive deficits among offenders, yet recognised the fact that this phenomenon is not systematically allowed for in correctional rehabilitation programs (Tuominen et al., 2014a). The dominance of cognitive behavioural therapy may contribute to this. As Tuominen and colleagues (2014a:38) highlight, the heavy reliance on cognitive skills programs in Nordic prisons means that whilst offenders are educated about 'cognitive distortions' and how to develop better problem-solving skills, these programs do not assist with managing and coping with more basic cognitive deficits that are frequent among offenders. Results found that increased recidivist offences correlated with the offender having a greater attention disorder profile, as well as deficits in motor dexterity, visual construction, verbal comprehension, verbal and visual memory, and shifting attention (Tuominen et al., 2014a:46). They concluded that the use of neurocognitive assessments as part of prison programs would provide greater insight into identifying those most in need of specialised programs before they progress to learning more complex social tasks (Tuominen et al., 2014a:36). Tuominen and colleagues (2014a:44) argue that these neurocognitive assessments are more informative for allocating offenders to programs rather than relying on the simple allocation by offence type, which ignores individual characteristics and circumstance. Of importance was the discovery of poor visual-perceptual-organisational

skills, which may contribute to poor academic skills, and may also be connected to deficits in social perception, social judgement and social interaction (Tuominen et al., 2014a:44).

Another Finish study using 72 male prisoners examined the nature of offenders' academic skill deficits in relation to neurocognitive deficits (Tuominen et al., 2014b). Results demonstrated a high number of reading and spelling disorders, with 88 percent of participants who had at least one problem area in literacy skills also experienced neurocognitive deficits (Tuominen et al., 2014b). These results were only minimally explained by IQ levels and educational background (Tuominen et al., 2014b). These findings can be considered together with the findings in Chapters Six and Seven regarding the correlation between the experience of childhood maltreatment and deficits in learning and cognitive function, as well as findings in Chapter Five that correlate experiences of childhood maltreatment and offending behaviour.

Another neurocognitive study into offenders' decision-making skills examined 96 first-time incarcerated offenders in America (Yechiam et al., 2008). Decision-making was examined using a computerised version of the Iowa Gambling Task. Results indicated that offenders in general demonstrated poor decision-making that was characterised by a failure to learn from previous mistakes (Yechiam et al., 2008:48). Offenders in prison for violence/assault/murder displayed a neurocognitive profile that was similar to individuals with diagnosed orbitofrontal damage to the brain (Yechiam et al., 2008:49). These studies add to the argument that neurocognitive assessments can be a highly successful tool as part of prison assessments in order to provide a microanalysis of overall cognitive performance patterns (Yechiam et al., 2008:49).

Conclusion

When examining sentencing options available in Australia it is apparent that despite the prevailing neoliberal climate of increased punitive responses to crime, there are a number of alternative sentencing options emerging that are born out of theories of therapeutic jurisprudence. Despite this, a major concern that has emerged is the inequality of access of alternative options to imprisonment. Eligibility for program participation is often dependent upon the geography of where the offence occurred or where the offender resides. Additionally, rehabilitation programs are not available in all prisons (Glass, 2014:18). Furthermore, the neoliberal agenda of being 'tough on crime' and promoting more punitive responses to offending is dramatically increasing prisoner numbers. This is resulting in the erosion of the ability for prisoners to access rehabilitation programs. Not only does this contravene a foundational principle of sentencing for our criminal justice system, it is also a blatant violation of the Standard Guidelines for Corrections in Australia, which states,

“Prisoners should be provided with access to programmes and services, including education, vocational training (and employment), that enable them to develop appropriate skills and abilities to support reduced re-offending when they return to the community” (Conference of Correctional Administrators, 2012:3.6).

According to the Victorian Ombudsman Deborah Glass (2014:8), virtually all prisoner rehabilitation programs are based on cognitive behaviour therapy (CBT). As Kramer, Rajah and Sung (2013:2) suggest, the dominance of CBT in prison rehabilitation serves to reinforce the dominant discourse that offending behaviour is the result of cognitive errors on behalf of the individual. An authoritative text governing the administration of prisons is the *Standard Guidelines for Corrections in Australia* in which a guiding principle states:

“3.10 Programmes and services provided to address criminogenic needs should be based on best practice and have solid evidence as to their efficacy” (Conference of Correctional Administrators, 2012:3.10).

It is argued that knowledge from neuroscience on brain function following trauma is not being considered when developing programs. Indeed prominent figures in the field of neuroscience argue that CBT has limited application when used with people who have suffered trauma due to changes in the brain structure and functioning and in particular, HPA-axis functioning which controls behaviour. Whilst it is recognised that there is strong evidence base for CBT, what is less obvious is the fact that the discourse around CBT as the only treatment option is so dominant that other possible theories for rehabilitation are rarely considered. Neuroscience research examining the efficacy of CBT in traumatised populations generates a very different story.

A significant flaw in the dominance of cognitive behavioural interventions in offender rehabilitation is the focus on the cortical or limbic systems by targeting cognitive or relational interactions. For those individuals who have experienced chronic childhood maltreatment significant physiological disruptions to the brain are likely to have occurred during the organisation of the lower brain, resulting in disorganised or poorly regulated networks (Perry, 2009:244). The successful implementation of CBT-based strategies is dependent upon intact executive functioning and engagement of the pre-frontal cortex, both of which are significantly impaired under conditions of chronic stress, such as the experience of childhood maltreatment (Raio et al., 2013:15139). The ability of an individual to consciously control cognition and emotion are limited by the fact that the majority of sensory input is processed by the primitive areas of the brainstem and diencephalon, external of conscious awareness (Gaskill & Perry, 2012). Highly traumatised populations with over-developed threat response systems therefore do not

necessarily respond effectively to the CBT-based therapies, due to their reliance on appropriate higher brain cortical function (Perry, 2006:34).

A recent examination of the efficacy of CBT-based strategies under conditions of stress found critical limitations in the usefulness of these techniques under conditions of stress (Raio et al., 2013:15139). As previously stated, research has found that exposure to acute stress significantly blunts the efficacy of the higher cognitive processes that CBT strategies are inherently reliant upon (Alexander et al., 2007; Arnsten, 2009; Arnsten et al., 2012; Duncko et al., 2009; Elzinga & Roelofs, 2005; Heatherton & Wagner, 2011; Luethi et al., 2009; Plessow et al., 2011; Roozendaal et al., 2004; Roozendaal et al., 2009; Schoofs et al., 2009). Acute stress in particular, targets the dorsolateral PFC (Arnsten, 2009; Arnsten et al., 2012; Kern et al., 2008; Qin et al., 2009), which has been demonstrated to be integral in cognitive emotion regulation (Hartley & Phelps, 2010; Ochsner et al., 2012; Schiller & Delgado, 2010). This is why CBT-based strategies are ineffective in controlling emotion regulation during stressful situations, particularly for individuals exposed to previous trauma (Heide & Solomon, 2009; Perry, 1997:130; Raio et al., 2013:15139).

Somatic therapy provides one avenue within which neuroscience can contribute to rehabilitation programs. It is a relatively recent approach and is founded on neuroscientific insights on the nature of brain function. A number of experts, including Dr Bessel van der Kolk, Dr Peter Levine, Dr Dan Siegel, Dr Stephen Porges and Dr Bruce Perry, advocate the use of somatic therapies for highly traumatised populations rather than the traditional cognitive-based therapies. Somatic therapy differs from CBT in that it is based on the premise that whilst mainstream treatments of PTSD are based on cognitive and pharmacological treatments, the pathology of PTSD includes a loss of body awareness, including alexithymia (extreme emotional dysfunction), and loss of emotional regulation (van der Kolk et al., 2014:e560). Underlying this pathology are alterations in neural structures that regulate body states (van der Kolk et al., 2014:e560). Somatic approaches to therapy use some form of movement-based activity to build interoceptive awareness and improve self-regulation (Warner et al., 2014:238). This includes yoga and creative therapy, as well as dance and movement therapy that focuses on rhythm and ritual in order to facilitate the regulatory processes in the brain that have been disrupted as a result of trauma (Goodman et al., 2009; Harris, 2007; Kornbum & Halsten, 2006; Truppi, 2001, van der Kolk et al., 2014). Research has found that body awareness is essential for emotional and affect regulation (Critchey et al., 2004; Craig, 2003; Damasio, 2003). Much of this research has centred on the interoceptive system, which involves the body's internal perception and is associated with autonomic motor control (Craig, 2003:500). Somatic therapy therefore teaches the individual to notice, tolerate, manage and reinterpret visceral sensations associated with PTSD (van der Kolk et al., 2014:e563).

Przybylski (2008:2) argues that programs that focus on an offender's criminogenic needs, such as drug and alcohol use, unemployment, or inadequate housing, can significantly reduce rates of recidivism. This thesis argues that whilst from a systems perspective these are certainly important influences on offending behaviour, they do not form a complete representation of the problem. In addition to both these material and social contributors the original contribution of neurobiological changes in the brain resulting from chronic childhood maltreatment also need to be acknowledged and addressed as part of an effect rehabilitation program. As research from Finland demonstrates, neuroscience may in fact play an important role in assessing for cognitive or emotional regulation deficits which can then allow rehabilitative interventions to be more effectively tailored to meet the needs of offenders.

In examining the offender rehabilitation programs currently in operation in Australia the dominance of CBT was highly evident. From a neuroscience perspective there is evidence emerging that reliance on CBT for highly traumatised populations is largely ineffective due to alterations that have occurred within the brain as a result of exposure to chronic stress. Rehabilitation programs in the Australian context seem to have yet to take up the insights offered through new emerging neuroscientific understanding of the neurobiological impact of childhood maltreatment on the brain and the relation of childhood maltreatment and offending. The gradual emergence of therapeutic jurisprudence within the legal system in Australia provides an opportunity for the justice system to better tailor its rehabilitation programs to meet the needs of particular offender populations.

A common thread that is woven throughout each of these chapters is the need for inclusivity of knowledge from multiple disciplines. In this chapter it has been clearly established that there is no single answer to addressing deficits in Australia's criminal justice system and rehabilitation programs, but instead an interdisciplinary approach is required that incorporates neuroscience knowledge with psychology and criminology and social factors. In addition to this however, adopting a critical perspective is essential not only in analysing social and structural contributors to criminal behaviour, but also examining the prevailing political agendas that advocate for privatisation of state-run prison facilities. In turn, this has implications for the commitment of these facilities to effective rehabilitation, given that they are profit-driven and reliant on increasing prisoner numbers.

CHAPTER NINE: CONCLUSION

Introduction

The topic for this thesis emerged from my experiences as a social worker, not only within the child protection system, but also more recently, working with the Victorian Drug Court. As stated in Chapter One, through this work it became apparent that certain populations are at an increased risk of becoming ensnared in a vicious cycle of drug addiction, offending and homelessness. Having a shared history of chronic childhood maltreatment, disconnection from school and social institutions, and escalating antisocial behaviour during adolescence, appeared to be significant. Examining emerging research on the adverse effects of chronic childhood maltreatment on brain development and function it became apparent that there were consistent patterns of neural alterations that occurred with experiences of chronic childhood maltreatment.

So emerged the central question of this thesis: does existing research evidence support the idea that chronic childhood maltreatment has a physiological impact on the developing brain, which can place individuals at a greater risk of engaging in recidivistic offending in adulthood? Given the high rates of recidivism within Australian prisons, can extrapolating this knowledge of the potential adverse effects of chronic childhood maltreatment on brain development and function enhance the effectiveness of correctional programs and reduce the human, social, and economic costs of criminal recidivism within Australia?

This complex question was broken down into three distinct parts using two methods: research synthesis and policy analysis. The first part involved an examination of the existing literature on the impact of chronic childhood maltreatment on brain development and function. Much of this literature was drawn from neuroscience, medicine and psychiatry journals, with none being sourced from social work-specific journals. Secondly, an examination of the plethora of social science research that links the experience of childhood maltreatment in offending behaviour was undertaken. A reversal of the aforementioned journal dominance was found in this research synthesis, with the majority of this research emerging from the subject fields of psychology, social work and criminology, with neuroscience explanations being largely absent. The final method involved the examination of Australia's criminal justice system, paying particular attention to the types of knowledge that are privileged in the development of rehabilitation practice.

During the course of this thesis it was apparent that neuroscience is largely absent from discourse on Australian criminal justice policy and rehabilitation practice. In turn, social

work perspectives are noticeably absent from research that examined the impact of chronic childhood maltreatment on brain development and function. Synthesising the vast array of research across various academic disciplines a number of different threads emerged. The challenge lay in knitting together these disparate threads together to form a uniform garment of understanding.

This chapter will draw together the major themes that emerged from the research syntheses, firstly from neuroscience, examining the neurobiological impact of chronic childhood maltreatment on brain development, and secondly, examining the way in which social sciences has linked the experience of chronic childhood maltreatment with offending behaviour. It will then examine the policy response to crime before presenting the arguments that highlight the case for an interdisciplinary response to the problem.

The contribution of neuroscience

Through neuroscientific advances, the first three years of life have been identified as being critical to brain development and function due to the brain's extreme plasticity. Thus, during this period events and environmental surrounds generate considerable influence on the way in which neurons and neuronal connections in the brain develop (Farmer R, 2009:89; Perry, 2002:87). The brain regions that are involved in the stress and fear response are particularly sensitive to traumatic experiences during this time (Farmer R, 2009:89). Despite the brain's plasticity, if early life nurturing and secure attachment is absent during critical periods of early development, neural systems that mediate socio-emotional functioning are at significant risk of malorganisation during subsequent development (Egan, Combs-Orme & Neely-Barnes, 2011:272).

In systematically reviewing research on the impact of chronic childhood maltreatment on the development and function of the brain, two recurring themes emerged: the impact on emotion regulation, and the negative impact on cognition, memory, and learning. Poor education and disruptive interpersonal relations increases the likelihood of social isolation and engagement in antisocial behaviour. Additionally, learning and cognitive deficits result in limited education and poor employment opportunities, which also increases the risk of engagement in criminal activity.

At this point it is important to acknowledge that whilst neuroscience research suggests that individuals exposed to chronic childhood maltreatment are at greater risk of deficits and alterations in brain structure and function, it is also necessary to highlight the danger of determinism, or indeed fatalism, in equating these experiences with universal brain alterations. What is so remarkable about the brain is its extreme plasticity and ability to adapt to the surrounding environment. This understanding has implications for the range

of supports required to maximise these processes. In fact it is the plasticity of the brain in being able to adapt to its surrounding environment that is so important to social work as a profession given that social work is at the front line in working with children and families in the child protection and juvenile justice systems. By utilising the emerging knowledge from neuroscience social work has an obligation to use this knowledge to advocate for optimal conditions for brain development during childhood.

Emotion regulation

Chapters Six and Seven documented the research synthesis of 76 studies that explore the impact of childhood maltreatment on brain development. The majority of this research emerged from the United States, which is not surprising given the declaration by President Bush of the 1990s as being the 'decade of the brain' (Goldstein, 1994:239). The research synthesis determined that neuroimaging research has indeed found evidence of compelling differences in the architecture of the cortical networks and functioning of the brain in adults who experienced childhood maltreatment. These differences appear to impact on these individuals in such a way as to compromise the ability to regulate emotion and behaviour, leading to greater risk of engagement in aggressive and impulsive behaviour. As Cohen (2005:108) asserts, this in turn has definite implications for engagement in criminal behaviour, particularly with strong correlations found between impulsivity and criminal behaviour. Specifically, childhood maltreatment was associated with decreased connectivity in areas of the brain that are involved with emotional regulation and ability to empathise and accurately attribute thoughts or intentions to others, and monitor their own behaviour within a social context (Teicher, Anderson et al., 2014).

Research also reveals a link between the experience of chronic childhood maltreatment and decreased neural connectivity in areas of the brain that are believed to be significant for emotion regulation: the PFC, hippocampus, and amygdala, as well as differences in left and right hemisphere coherence. An examination of the research revealed that an increase in left hemisphere functioning as a result of chronic childhood maltreatment has been implicated in a decreased ability to mediate antisocial behaviour, resulting in an increased display of anger, hostility and aggression. Findings also suggest that increased aggression, impulsivity and a capacity for violence can stem from either chronic stress, which increases brainstem activity at the detriment of higher cortical functioning, or chronic neglect, which decreases the ability of the limbic and cortical regions to moderate these behaviours (Perry, 1997:127). Additionally, the alteration of the PFC architecture and functioning as a result of chronic childhood maltreatment also contributes to the display of impulsive behaviour (Bechara et al., 1994; Kiehl et al., 1999; Barratt et al., 1997).

Due to altered homeostasis and the associated hyperarousal symptoms, maltreated children are more likely to interpret ambiguous situations as threatening (Toth et al., 2011). As a result of this negative bias, attention is diverted away from positive situations and focused instead on negative stimuli (Toth et al., 2011). This too has implications for emotion regulation and social interactions. Threat detection leads to increased activity of lower primal brain areas including emotions, whilst simultaneously decreasing the ability of the higher brain areas to moderate emotions, resulting in increased aggression, impulsivity and capacity for violence. Any stimulus that increases the activity of the brainstem, such as chronic stress, or decreases the moderating capacity of the limbic and cortical regions, such as neglect, will eventuate in increased aggression, impulsivity and capacity for violence (Perry, 1997:127). Impulsive behaviour describes behaviour that which is reckless or with little thought to future consequences (Cohen, 2005:109). Antisocial behaviour, which often results in criminality, is largely linked with individuals having deficits in impulsive control (Cohen, 2005:108).

Compounding these changes are the permanent alterations that take place in the hypothalamic-pituitary-adrenal axis (HPA axis) in response to long-term threat exposure (Hart et al., 1995; Kaufman, Birmaher et al., 1997; Kaufman, Plotsky et al., 2000; Perry & Pollard, 1998; Rao, Hammen et al., 2008). There is no precise consensus for the way in which the homeostasis of the stress response system is altered, with some research finding an increased cortisol response and other research finding a blunting of its response. These differing results are likely due to differences in methodology, research design and definitions, and most importantly differences in population sampling, including age, gender, type of abuse experienced, or the presence of coexisting psychiatric diagnoses. Regardless, cortisol dysfunction appears to be a conspicuous consequence of chronic childhood maltreatment, with blunted cortisol responses being linked with aggression, antisocial behaviours, and diminished social competence (Bergman & Brisman, 1994; Hart et al., 1995; McBurnett, Lahey, Rathouz et al., 2000; Moss et al., 1995; Tennes & Kreye, 1985; Shirtcliff et al., 2009; Shoal et al., 2003; Susman, 2006; Susman et al., 1997; Vanyukov et al., 1993; Van Goozen et al., 1998; Van Goozen et al., 2003), and increased cortisol response being linked with hyperarousal, hypervigilance, anxiety, impulsivity, sleep disorders, and conduct disorders (Kaufman, Birmaher et al., 1997; Kaufman, Plotsky et al., 2000; Perry & Pollard, 1998; Rao, Hammen et al., 2008). There is also the physical impact of high cortisol levels on brain structures leading to cell death and atrophication, particularly in the areas of the brain that have high numbers of glucocorticoids receptors such as the hippocampus (Bernard, Lind & Dozier, 2014; Sapolsky, 2000; Weber & Reynolds, 2004).

Learning and cognition

The second important theme that emerged from the research literature analysis was strong correlations between chronic childhood maltreatment and learning and cognitive deficits. This is perhaps best explained in writings of Dr Bruce Perry who espoused the importance of the sequential development of the brain from the lower regions, responsible for basic functioning, to the higher brain regions that are responsible for complex cognition (Gaskill & Perry, 2012:33; Perry, 1997:126; Perry, 2009:241). Much of the sensory input is initially processed by the brainstem and diencephalon external of conscious awareness, with the signals automatically stimulating hormonal secretions and activating higher brain regions (Gaskill & Perry, 2012). This is an important point because it highlights the limitations of the individual to consciously control cognition and emotion (Gaskill & Perry, 2012). When exposed to extreme stress it is those higher brain regions that close down meaning that responses become instinctual rather than cognitive (Gaskill & Perry, 1997:34). The instinctual brain is targeted towards survival and therefore focuses on non-verbal stimuli, including body language, tone of voice, and facial expression, as opposed to acknowledging actual verbal content, which requires higher cognitive function (Perry, 1997:130). This can result in difficulties processing and storing cognitive verbal stimuli, which ultimately reduces the ability to learn. It is therefore not surprising that children who experience maltreatment often display learning and cognitive deficits when compared with their peers.

Another contributor to deficits in cognition is the long-term impact of high levels of cortisol on the integrity of brain structures. As was discussed in Chapter Seven, the excretion of cortisol occurs as part of the body's stress response system and assists in modulating various psychobiological processes (increased heart rate, mobilising energy, preventing energy from being stored) that promote survival (Strelzyk et al., 2012:616; Weber & Reynolds, 2004:122). A number of studies correlated the experience of chronic childhood maltreatment with the hypersecretion of cortisol (Bernard, Butzin-Dozier et al., 2010; Bugental et al., 2003; Cicchetti & Rogosch, 2001; Cutuli et al., 2010; De Bellis, Baum et al., 1999; Doom et al., 2013; Hiem et al., 2000; Hiem et al., 2001; Hiem et al., 2002; Kaufman, Birmaher et al., 1997; Liu J et al., 2012; Tyrka et al., 2008; Rao, Hammen et al., 2008). Studies now show that elevated cortisol levels contribute to neuronal cell death and atrophication of areas of the brain with high numbers of glucocorticoid receptors including the hippocampus (Sapolsky, 2000:758; Weber & Reynolds, 2004:121). The impact of this is possibly evidenced in the number of studies that correlated the experience of chronic childhood maltreatment with decreases in brain volume (Anda, 2006; De Bellis, Keshavan, Spencer et al., 2000; De Bellis, Keshavan, Frustaci et al., 2002; De Bellis & Keshavan, 2003; Edmiston et al., 2011; Fonzo et al., 2013; Frodl et al., 2010; Mehta et al., 2009; Perry, 2009:241; Schore, 1996). Reductions

were also found in grey matter volumes in areas of the brain that are important in recognising faces, words, objects and colours, which again has implications for learning and cognition (Tomoda, Nevalta et al., 2009).

Similarly, correlations found between chronic childhood maltreatment and deteriorations in neural pathways that connect areas of the brain that are crucial for the production of speech and for language comprehension also have profound implications for learning and cognition (Choi et al., 2009; Ito et al., 1998; Toth et al., 2011). Chronic childhood maltreatment has been found to result in decreased hippocampal volumes, particularly the left region, resulting in an inability to integrate sensory inputs, difficulties with remembering events in their contextual situations, and difficulties processing and learning from negative experiences (Anda et al., 2006; Strominger & Demarest, 2012; Watson, 2010). It is therefore not surprising that many studies found correlations between the experience of chronic childhood maltreatment and decreases in IQ scores (Koenan et al., 2003), and increased levels of illogical thinking and deficits in language-related areas of the brain (Toth et al., 2011).

As was revealed in Chapters Six and Seven, chronic childhood maltreatment can result in permanent homeostatic alterations in the microarchitecture and neurochemical functioning of the brain, leading to hypersensitivities to external stimuli and hypervigilance. Threatening stimuli also results in increased amygdala function, which stimulates cortisol production and decreases the ability of the hippocampus to regulate cortisol release (Watson, 2010:115). The overproduction of cortisol impairs hippocampal functioning by reducing dendritic branches resulting in memory impairment (Davidson & McEwen, 2012:693; Watson, 2010:115). This again has implications for learning and cognition.

Whilst not specifically included in the neuroscience research that was explored as part of this thesis, there are obvious implications for these findings in terms of increased risk of engaging in criminal behaviour. For example, reductions in brain volume, particularly the hippocampus, are likely to have implications for learning, memory function, and cognition, which in turn impacts on education and employment opportunities. A report by the Australian Institute of Health and Welfare (AIHW) on the health of prisoners in Australia in 2012 found that 71 percent of prison entrants had only completed education up to Year 10 or below (AIHW, 2012:20). The report also found that 48 percent of prison entrants were unemployed in the 30 days prior to incarceration, and upon discharge 71 percent had either no form of organised employment or were unsure of their ability to obtain work (AIHW, 2012:22, 24). That said, non-biological influences such as socio-economic factors (including economic pressures to earn money), minority status, familial

stress and dysfunction, or level of parental education attainment cannot be overlooked. This is where social work can make an important contribution to neuroscience, balancing the risk of biological determinism with the recognition of other systemic and social influences on criminal behaviour.

Neuroscience research also found brain volume reductions in areas of the brain that are believed to be responsible for emotion regulation and impulse control (Edmiston et al., 2011:1072; Fonzo et al., 2013; Teicher, Anderson et al., 2014; Van Harmelen et al., 2010). Additionally, chronic childhood maltreatment has also been correlated with hypersensitivity or overidentification of threatening stimuli (Perry, 1997:130; Pollak, Cicchetti et al., 1997; Pollak, Klorman et al., 2001; Pollak, Vardi et al., 2005; Pollak & Kistler, 2002; Pollak & Sinha, 2002; Pollak & Tolley-Schell, 2003). This can result in misinterpretations of social cues, leading to impulsive reactions and aggressive behaviour (Bufkin & Luttrell, 2005:179), which in turn has implications for offending behaviour.

Findings correlating chronic childhood maltreatment and learning deficits are reflected in correctional statistics, the majority (41 percent of male and 39 percent of female) of individuals detained in police custody in 2012 having only completed education up to Year 10 standard (AIC, 2014:79). Similarly, 78 percent of female and 58 percent of male police detainees reported that government welfare was their primary source of income (AIC, 2014:80), highlighting the potential lack of employment opportunities as a result of limited education. Education has also been linked with increased employment opportunities, which in turn correlates with reduced recidivism rates (Tripodi, Kim & Bender, 2010). Attachment to social institutions, such as education, is critical for integration into society, with these institutions serving as socialising agents and control mechanisms (Thomas S & Shihadeh, 2013:1176). Research has found that institutionally isolated youth are responsible for a disproportionate amount of crime (Thomas S & Shihadeh, 2013:1176).

Neuroscience knowledge of brain development and function provides empirical evidence for previously acknowledged phenomena that have linked the experience of chronic childhood maltreatment and engagement in criminal activity. The neurobiological findings provide empirical evidence supporting literature from both social work and criminology fields that has equated poor educational attainment with greater risk of engagement in criminal activity (see AIC, 2014:79; Buonanno & Leonida, 2006; Groot & van den Brink, 2010:288; Lochner & Moretti, 2004:183).

The associated increase in risk of engagement in criminal behaviour as a result of chronic childhood maltreatment is however an area that has undergone extensive research in the

social and psychological sciences, albeit with little acknowledgement of neurobiological implications.

Social sciences' linking of chronic childhood maltreatment with offending behaviour

Although methodological and interpretative differences created difficulties in being able to accurately compare and synthesise research linking chronic childhood maltreatment and offending behaviour, overwhelmingly the majority of research supported the hypothesis that the experience of chronic childhood maltreatment does significantly increase the likelihood of engaging in offending behaviour. Explanations for the way in which chronic childhood maltreatment contributes to this behaviour was less clear. A number of contradictions emerged within the research literature, including whether severity versus chronicity of childhood maltreatment experiences is more predictive of engagement in offending behaviour. However the most prominent myriad of contradictions emerged from research that attempted to differentiate the risk of engagement in offending behaviour based on type of abuse experienced. Attempting to quantify abuse types as a variable is inherently flawed given that each experience is individual and cannot be easily categorised within specific parameters defined by the researcher. The contradictory nature of the research designs also impacts on social sciences' explanatory theories for findings of this link between chronic childhood maltreatment and offending behaviour. Almost all studies relied on previous psychological or sociological theories to explain this link.

As stated in Chapter Five, attempting to synthesise these links felt like a process of apophrenia, attempting to make false causal connections between variables. As noted above, there was reliance on psychological or sociological theories in order to explain this link, with just two studies mentioning possible neurobiological influences. It is argued that neuroscience knowledge can however provide important scientific data to contribute to general strain theory to explain criminal behaviour. Using general strain theory as a framework for analysis, Barn and Tan (2012) concluded that strains, including school exclusion, unemployment and placement instability, were significant contributors to engagement in criminal behaviour for foster care youth. There is a paucity of research that acknowledges neurobiological knowledge of the impact of chronic childhood maltreatment on criminal activity, which is surprising particularly as this knowledge began to emerge in the early 1990s. Despite the contradictions in the specifics of how chronic childhood maltreatment and offending are connected, there exists overwhelming evidence that there is a connection. Such a paucity of research that examined the causal link from a neurobiological perspective indicates a lag in the uptake of neurobiological research by the social sciences.

In Chapter Two discussions were raised about traditional criminology's mistrust of biological explanations for crime. The work of Italian criminologist Cesare Lombroso (1876) developed theories of anthropological criminology that provided a scientific foundation for a number of oppressive and political regimes, including Nazi policies and the eugenics movement. Given the dark period in history to which biological criminology contributed it is understandable that there is considerable reluctance to accept biological explanations for influences on crime. This thesis has highlighted that criminology and social work fields have been weak in incorporating an interdisciplinary approach to research, particularly in terms of the inclusion of recent advances in neuroscience knowledge in the understanding of how the brain works.

Yet, with history's use of biological reductionism to justify racist and oppressive regimes it is not unwarranted to be wary of the potential ramifications of incorporating neurobiological knowledge into social work and criminology. One of social work's inherent values is the uniqueness of the whole person and individual experience (Bartlett, 1970:38), as well as the inescapable interrelationship between multiple systems and environments. Another cornerstone of social work's values is the recognition of structural and institutional inequalities that contribute to poor life outcomes. There appears to be reluctance to any idea that may reduce person's experiences being a product of their brain or biology rather than acknowledging wider structural inequalities and person agency that also contributes to experiences. I will return to these themes.

The correctional response to crime

The interdisciplinary sharing and linking of this knowledge also appears to be largely absent in Australian correctional responses to offenders with a history of chronic childhood maltreatment. Since the 1990s the dominant ideology of neoliberalism, based on free-market capitalism where welfare is minimal and means-tested, has heavily influenced the Australian criminal justice system, evidenced by political rhetoric aimed at 'getting tough on crime', and operationalised through increased statutory maximum penalties, mandatory detention, the abolition of home detention as a sentencing option, and stringent changes to parole eligibility (Baker & Roberts, 2013:121; Cavadino & Dignan, 2006:440; Crispin, 2010:119; Freiberg, 2010:209).

With this in mind it becomes clear that the growth in prisoner numbers in recent years is not necessarily reflective of soaring crime levels, but rather the dominant paradigm of increasing punitiveness. In fact, it is now recognised throughout the world that crime rates and imprisonment rates have a limited correlation, with imprisonment being more reflective of political ideology rather than criminological necessity (Naylor, 2014:8). As

was discussed in Chapter Eight, governments may in fact have a vested interest in legislating for more punitive responses to crime given that, with the increasing privatisation of state-run prison facilities, these corporations are dependent on rising prisoner numbers in order to return a profit. From a critical perspective it is necessary to recognise that in privatising prison facilities, the genuine commitment of these corporations to effective rehabilitation may be compromised, as this is likely to result in a reduction of offenders and thereby a reduction in profits. Additionally the swelling prisoner numbers means that many offenders are being denied access to rehabilitation programs within prisons.

Whilst alternative sentencing options are becoming available through the promotion of therapeutic jurisprudence resulting in the creation of specialist courts and alternative sentencing options to incarceration, there remain significant inequalities in the accessibility of these options. This is particularly the case geographically with many options not being available for rural or regional offenders, resulting in heavy reliance on incarceration. Additionally there are strict eligibility requirements for access to specialist courts, including current offence type, prior offending history, capacity to participate, and the presence of drug and alcohol dependency (Payne, 2006:4). Even within jurisdictions, geographical location of the commission of the crime or offender's residence will determine whether particular sentencing and rehabilitative option are available. For example, Family Violence Courts and Drug Courts will only service the geographical area within which they are located.

In reviewing current Australian criminal justice policies, there are two main options available for sentencing recidivist offenders. First is the punitive path, underpinned by the belief in rational choice theory, which assumes that offenders will act in a rational manner by weighing up the costs and benefits of committing a crime, and the consequences of committing a particular offence. The second path believes the deficit lies within the offender and advocates rehabilitative programs that teach pro-socialisation skills, cognitive behavioural skills and vocational skills. The neo-liberal domination of correctional programs can be witnessed with the emergence of programs designed to redress 'cognitive distortions', which are described as the rationalisation of criminal behaviour through offence-supportive attitudes and excuses for offending (Kramer, Rajah & Sung, 2013:537; Barriga et al., 2000:54; Maruna & Mann, 2006:155). Treatment programs that address this 'cognitive distortion' are therefore designed to encourage the offender to take responsibility for his/her actions and to address cognitive schemas that are linked to reoffending behaviour (Maruna & Mann, 2006, 155). It is argued by writers such as Kramer, Rajah and Sung (2013:538) that a dominance of CBT within prisoner

rehabilitation programs in Australia, serves to reinforce the dominant discourse that offending behaviour is the result of individual pathology due to cognitive errors.

Despite an expanding cache of treatment approaches being developed to work with individuals who have experienced childhood maltreatment, nearly all evaluations on the efficacy of treatment approaches have focused solely on CBT (Warner et al., 2014:237). CBT is based upon the relationship between emotions and thoughts and promotes the correction of 'irrational' or distorted cognitive processes in order to generate a more adaptive emotional response (Raio et al., 2013:15139). Empirical studies have however demonstrated that during episodes of stress or dysregulation, cognitive approaches are largely ineffective (Raio et al., 2013; van der Kolk & Fislser, 1994). The successful implementation of CBT-based strategies is dependent upon intact executive functioning and engagement of the pre-frontal cortex, both of which are significantly impaired under conditions of chronic stress, such as the experience of childhood maltreatment (Raio et al., 2013:15139). Research has found that exposure to acute stress significantly blunts the efficacy of the higher cognitive processes that CBT strategies are inherently reliant upon (Alexander et al., 2007; Arnsten, 2009; Arnsten et al., 2012; Duncko et al., 2009; Elzinga & Roelofs, 2005; Heatherton & Wagner, 2011; Luethi et al., 2009; Plessow et al., 2011; Roozendaal et al., 2004; Roozendaal et al., 2009; Schoofs et al., 2009).

Acute stress in particular, targets the dorsolateral PFC (Arnsten, 2009; Arnsten et al., 2012; Kern et al., 2008; Qin et al., 2009), which has been demonstrated to be integral in cognitive emotion regulation (Hartley & Phelps, 2010; Ochsner et al., 2012; Schiller & Delgado, 2010). The brain's cortex has a relatively low threshold for becoming overwhelmed, and when exposed to extreme stress the cortex shuts down and the lower brain regions assume control (Gaskill & Perry, 2012:34). The functional response of this means that during periods of perceived threats the brain will focus on non-verbal stimuli, including body language, tone of voice and facial expressions, at the expense of actual verbal content, which is a higher cognitive function (Perry, 1997:130). Individuals in a persistent state of hyperarousal are therefore not easily able to comprehend complex cognitive information (Perry, 1997:130). A state of hyperarousal activates the lower brain areas of brainstem and midbrain, leaving the cortex inactive and unable to store this cognitive information (Perry, 1997:130). This is why CBT-based strategies can be ineffective in controlling emotion regulation during stressful situations, particularly for individuals exposed to previous trauma (Heide & Solomon, 2009; Raio et al., 2013:15139). Instead therapeutic interventions that target somatic forms of regulation are particularly beneficial for individuals for whom somatic, emotional and behavioural dysregulations are prevalent (Warner et al., 2014:238).

The two main models used in prison rehabilitation in Australia (the Risk-Need-Responsivity Model and the Good Lives Model) do go some way towards addressing the criminogenic needs of offenders, such as drug and alcohol use, unemployment, or inadequate housing, which can significantly reduce rates of recidivism. The evidence from this thesis argues however that this does not go far enough, and that it is in fact the original neurobiological changes in the brain as a result of chronic childhood maltreatment that precede engagement in substance use, unemployment, or antisocial behaviour that also need to be acknowledged and addressed as part of an effective rehabilitation program. Given the number of offenders who have experienced some form of chronic childhood maltreatment there is considerable scope for rehabilitation models to consider the implications of neurobiological changes that arise from chronic trauma and to seek to incorporate this into a rehabilitative model for offender treatment.

A significant flaw in the dominance of cognitive behavioural interventions in offender rehabilitation is the focus on the cortical or limbic systems by targeting cognitive or relational interactions. For those individuals who have experienced chronic childhood maltreatment much of the physiological disruptions to the brain are likely to have occurred during the organisation of the lower brain, resulting in disorganised or poorly regulated networks (Perry, 2009:244). When a potential threat is identified, a cascade of patterned neuronal activity initiates from the primitive areas of the brain, with these signals moving up to higher areas of the brain for interpretation (Perry, 2006:32). The ability of an individual to consciously control cognition and emotion are limited by the fact that the majority of sensory input is processed by the primitive areas of the brainstem and diencephalon, external of conscious awareness (Gaskill & Perry, 2012). Highly traumatised populations with over-developed threat response systems therefore do not necessarily respond effectively to the CBT-based therapies, which dominate the corrections rehabilitation practice (Perry, 2006:34).

From a critical perspective it could be argued that Australia's correctional policies and practices in fact reinforce the pathologising of the individual through the reliance on cognitive behavioural therapy and skill development, which inherently focuses the problem on some form of deficiency of the individual that needs to be re-modeled, rather than seeking an understanding from a neurobiological point of view why daily functioning may be difficult for this particular population group. Rather than blaming the individual, neuroscience knowledge can assist with providing explanations as to why particular experiences may increase the risk of engagement in offending behaviour. Ironically, social sciences' reluctance to take up neuroscience knowledge has also been in part to avoid pathologising the individual through engaging in biological reductionism. This is where the recent paradigmatic shifts in the natural sciences come into play, for science now

recognises the fundamental interconnectedness between the person and the environment, and the bidirectional flow of this relationship. This therefore paves the way for social science to open the doors of the discipline to include neurobiological knowledge in order to deepen our understanding of the human condition.

It is argued that this gap in Australia's criminal justice system paves the way for a greater focus on the neurobiology that can contribute to criminal behaviour and generate opportunities for innovative research to begin into rehabilitation programs that acknowledge and address the physiological and functional changes in the brain that may be contributing to engagement in criminal behaviour. It can also assist in placing the offender's life and situation in a wider context beyond an 'offending label'.

A role for social work

As highlighted in the introduction of this thesis, social work is comprised of a multitude of different practices aimed at promoting the wellbeing of individuals and addressing disadvantage, oppression and structural barriers faced by vulnerable groups in society. As such, there are numerous ways in which the social work profession can contribute to the focus of this thesis; being the need to incorporate a multidisciplinary approach when addressing criminal recidivism, particularly in terms of utilising emerging neuroscience knowledge on the long-term impact of chronic childhood maltreatment on brain development and function and the associated implications for criminal recidivism. Of considerable importance for social work is the role the profession can play in the provision of rehabilitation interventions, and policies and practices within the criminal justice system that acknowledge and utilise this neuroscience knowledge.

Significantly, there is also a considerable role for social work to play in the area of child protection. In harnessing the amassed knowledge from the neurosciences on the long-term impact of chronic childhood maltreatment on brain development and function the social work profession is in a vital position of being front-and-centre of child protection in Australia. Social work is potentially central in being able to advocate for child protection policies and practices that not only utilise this neuroscience knowledge in the decision-making process for deciding the future of these vulnerable children, but also in the therapeutic process for these children in being able to overcome their experiences of childhood maltreatment.

In recent years Australian child protection systems have been the subject of close scrutiny and criticism, with there being a number of inquiries examining the policies and practices of child protection agencies throughout Australia. In fact since 2000, every jurisdiction within Australia has embarked on at least one substantial review into child protection

services (Cummins, Scott and Scales, 2012:xxviii). An example is the inquiry into the systemic problems within Victoria's child protection system in 2012 (Cummins, Scott and Scales, 2012). Submissions to this inquiry noted a lack of acknowledgement by the legal system of the impact of cumulative harm on children's health and wellbeing, and as such child protection's limitations in incorporating cumulative harm into reports to the court (Cummins, Scott and Scales, 2012:99). In response to this the Children's Court submitted that child protection agencies' focus on crisis-based interventions undermines the court's ability to incorporate a sound approach to cumulative harm (Cummins, Scott and Scales, 2012:99). The Children's Protection Society submitted that the overall result of this is that "children suffering the corrosive effects of constant low-level insults to their dignity, health and wellbeing are overlooked" (Cummins, Scott and Scales, 2012:99).

The service framework surrounding the protection of vulnerable children in Australia is substantial, and includes universal services (such as childcare, maternal child health nurse services, education, health and financial services); targeted community service organisations (such as early childhood services, drug and alcohol services, family violence services); child protection services that receive and assess reports of suspected child abuse and neglect, the courts and legal system; Commonwealth, State and local government laws, programs and policies; as well as out-of-home care providers, such as foster care, kinship care, and residential care (Cummins, Scott and Scales, 2012:xxix). The social work profession is involved in every facet of this work, from policy and practice development, to advocacy, to the legal system, as well as the provision of child protection assessments and investigations and direct therapeutic care to vulnerable children and families. The role of social work in incorporating neuroscience knowledge into policies and practices could be fundamental. In fact, I would argue that there is no other profession that spans across such vast facets of work that can be as instrumental in bringing together multidisciplinary knowledge to improve the wellbeing of individuals across the life course.

Neurobiologically informed therapy

Somatic therapy provides one such avenue within which neuroscience can contribute to rehabilitation programs. It is a relatively new field and is founded on neuroscientific insights on the nature of brain function. A number of experts, including Dr Bessel van der Kolk, Dr Peter Levine, Dr Dan Siegel, Dr Stephen Porges and Dr Bruce Perry, advocate the use of somatic therapies for highly traumatised populations rather than the traditional cognitive-based therapies.

As discussed in Chapter Eight, somatic therapy is based on the premise that the pathology of PTSD includes a loss of body awareness, including alexithymia (extreme emotional

dysfunction), and loss of emotional regulation, underlied by alterations in neural structures that regulate body states (van der Kolk et al., 2014:e560). Somatic approaches to therapy use movement-based activity to build interoceptive awareness and improve self-regulation, including yoga, creative therapy, dance, and movement therapy, focusing on rhythm and ritual to facilitate the regulatory processes in the brain that have been disrupted from trauma (Goodman et al., 2009; Harris, 2007; Kornbum & Halsten, 2006; Truppi, 2001, van der Kolk et al., 2014; Warner et al., 2014:238). Somatic therapy teaches the individual to notice, tolerate, manage and reinterpret visceral sensations associated with PTSD (van der Kolk et al., 2014:e563). By incorporating these therapies in offender rehabilitation interventions, individuals would be assisted with reducing reactivity, impulsivity and improving self-regulation, all of which are important for healthy functioning within society.

The need for an interdisciplinary approach

There are a number of fields that are beginning to recognise the need for a paradigm shift, and some are finding value in what the social sciences can offer. A notable example is Professor Bruce Alexander's dislocation theory of drug addiction (Alexander, 2010:np). Alexander conducted a series of experiments in the late 1970s known as the 'Rat Park' experiments, the findings of which contradict the dominant medical model of drug addiction, of which our legislation and treatment practices are based on, that espouses drug addiction as resulting from the chemical make-up of the drug itself (Alexander, 2001:np). Alexander's experiments compared rats living in isolation in laboratory cages with rats residing in what was dubbed the 'rat park': a space two hundred times larger than a laboratory cage, containing 16 to 20 male and female rats, abundant food, toys, and places to create nests and raise families (Alexander, 2001:np). Both groups were given a choice between plain water and sweetened water with morphine. The experiments found that rats living in isolation quickly became addicted to the morphine, however rats residing in the rat park chose plain water over the morphine (Alexander, 2001:np). Some of the experiments involved forcing rats to consume morphine for weeks prior to allowing them a choice of either morphine water or plain water. The rats in the rat park demonstrated significantly less desire for morphine, despite being exposed to it, compared with the isolated rats (Alexander, 2001:np). Alexander therefore concluded that a purely medical model of drug addiction provided an inadequate explanation and instead a social science paradigm needs to be adopted that acknowledges the impact of isolation and individualism on drug addiction (Alexander, 2010:np). He argued,

"...chronically displaced people strive to compensate for their agonizing lack of belonging, meaning, and identity by clinging desperately to the best substitutes that they can find for an authentic social life... Dislocated people desperately cling to their addictions, because, without them, they have terrifyingly little reason to live" (2010:n.p.).

The usefulness of an interdisciplinary approach to research designs is exemplified by the emergence of neuroanthropology, which joins traditional biological knowledge and new understandings of neural plasticity, with the

“insistence that brain function is always embedded in larger, living systems, including the human body, the social field, and the longer-term, larger-scale structures that are the products of human brains yoked into cooperative, cumulative systems” (Lende & Downey, 2012:2).

In her research Emily Martin argues that whilst *“brain-based explanations of human consciousness are entrenched in the neurosciences, their uptake in the wider public and in other academic disciplines is uneven”* (Martin, 2010:367). There is increasingly a small group of social work writers who are advocating for the acknowledgement of this in research, practice and social work education (see Egan, Combs-Orme & Neely-Barnes, 2011; Farmer R, 2009; Green D & McDermott, 2010; Lefmann and Combs-Orme, 2013).

It is clear from the systematic reviews that have been considered in this thesis that there is limited filtration of knowledge between disciplines, particularly between social work and neuroscience, and criminology and neuroscience. More specific neuroscience research is crucial in order to better understand the possible changes that occur in the brain after experiencing chronic childhood maltreatment that increase the risk of engagement in criminal activity. To ignore the influence of the biology of the brain and the interplay between the biological brain, and the emotional and physical responses, is to ignore an essential component of the fundamental principle of social work, which is the interdependence of the individual and surrounding systems (Teater, 2011:17). Just as the natural sciences have evolved to now incorporate the influence of social and economic systems, social work too must expand to incorporate biological and neuroscience knowledge into what has traditionally centred solely on practice theory (Green, D. & McDermott, 2010:2427). Whilst the use of interpretive and critical discourse is necessary to highlight the interplay of systems within society, there remains a vital place for empirical and replicable methods used traditionally in the medical and science traditions.

It is now undeniable that both nature and nurture have profound influence on human behaviour. Neuroscience research has been of paramount importance in defining the dynamic bi-directional relationship between individuals and their environment, and the way in which an individual simultaneously shapes, and is shaped by, their environment (Green D & McDermott, 2010:2426). This acknowledgement may serve to break down the dichotomous, and in fact disciplinary divide between life science and social work. For social work to intervene at the intersecting points of individuals and their environment it needs to be acknowledged that people both influence and are influenced by their environment in a bidirectional flow. To ignore the influence of the biology of the brain

and the interplay between the biological brain, and the emotional and physical responses, is to ignore a crucial component of the fundamental principle of social work, which is the interdependence of the individual and surrounding systems. This therefore sharpens the call for social work to pay heed to developments in neuroscience and the way in which these biological changes impact on the social functioning of the person and society.

In Chapter Two I highlighted the caution shown by both social work and criminology to embrace neuroscience knowledge, in part due to the quest to avoid biological reductionism, as well as the concern that this knowledge will deny the influence of structural and systemic disadvantage and oppression. Furthermore, there is clearly an historical basis for this apprehension regarding the use of biological knowledge, given its use to promote oppressive regimes and policies in the not-too-distant past, with horrific consequences. This thesis in no way makes the claim that an individual's genetic and environmental upbringing automatically changes the development and function of the brain in such a way as to make engagement in crime inevitable. Nor does it want to suggest that there is no hope for these individuals as a result of biological constraints. Instead this thesis aims to highlight the significant contribution neuroscience can make in better understanding of the way in which the brain functions, and the way in which environment and circumstance can fundamentally alter the brain. What is apparent however is the fact that the brain is a highly complex organ that possesses amazing plasticity in its ability to adapt and recover from trauma or injury, meaning that dysfunctional brain changes are not inevitable, nor will they affect every individual in the same way. More importantly, one's childhood experiences do not translate into permanent and inevitable malfunctioning. Just as we remain unsure about the exact way in which environment impacts on brain development, we remain equally unsure of the mechanisms in the brain that can make an individual resilient to circumstances that cause others hardship. Additionally this thesis does not wish to provide excuses for engagement in criminal activity, nor to absolve responsibility for individuals who have offended. Instead it hopes to shed light on the importance of understanding how the brain functions, particularly after prolonged trauma during childhood, and how this knowledge may be able to be used and adapted to increase the success of offender rehabilitation programs.

In summarising Chapter Five, I raised the point that seeking coherence in explanations for the causal links between the experience of chronic childhood maltreatment and engagement in offending behaviour felt like a process of apophrenia. I suggested that neuroscience might be a unifying factor that can transform the feeling of apophrenia to one of epiphany. Advances in neuroscience are particularly important in explaining some of the causation that has led to a correlation between the experience of chronic

childhood maltreatment and later engagement in recidivistic offending. They are also important in providing a neurobiological explanation as to why the rehabilitation programs currently in place in Australian correctional facilities may be ineffective for these populations, and hopefully provide new opportunities to develop alternative interventions to not only reduce recidivist offending, but also provide this population with greater understanding and opportunities to live a full and engaged life. Not only is this relevant to correctional interventions but also utilising neuroscience knowledge to assist in child protection interventions and the creation of environments that support children during their early developmental years in a neurodevelopmentally-informed manner. Combining neuroscience and social work research enables the creation of interventions that allow individuals to access the various brain regions that will provide a wider variety of alternative behavioural responses (Matto & Strolin-Goltzman, 2010:150). Tangible medical evidence can therefore contribute to critical theory's arguments on the impact of dominant power structures on the psychological and physical health of a population (Green D & McDermott, 2010:2427).

Conclusion

This thesis has focused on the contribution neuroscience knowledge can make to understanding the impact of chronic childhood maltreatment on a trajectory of criminality; however, we must not lose sight of the pivotal role social work too can play in furthering our understanding. As previously discussed, the experiments by Bruce Alexander (2001, 2010) provide a shining example of the centrality social work can play. Alexander's experiments repeatedly demonstrated that failures or breaks in multiple systems (social bonds, nutrition, surrounding environment, opportunities) caused the rats to develop addictions rather than simply a chemical reaction. Social work can therefore play a pivotal role in focusing attention on the multiple systemic breaks that contribute to the complexity of the issue.

Social work is in a unique position within which to undertake this task given its foundational principles that recognise the multiple systems that make up reality and longstanding commitment to the 'person-in-environment'. It is against this backdrop that this thesis argues that neuroscience's knowledge of the impact of chronic childhood maltreatment on brain development and function needs to be examined more thoroughly in light of the obvious connection between the experience of chronic childhood maltreatment and later engagement in crime. Overarching all of this is the need for policy makers to acknowledge what the impact of chronic childhood maltreatment on the brain might mean for criminal justice policy and practices including rehabilitation programmes, and the ongoing task to create environments which nurture children's development.

Historically, trends in social work knowledge have emerged out of practice movements that aim to fundamentally alter how social work is practised (Reid, 2002:7). This thesis argues that the incorporation of neurobiological understandings of the brain and its impact on behaviour and functioning is a critical practice movement of the new millennium that must be incorporated into the core values of social work. Changing the academic landscape to be more inclusive and less driven by traditional ideological divides may not only be recommended, but may in fact be inevitable.

Social work has a long tradition of forging new frontiers and has sought to push against hegemonic discourse and open people's minds to alternative ways of viewing the world around them. In this the twenty-first century, social work is in the unique position of standing at the forefront and being able to push yet another boundary; one that forges a bridge between the natural sciences and the social sciences, and one that has the potential to revolutionise our knowledge of human existence. This thesis argues that the combining of neuroscience and social work knowledge has the potential to achieve this goal.

APPENDIX A:

Research from systematic review examining the impact of chronic childhood maltreatment on brain structure and function

Reference	Objective	Study Design	Population	Journal	Nationality	Outcome
Shenk, C., Noll, J., Putnam, F., Trickett, P. 2010, 'A prospective examination of the role of childhood sexual abuse and physiological asymmetry in the development of psychopathology', <i>Child Abuse and Neglect</i> , vol. 34, no. 10, pp. 752-761.	Assessed whether an asymmetrical stress response predicted higher levels of psychopathology over time.	Participants were enrolled in a longitudinal study examining the developmental effects of childhood sexual abuse. Vagal tone and cortisol were measured 7 years after initial meeting to assess physiological response to a laboratory stressor. Depressive symptoms and antisocial behaviours were assessed 6 years after the completion of the laboratory stressor.	52 female subjects with substantiated sexual abuse, 77 non-abused comparison subjects.	<i>Child Abuse and Neglect</i>	USA	A prior history of childhood sexual abuse predicted an asymmetrical physiological response to stress in late adolescence. This asymmetrical response predicted both higher levels of depression and antisocial behaviours in young adulthood. Childhood sexual abuse may sensitise females to respond to moderate daily stressors in a manner that places them at higher risk for experiencing depressive symptoms and antisocial behaviours over time.
Bockting, C., Lok, A., Visser, I., Assies, J., Koeter, M. and Schene, A. 2012, 'Lower cortisol levels predict recurrence in remitted patients with recurrent depression: A 5.5 year prospective study', <i>Psychiatry Research</i> , vol. 200, no. 2-3, pp. 281-287.	To examine the predictive effect of cortisol on consecutive episodes of depression in remitted recurrently depressed patients.	Salivary cortisol levels measured in remitted recurrently depressed patients that were followed up prospectively for 5.5 years after remission. Recurrence was assessed using a validated structured interview.	55 patients who had experienced at least two Major Depressive Episodes in the last five years. DSM-IV criteria used. A score of less than 10 in the Hamilton Rating Scale for Depression.	<i>Psychiatry Research</i>	Netherlands	Lower cortisol levels were associated with the experience of childhood trauma. Having a lower average morning cortisol level was found to be predictive of recurrence of depression over the 5.5 year period.
Cicchetti, D., Rogosch, F.A. 2001, 'The impact of child maltreatment and psychopathology on neuroendocrine functioning', <i>Development and Psychopathology</i> , vol. 13, no. 4, pp. 783-804.	To assess the impact of child maltreatment and psychopathology on neuroendocrine functioning.	Cortisol regulation was investigated in a sample of school-aged maltreated non-maltreated children in the context of a day camp research program. The presence of clinical-level internalising and clinical-level externalising symptomatology was determined through adult report and child self report.	167 school-aged maltreated children and 204 demographically comparable non-maltreated children.	<i>Development and Psychopathology</i>	USA	Maltreated children with clinical-level internalising problems exhibited higher morning, afternoon, and average daily cortisol levels. Not all maltreated children displayed the same pattern of cortisol regulation. The experience of childhood maltreatment intensified the usual effects of depressive disorders in childhood on neuroendocrine functioning. Maltreated children with significant internalising psychopathology were at greater risk
Cicchetti, D., Rogosch, F.A. 2001, 'The	To assess the impact of child maltreatment and	Cortisol regulation was investigated in a sample of school-aged maltreated	167 school-aged maltreated children and 204	<i>Development and Psychopathology</i>	USA	Maltreated children with clinical-level internalising

<p>Frodl, T., Reinhold, E., Koutsouleris, N., Reiser, M. and Meisenzahl, E.M. 2010, 'Interaction of childhood stress with hippocampus and prefrontal cortex volume reduction in major depression', <i>Journal of Psychiatric Research</i>, vol. 44, no. 13, pp.799-807.</p>	<p>To assess whether childhood stress is associated with structural brain alterations in patients with major depression (MD).</p>	<p>43 individuals with MD and 44 matched healthy individuals were investigated using MRI imaging.</p>	<p>43 inpatients aged between 18 and 65 years being treated for MD at the Department of Psychiatry and Psychotherapy of the Ludwig-Maximilian University, Munich, were investigated using structural MRI and childhood stress frameworks. Patients were compared with 44 matched healthy control subjects.</p>	<p><i>Journal of Psychiatric Research</i></p>	<p>Germany</p>	<p>Significantly smaller hippocampal white matter and prefrontal gray matter volume was observed in patients with MD. In particular left hippocampal white matter was smaller in patients who had emotional childhood neglect. For male patients this effect was seen in the left and right hippocampus. Physical neglect during childhood affected prefrontal gray matter volume in healthy subjects. Both emotional neglect and brain structural abnormalities predicted cumulative illness duration and there was a significant interaction between emotional neglect and prefrontal volumes, as well as hippocampal white matter on the illness course. Childhood stress and brain structure volumes independently predicted cumulative illness course. Subjects with both structural brain changes and childhood emotional neglect are at very high risk to develop a more severe illness course.</p>
<p>Anda, R., Felitti, V., Bremner, J., Walker, J., Whitfield, C., Perry, B., Dube, S., Giles, W. 2006, 'The enduring effects of abuse and related adverse experiences in childhood', <i>European Archives of Psychiatry and Clinical Neuroscience</i>, vol. 256, no. 3, pp. 174-186.</p>	<p>To examine the long-term effects of abuse and adverse childhood experiences on the developing brain.</p>	<p>Used the Adverse Childhood Experiences (ACE) Study, which relied on in-depth questionnaires that were graded for analysis.</p>	<p>The ACE study involved 17,337 adults assessed 8 types of adverse childhood experiences (ACEs) including abuse, witnessing domestic violence, and serious household dysfunction.</p>	<p><i>European Archives of Psychiatry and Clinical Neuroscience</i></p>	<p>USA</p>	<p>Cumulative exposure of the developing brain to the stress response results in impairment in multiple brain structures and functions of the brain. Public health policies and practices are fragmented by categorical funding, organisational boundaries and a symptom-based system of medical care. Policies need to recognise that these health and social problems are generally comorbid and originate as a result of neuro-developmental consequences of abuse and neglect.</p>
<p>De Bellis, M.D. and Keshavan,</p>	<p>To examine gender differences in brain</p>	<p>61 medically healthy children and adolescents</p>	<p>61 medically healthy young</p>	<p><i>Neuroscience and Biobehavioral</i></p>	<p>USA</p>	<p>Found gender differences in the</p>

Toth, S., Pickering Stronach, E., Rogosch, F., Caplan, R. and Cicchetti, D. 2011, 'Illogical thinking and thought disorder in maltreated children', <i>Journal of the American Academy of Child & Adolescent Psychiatry</i> , vol. 50, no. 7, pp. 659-668.	To examine and compare illogical thinking in children from low-income families with and without histories of child maltreatment.	Children participated in a story game designed to elicit speech samples. Children were instructed to listen to two recorded stories and prompted to retell the story. Children were then asked to create their own story from possible topics. Child behaviour ratings on the Child Behavior Checklist were completed after 35 hours of observation.	91 maltreated and 43 non-maltreated school-aged children from low-income families.	<i>Journal of the American Academy of Child & Adolescent Psychiatry</i>	USA	Maltreated children exhibited more illogical thinking, with the level of illogical thinking being in the clinically pathological range. The ability to formulate ideas and logically communicate them is compromised in children who have experienced maltreatment.
Morris, M., Compas, B. and Garber, J. 2012, 'Relations among posttraumatic stress disorder, comorbid major depression, and HPA function: A systematic review and meta-analysis', <i>Clinical Psychology Review</i> , vol. 32, no. 4, pp. 301-315.	To undertake a meta-analysis on research that examines the hypothesis that exposure to traumatic stress is associated with increased risk for PTSD and alterations of HPA function.	A meta-analysis of 47 studies involving 6008 subjects.	Varied	<i>Clinical Psychology Review</i>	USA	Enhanced HPA feedback function may be a marker of trauma-exposure rather than vulnerability for PTSD. Lower daily cortisol output may be associated with PTSD in particular.
Cutuli, J., Wiik, K., Herbers, J., Gunnar, M. and Masten, A. 2010, 'Cortisol function among early school-aged homeless children', <i>Psychoneuroendocrinology</i> , vol. 35, no. 6, pp. 833-845.	To compare the influence of two classes of risk in the context of homelessness, in terms of cortisol function among early school-aged homeless children.	Levels of socioeconomic resource-related risk and negative lifetime events were examined with respect to morning cortisol levels and cortisol response to a set of cognitive tasks.	66 children between the ages of 4 and 7 years staying in an emergency shelter for families.	<i>Psychoneuroendocrinology</i>	USA	Adversities largely reflecting family level negative life events predicted higher levels of morning cortisol and differences in initial level and change over the course of the session of cognitive tasks. In contrast, a socioeconomic cumulative risk score was not associated with morning or session-related differences in cortisol.
De Bellis, M. and Kuchibhatla, M. 2006, 'Cerebellar volumes in pediatric maltreatment-related posttraumatic stress disorder', <i>Biological Psychiatry</i> , vol. 60, no. 7, pp. 697-703.	To explore the relationship between structural volumes of the cerebellum hemispheres, vermis, brainstem, and clinical variables in pediatric maltreatment-related PTSD.	Subjects underwent a comprehensive psychiatric assessment and an anatomical magnetic resonance image brain scan.	58 psychotropic-naïve maltreated children and adolescents with PTSD and two groups of pediatric subjects with no DSM-IV criteria A trauma histories: 13 with pediatric generalised anxiety disorder, and 98 healthy non-abused subjects.	<i>Biological Psychiatry</i>	USA	The results support cerebellar volume differences in maltreated children and adolescents with PTSD. Cerebellar volumes positively correlated with age of onset of the trauma that lead to PTSD and negatively correlated with the duration of the trauma that lead to PTSD.
Curtis, W. and Cicchetti, D. 2007, 'Emotion and resilience: A multilevel investigation of resilience, emotion regulation, and investigation of hemispheric electroencephalogram (EEG) asymmetry in a sample of maltreated and non-maltreated school-	To conduct a multilevel investigation of resilience, emotion regulation, and investigation of hemispheric electroencephalogram (EEG) asymmetry in a sample of maltreated and non-maltreated school-	Utilised a multi-informant, multi-perspective view of child behaviour and adaptive function, including child self-report, peer evaluations, counsellor observations, and counsellor-report assessments of children, as well as annual assessment of children's school	87 children aged between 6 and 12 years from low-income families who attended a summer day camp over 3 consecutive years, between 2004 and 2007. 37 children were classified as resilient	<i>Development and Psychopathology</i>	USA	EEG asymmetry across central cortical regions showed greater left hemisphere activity in resilient children. Non-maltreated children showed greater left hemisphere EEG activity across
Curtis, W. and Cicchetti, D.	To conduct a multilevel	Utilised a multi-informant, multi-perspective view of	87 children aged between 6 and 12	<i>Development and Psychopathology</i>	USA	EEG asymmetry across central

Rao, H., Betancourt, L., Giannetta, J., Brodsky, N., Korczykowski, M., Avants, B., Gee, J., Wang, J., Hurt, H., Detre, J. and Farah, M. 2010b, 'Early parental care is important for hippocampal maturation: Evidence from brain morphology in humans', <i>NeuroImage</i> , vol. 49, issue 1, pp. 1144-1150.	To examine the effects on later brain morphology of parental nurturance and environmental stimulation.	Used a longitudinal data set including ecologically valid in-home measures of early experience during childhood (at age 4 and 8 years) and high-resolution structural brain imaging during adolescence (mean age 14 years).	49 African American middle school-aged children (24 female). These participants had been recruited at birth for a study of the effects of gestational cocaine exposure (Hurt et al., 1995). Use of drugs other than tobacco, alcohol, marijuana, and cocaine was an exclusionary criterion.	<i>NeuroImage</i>	USA	A variation in childhood experience of healthy human bears a significant relationship to brain structure. The effect of childhood experience may be highly selective, with parental nurturance but not environmental stimulation being related to hippocampal morphology. The timing of this relationship between childhood experience and hippocampal structure is consistent with the existence of a sensitive developmental period, with only the earlier measure of parental nurturance at age 4 predicting adolescent hippocampal volumes. Disappears at age 8, supporting the existence of a sensitive developmental period for brain maturation. These findings indicate that variation in normal childhood experience is associated with differences in brain morphology, and hippocampal volume is specifically associated with early parental nurturance.
Majer, M., Nater, U., Lin, J., Capuron, L. and Reeves, W. 2010, 'Association of childhood trauma with cognitive function in healthy adults: a pilot study', <i>BMC Neurology</i> , vol.10, p. 61.	To measure the long-term consequences of childhood trauma on cognitive function.	Utilised the Cambridge Neuropsychological Test Automated Battery (CANTAB) and the Wide-Range-Achievement-Test (WRAT-3) to examine cognitive function and individual achievement. Type and severity of childhood trauma was assessed using the Childhood Trauma Questionnaire (CTQ). Data was analysed using multiple linear regression on CANTAB measures with primary predictors (CTQ scales) and potential confounders (age, sex, education, income).	47 healthy adults, selected from a sample of 227 individuals participating in a clinical study of chronic fatigue syndrome. No concurrent medical or psychiatric illness	<i>BMC Neurology</i>	USA	Emotional abuse was associated with impaired spatial working memory performance. Physical neglect correlated with impaired spatial working memory and pattern recognition memory. Physical neglect and emotional abuse might be associated with memory deficits in adulthood, which in turn might pose a risk factor for the development of psychopathology.
Tyrka, A., Wier, L., Price, L., Ross, N., Anderson, G., Wilkinson, C. and Carpenter, L.	To examine whether there is a link between childhood parental loss and alterations in hypothalamic-	44 participants experienced parental loss during childhood, including 19 with a history of parental death and 25 with a history of prolonged parental	88 healthy adults with no current Axis I psychiatric disorder. 44 participants experienced	<i>Biological Psychiatry</i>	USA	Parental loss was associated with increased cortisol responses to the test, particularly in men. Levels of parental
Tyrka, A., Wier, L., Price, L.,	To examine whether there is a link	44 participants experienced parental loss during	88 healthy adults with no current	<i>Biological Psychiatry</i>	USA	Parental loss was associated with

Jackowski, A., Perera, T., Abdallah, C., Garrido, G., Tang, C., Martínez, J., Mathew, S., Gorman, J., Rosenblum, L., Smith, E., Dwork, A., Shungu, D., Kaffman, A., Gelernter, J., Coplan, J., and Kaufman, J. 2011, 'Early-life stress, corpus callosum development, hippocampal volumetrics, and anxious behavior in male nonhuman primates', <i>Psychiatry Research: Neuroimaging</i> , vol. 192, no. 1, pp. 37-44.	To use neuroimaging techniques to examine the impact of early stress on the hippocampus and corpus callosum for non-human primates.	Male bonnet monkeys were subjected to the variable foraging demand (VFD) early stress paradigm as infants, MRI scans were completed an average of 4 years later, and behavioural assessments of anxiety and ex-vivo corpus callosum (CC) measurements were made when animals were fully matured.	23 adult male Bonnet Macaques.	<i>Psychiatry Research: Neuroimaging</i>	Brazil/USA	Demonstrated structural hippocampal deficits in nonhuman primates subject to early-life stress. Nonhuman primates subjected to early stress had smaller left hippocampal volume than the primates reared under normal conditions. Demonstrated a stable structural brain change in white matter that correlated with fearfulness.
Liu, J., Chaplin, T., Wang, F., Sinha, R., Mayes, L. and Blumberg, H. 2012, 'Stress reactivity and corticolimbic response to emotional faces in adolescents', <i>Journal of the American Academy of Child & Adolescent Psychiatry</i> , vol. 51, no. 3, pp. 304-312.	To investigate the relationship between cortisol response to a laboratory-based social stressor and regional brain responses to emotional face stimuli in adolescents.	Changes in cortisol levels following the Trier Social Stress Test—Child version were measured in 23 disadvantaged and chronically stressed adolescents who also participated in functional magnetic resonance imaging during processing of emotional faces and structural magnetic resonance imaging. The relationships between changes in cortisol following the TSST-C with regional brain activation during face processing, as well as with regional brain morphology, were assessed.	Participants were twenty-three healthy adolescents (ages 14–17 years, 10 females) recruited from a sample of disadvantaged children from families living at or below the federal poverty line, followed longitudinally by us since birth. These children were at risk for chronic exposure to high levels of stress from multiple sources.	<i>Journal of the American Academy of Child & Adolescent Psychiatry</i>	USA	Increased cortisol response to the Trier social stressor was associated with diminished response of the left hippocampus to faces depicting fear. This suggests that HPA–corticolimbic system mechanisms may underlie vulnerability to maladaptive responses to stress in adolescents that may contribute to development of stress-related disorders.
Rao, U., Chen, L., Bidesi, A., Shad, M., Thomas, M., Hammen, C. 2010a, 'Hippocampal changes associated with early-life adversity and vulnerability to depression', <i>Biological Psychiatry</i> , vol. 67, no. 4, pp. 357-364.	To longitudinally examine the relationship between early-life adversity and depressive illness in a subset of patients.	30 adolescents with unipolar major depressive disorder, 22 adolescent volunteers with no personal history of a psychiatric illness but who were at high risk for developing depression by virtue of parental depression, and 35 adolescent volunteers with no personal or family history of a psychiatric disorder (control subjects) underwent volumetric magnetic resonance imaging studies. Information was also gathered on early and recent adverse experiences with standard interviews. The participants were followed for up to 5 years to assess the onset and clinical course of depression.	30 adolescents with depression, 22 adolescents at high-risk for depression, and 35 control subjects. Aged between 12 and 20 years.	<i>Biological Psychiatry</i>	USA	Depressed and high-risk groups had significantly smaller left and right hippocampal volumes than control subjects. Higher levels of early-life adversity were associated with smaller hippocampal volumes. Smaller hippocampal volume partially mediated the effect of early-life adversity on depression during longitudinal follow-up. Smaller hippocampal volume in adolescents at high risk for depression suggests that it may be a vulnerability marker for the illness. Early-life adversity may
Rao, U., Chen, L., Bidesi, A.,	To longitudinally examine the	30 adolescents with unipolar major depressive	30 adolescents with depression, 22	<i>Biological Psychiatry</i>	USA	Depressed and high-risk groups had

<p>Rao, U., Hammen, C., Ortiz, L., Chen, L., Poland, R. 2008, 'Effects of early and recent adverse experiences on adrenal response to psychosocial stress in depressed adolescents', <i>Biological Psychiatry</i>, vol. 64, no. 6, pp. 521-526.</p>	<p>To examine the effects of early and recent adverse experiences on adrenal response to psychosocial stress in depressed adolescents.</p>	<p>A modified version of a standard psychosocial stressor used in adults, the Trier Social Stress Test, was administered to 30 adolescents with major depressive disorder and 25 healthy adolescents. Cortisol concentrations were measured in saliva samples collected before and after the stressor. Information was also gathered on early and recent adverse experiences with standard interviews.</p>	<p>30 adolescents with depression and 25 control subjects. The depressed adolescents met criteria for major depressive disorder (MDD).</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>Participants from both groups had increased cortisol secretion in response to TSST. Compared with control subjects, depressed subjects showed more elevated and prolonged cortisol secretion in response to TSST. The combination of early-life adversity and high levels of chronic stress during adolescence was the most powerful predictor of enhanced adrenal response to the TSST. The HPA response to the stressor was highest in those who had a combination of early-life adversity and high levels of chronic stress during adolescence.</p>
<p>Mangold, D., Wand, G., Javors, M., and Mintz, J. 2010, 'Acculturation, childhood trauma and the cortisol awakening response in Mexican-American adults', <i>Hormones and Behavior</i>, vol. 58, no. 4, pp. 637-646.</p>	<p>To examine the effects of exposure to early traumatic stress and acculturation on dysregulation of the cortisol awakening response (CAR) in Mexican-American adults.</p>	<p>Salivary cortisol samples were collected at awakening and 30, 45, and 60 min thereafter, on two consecutive weekdays from 59 healthy Mexican-American adult males (26) and females (33), ages 18–38 years. Participants were assessed for level of acculturation and exposure to early trauma.</p>	<p>59 healthy Mexican-American adult males (26) and females (33), ages 18–38 years.</p>	<p><i>Hormones and Behavior</i></p>	<p>USA</p>	<p>Greater exposure to early trauma is associated with attenuation of the CAR, even after controlling for age and sex. Anything more than minimal exposure to either risk factor was associated with attenuation of the awakening cortisol response. High exposure to both risk factors appeared to be only incrementally worse than exposure to either one.</p>
<p>Dube, S., Felitti, V., Dong, M., Giles, W. and Anda, R. 2003, 'The impact of adverse childhood experiences on health problems: evidence from four birth cohorts dating back to 1900', <i>Preventive Medicine</i>, vol. 37 no. 3, pp. 268-277.</p>	<p>To examine the relationship of the number of adverse childhood experiences (ACE score) to six health problems among four successive birth cohorts dating back to 1900 to assess the strength and consistency of these relationships in face of secular influences the 20th century brought in changing health behaviours and conditions.</p>	<p>ACE study A retrospective cohort study of 17,337 adult health maintenance organization (HMO) members who completed a survey about childhood abuse and household dysfunction, as well as their health. We used logistic regression to examine the relationships between ACE score and six health problems (depressed affect, suicide attempts, multiple sexual partners, sexually transmitted diseases, smoking, and alcoholism) across four successive birth cohorts: 1900–1931, 1932–1946, 1947–1961, and 1962–1978.</p>	<p>The study population was drawn from the HAC, which provides standardised medical, psychosocial, and preventive health evaluations to adult members of Kaiser Health Plan in San Diego County.</p>	<p><i>Preventive Medicine</i></p>	<p>USA</p>	<p>Growing up with ACEs increased the risk of numerous health behaviours and outcomes for 20th century birth cohorts, suggesting that the effects of ACEs on the risk of various health problems are unaffected by social or secular changes. Research showing detrimental and lasting neurobiological effects of child abuse on the developing brain provides a plausible explanation for the consistency and dose-response relationships found for each health problem across birth cohorts, despite</p>
<p>Dube, S., Felitti, V., Dong, M.,</p>	<p>To examine the relationship of the</p>	<p>ACE study A retrospective cohort study</p>	<p>The study population was</p>	<p><i>Preventive Medicine</i></p>	<p>USA</p>	<p>Growing up with ACEs increased the</p>

<p>Ford, J., Fraleigh, L., Albert, D. and Connor, D. 2010, 'Child abuse and autonomic nervous system hyporesponsivity among psychiatrically impaired children', <i>Child Abuse and Neglect</i>, vol. 34, no. 7, pp. 507-515.</p>	<p>To investigate stress-related autonomic nervous system (ANS) down-regulation as a sequelae of abuse.</p>	<p>Child Protective Services documented incidents of abuse were recorded for children in a sample of 262 pediatric psychiatric inpatients, as well as demographic, physical, and intellectual functioning, and diagnostic and medication prescription data. Before and after a mildly stressful blood draw, noninvasive assessments of ANS activity were obtained.</p>	<p>High-risk and seriously emotionally disturbed children and adolescents ages 6 to 19 years who attended the Devereux School in Massachusetts, a not-for-profit residential treatment center. Children and adolescents with serious emotional disturbance are placed in this facility through child protective agencies, public mental health agencies, juvenile justice authorities, and by school districts when unable to educate and maintain the student within the school community.</p>	<p><i>Child Abuse and Neglect</i></p>	<p>USA</p>	<p>A history of physical abuse (45% overall prevalence) was associated with poststressor ANS hyporesponsivity. Results suggest that a history of physical (but not sexual) abuse is associated with stressor-related ANS down-regulation in psychiatrically impaired children and adolescents. Practice implications Stressor-related autonomic hyporesponsivity secondary to physical abuse may contribute to the impairment of severely emotionally disturbed children. Differential diagnosis of psychiatrically impaired children should include identification of those who have a history of physical abuse, and their treatment should address stressor-related hyporeactivity.</p>
<p>Doom, J., Cicchetti, D., Rogosch, F. and Dackis, M. 2013, 'Child maltreatment and gender interactions as predictors of differential neuroendocrine profiles', <i>Psychoneuroendocrinology</i>, vol. 38, Issue 8, pp. 1442-1454.</p>	<p>To examine whether gender interacts with the stress of maltreatment to produce differential neuroendocrine profiles in children.</p>	<p>Saliva was collected 3 times across the day for 5 days for cortisol and dehydroepiandrosterone (DHEA) analysis. Department of Human Services records were examined to determine the type, severity, chronicity, onset, and recency of maltreatment for children in the maltreated group.</p>	<p>137 maltreated and 110 nonmaltreated low-income, racially and ethnically diverse children (range: 7.9–10.9 years; M = 9.42 years; 52% male) who attended a summer research day camp.</p>	<p><i>Psychoneuroendocrinology</i></p>	<p>USA</p>	<p>Significant interactions between gender and maltreatment pervasiveness predicted diurnal cortisol, DHEA, and cortisol/DHEA ratio levels. Elevated daily cortisol levels were reported for boys compared to girls in the group with more pervasive maltreatment. Boys with less pervasive maltreatment had lower DHEA and higher cortisol/DHEA ratio levels than girls with similar experiences, nonmaltreated boys, and boys with more pervasive maltreatment. Further results are consistent with down-regulation of cortisol production in girls with more pervasive maltreatment and girls who experienced maltreatment that was early onset and not recent. The effectiveness of</p>
<p>Doom, J., Cicchetti, D.,</p>	<p>To examine whether gender interacts with</p>	<p>Saliva was collected 3 times across the day for 5 days for</p>	<p>137 maltreated and 110 nonmaltreated</p>	<p><i>Psychoneuroendocrinology</i></p>	<p>USA 176</p>	<p>Significant interactions between</p>

<p>Alper, K., Shah, J., Howard, B., John, E., Prichep, L. 2013, 'Childhood abuse and EEG source localization in crack cocaine dependence', <i>Psychiatry Research: Neuroimaging</i>, vol. 213, no. 1, pp. 63-70.</p>	<p>To examine impact of child trauma on EEG readings in individuals with crack cocaine dependence. Previous studies have always excluded substance dependent individuals when examining impact of child trauma on abnormal EEG readings.</p>	<p>14 subjects with histories of sexual and/or physical abuse in childhood and 13 matched control subjects were selected from a consecutive series of clients in residential treatment for crack cocaine dependence. Standardised low-resolution electromagnetic brain tomography was used to estimate the source generators of the EEG.</p>	<p>27 patients from a residential rehabilitation facility. 14 patients with histories of childhood abuse; 13 patients with no history of abuse. Average age of 30 years. 12 males and 15 females.</p>	<p><i>Psychiatry Research: Neuroimaging</i></p>	<p>USA</p>	<p>Subjects with histories of abuse in childhood had significantly greater EEG power than controls in the theta frequency range, mainly in the parahippocampal, fusiform, lingual, posterior cingulate, and insular gyri. In excess, theta EEG power, a bandwidth of transactions among hippocampus and amygdala and paralimbic and visual association cortex, may be a correlate of childhood exposure to abuse. The theta rhythm generated in the amygdala might relate to the intrusiveness and pathological salience of external stimuli and internal representations related to exposure to trauma and abuse.</p>
<p>De Bellis, M., Keshavan, M., Shifflett, H., Beers, S., Hall, J. and Moritz, G. 2002, 'Brain structures in pediatric maltreatment-related posttraumatic stress disorder: a sociodemographically matched study', <i>Biological Psychiatry</i>, vol. 52, issue 11, pp. 1066-1078.</p>	<p>To examine the hypothesis that maltreated children evidence alterations of chemical mediators of stress and adverse brain development.</p>	<p>28 psychotropic naïve children and adolescents with maltreatment-related PTSD and 66 sociodemographically similar healthy control subjects underwent comprehensive clinical assessments and anatomical MRI brain scans.</p>	<p>28 children and adolescents with maltreatment-related PTSD and 66 sociodemographically similar healthy control subjects.</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>Subjects with PTSD had smaller intracranial, cerebral, and prefrontal cortex, prefrontal cortical white matter, and right temporal lobe volumes and areas of the corpus callosum and its subregions, and larger frontal lobe cerebrospinal fluid (CSF) volumes than control subjects. The total midsagittal area of corpus callosum and middle and posterior regions remained smaller in subjects with PTSD, whereas right, left, and total lateral ventricles and frontal lobe CSF were proportionally larger than in control subjects, after adjustment for cerebral volume. Brain volumes positively correlated with age of onset of PTSD trauma and negatively correlated with duration of abuse. Significant gender × group effect demonstrated greater lateral ventricular volume increases in maltreated male</p>
<p>De Bellis, M., Keshavan, M.,</p>	<p>To examine the hypothesis that</p>	<p>28 psychotropic naïve children and adolescents</p>	<p>28 children and adolescents with</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>Subjects with PTSD had smaller</p>

<p>Ito, Y., Teicher, M.H., Glod, C.A., Ackerman, E. 1998, 'Preliminary evidence for aberrant cortical development in abused children: A quantitative EEG study', <i>Journal of Neuropsychiatry and Clinical Neurosciences</i>, 10 (3), pp. 298-307.</p>	<p>To investigate cortical development and hemispheric asymmetry in abused children.</p>	<p>15 hospitalised children with severe physical or sexual abuse and 15 normal children were studied with quantitative EEG.</p>	<p>15 hospitalised children (mean age 10.7 ± 2.5 years) with severe physical or sexual abuse and 15 normal children (10.1 ± 3.1 years).</p>	<p><i>Journal of Neuropsychiatry and Clinical Neurosciences</i></p>	<p>USA</p>	<p>Abused children had higher levels of left hemisphere coherence and it reversed asymmetry, with left hemisphere coherence significantly exceeding right hemisphere coherence. Left hemisphere coherence decreased more rapidly across electrode distance in normal subjects, suggesting that increased left coherence in abused patients stemmed from a deficit in left cortical differentiation. These findings support the hypothesis that early severe abuse may have a deleterious effect on brain development.</p>
<p>Pollak, S.D., Cicchetti, D., Klorman, R., Brumaghim, J.T. 1997, 'Cognitive Brain Event-Related Potentials and Emotion Processing in Maltreated Children', <i>Child Development</i>, vol. 68, no. 5, pp. 773-787.</p>	<p>To examine emotional processing in maltreated children.</p>	<p>Cognitive event-related potentials (ERPs) were recorded from 23 maltreated and 21 nonmaltreated children. Children were presented with slides of Ekman photographs of a single model posing an angry (25%), a happy (25%), or a neutral (50%) facial expression. In 1 of 2 counterbalanced target conditions, children were asked to press a button in response to the angry face; in the other target condition, they responded to the happy face.</p>	<p>23 maltreated and 21 nonmaltreated children.</p>	<p><i>Child Development</i></p>	<p>USA</p>	<p>These results suggest different cognitive processing for positive versus negative affective expressions by children with histories of atypical emotional experiences.</p>
<p>Hart, J., Gunnar, M., Cicchetti, D. 1996, 'Altered neuroendocrine activity in maltreated children related to symptoms of depression', <i>Development and Psychopathology</i>, vol. 8, no. 1, pp. 201-214.</p>	<p>This study examined the effects of stressful environments on physiological and affective functioning.</p>	<p>131 maltreated school-aged children attending a summer day camp. Sixty-six nonmaltreated children also attending the camp served as a comparison group. Salivary cortisol measures were obtained daily at 10am and 4pm. Depression was measured using the Child Depression Inventory. Children with scores of 19 or higher were classified as depressed. Internalising and externalising behaviour problems were determined from the Teacher Report Form of the Child Behavior Checklist. Children with scores of 70 or higher were classified as having clinical levels of these problems.</p>	<p>131 maltreated and 66 non-maltreated school-aged children attending a summer day camp.</p>	<p><i>Development and Psychopathology</i></p>	<p>USA</p>	<p>Maltreated children had slightly elevated afternoon cortisol concentrations, but their morning concentrations did not differ significantly from those of nonmaltreated children. Neither clinical levels of depression, internalising, or externalising problems were predictive of the elevated afternoon values. Depression among maltreated children was, however, associated with altered activity of the HPA-axis. Depressed maltreated children had lower morning cortisol concentrations compared to</p>
<p>Hart, J., Gunnar, M.,</p>	<p>This study examined the effects of stressful</p>	<p>131 maltreated school-aged children attending a</p>	<p>131 maltreated and 66 non-maltreated</p>	<p><i>Development and Psychopathology</i></p>	<p>USA</p>	<p>Maltreated children had slightly elevated</p>

<p>Pollak, S., Tolley-Schell, S. 2003, 'Selective attention to facial emotion in physically abused children', <i>Journal of Abnormal Psychology</i>, vol. 112, no. 3, pp. 323-338.</p>	<p>To examine whether physically abused children displayed specific information-processing problems in a selective attention paradigm using emotional faces as cues.</p>	<p>Six happy (3 female and 3 male), 6 angry (3 female and 3 male), and 12 neutral (6 female and 6 male) face cues were used. Responses were obtained from a Neuroscan Stimpad response box.</p>	<p>The sample consisted of 14 physically abused and 14 nonabused children ranging in age from 8 to 11 years.</p>	<p><i>Journal of Abnormal Psychology</i></p>	<p>USA</p>	<p>Physically abused children demonstrated delayed disengagement when angry faces served as invalid cues. Abused children also demonstrated increased attentional benefits on valid angry trials. Physically abused children devoted more processing resources disengaging attention from angry, but not happy, cues. Physically abused children have a specific, or differential, deficit involving attentional processing of anger. Physically abused children have a specific, or differential, deficit involving attentional processing of anger. It appears that problems controlling attention when processing threatening interpersonal signals may make it difficult for abused children to accurately perceive and regulate emotions in social contexts.</p>
<p>Koenen, K., Moffitt, T., Caspi, A., Taylor, A., Purcell, S. 2003, 'Domestic violence is associated with environmental suppression of IQ in young children', <i>Development and Psychopathology</i>, vol. 15, no. 2, pp. 297-311.</p>	<p>Tested whether domestic violence had environmentally mediated effects on young children's intelligence.</p>	<p>The IQs of monozygotic and dizygotic twin 5-year olds were tested. Mothers reported their experience of domestic violence in the previous 5 years.</p>	<p>Children's IQs were assessed for a population sample of 1116 monozygotic and dizygotic 5-year-old twin pairs in England.</p>	<p><i>Development and Psychopathology</i></p>	<p>USA</p>	<p>Domestic violence was uniquely associated with IQ suppression in a dose-response relationship. Children exposed to high levels of domestic violence had IQs that were, on average, 8 points lower than unexposed children. Structural equation models showed that adult domestic violence accounted for 4% of the variation, on average, in child IQ, independent of latent genetic influences. The findings are consistent with animal experiments and human correlational studies documenting the harmful effects of extreme stress on brain development.</p>
<p>Bugental, D., Martorell, G.,</p>	<p>To demonstrate that subtle forms of</p>	<p>Used cortisol testing of mothers and children and</p>	<p>44 mothers who were deemed to be</p>	<p><i>Hormones and Behavior</i></p>	<p>USA</p>	<p>Infants who received frequent corporal</p>
<p>Bugental, D., Martorell, G.,</p>	<p>To demonstrate that subtle forms of</p>	<p>Used cortisol testing of mothers and children and</p>	<p>44 mothers who were deemed to be</p>	<p><i>Hormones and Behavior</i></p>	<p>USA</p>	<p>Infants who received frequent corporal</p>

<p>Heim, C., Newport, D., Wagner, D., Wilcox, M., Miller, A., Nemeroff, C. 2002, 'The role of early adverse experience and adulthood stress in the prediction of neuroendocrine stress reactivity in women: A multiple regression analysis', <i>Depression and Anxiety</i>, vol. 15, no. 3, pp. 117-125.</p>	<p>To examine the role of early adverse experience vs. stress experiences in adulthood in the prediction of neuroendocrine stress reactivity in women.</p>	<p>Women underwent a series of interviews and completed dimensional rating scales on stress experiences and psychopathology, and were subsequently exposed to a standardised psychosocial laboratory stressor. Outcome measures were plasma adrenocorticotropin (ACTH) and cortisol responses to the stress test. Multiple linear regression analyses were performed to identify the impact of demographic variables, childhood abuse, adulthood trauma, major life events in the past year, and daily hassles in the past month, as well as psychopathology on hormonal stress responsiveness.</p>	<p>A total of 49 women (normal volunteers, depressed patients, and women with a history of early abuse).</p>	<p><i>Depression and Anxiety</i></p>	<p>USA</p>	<p>Peak ACTH responses to psychosocial stress were predicted by a history of childhood abuse, the number of separate abuse events, the number of adulthood traumas, and the severity of depression. Similar predictors were identified for peak cortisol responses. Although abused women reported more severe negative life events in adulthood than controls, life events did not affect neuroendocrine reactivity. The regression model explained 35% of the variance of ACTH responses. The interaction of childhood abuse and adulthood trauma was the most powerful predictor of ACTH responsiveness. Our findings suggest that a history of childhood abuse per se is related to increased neuroendocrine stress reactivity, which is further enhanced when additional trauma is experienced in adulthood.</p>
<p>Anderson, C., Teicher, M., Polcari, A., Renshaw, P. 2002, 'Abnormal T2 relaxation time in the cerebellar vermis of adults sexually abused in childhood: Potential role of the vermis in stress-enhanced risk for drug abuse', <i>Psychoneuroendocrinology</i>, vol. 27, no. 1-2, pp. 231-244.</p>	<p>Recent studies suggest that childhood sexual abuse (CSA) elicits a cascade of neurohormonal events that affect brain development and is also a risk factor for the later development of substance abuse. We hypothesise that the cerebellar vermis may be a key region linking these observations.</p>	<p>Steady-state fMRI) was performed to assess resting blood flow in the vermis of 24 young adults (18-22 years) selected by screening from a large community sample.</p>	<p>24 young adults (18-22 years) selected by screening from a large community sample. 8 subjects had a history of repeated CSA but were unmedicated and not under psychiatric care. 16 subjects were age-matched controls who had no personal or family history of Axis I psychiatric disorders. All subjects were screened to exclude known abnormalities affecting brain development, and any history of drug or alcohol abuse.</p>	<p><i>Psychoneuroendocrinology</i></p>	<p>USA</p>	<p>The vermis has a protracted ontogeny and a high density of glucocorticoid receptors, rendering it highly susceptible to early stress. The vermis modulates dopamine turnover in the accumbens and receives direct dopamine input through fibers with dopamine transporters. Findings suggest that early trauma may interfere with the development of the vermis, and produce neuropsychiatric symptoms associated with drug use.</p>
<p>Raine, A., Park, S., Lencz, T., Bihrl, S., Lacasse, L., Widom, C., Louai-Al-</p>	<p>This study used fMRI to address two important gaps in our knowledge of brain functioning and violence: (1)</p>	<p>Four groups of participants recruited from the community (controls, severe physical child abuse only, serious violence only, and severely abused, seriously</p>	<p>25 male participants were divided into 4 groups: controls, severe physical child abuse only,</p>	<p><i>Aggressive Behavior</i></p>	<p>USA</p>	<p>Violent offenders who had suffered severe child abuse show reduced right hemisphere functioning,</p>
<p>Raine, A., Park, S., Lencz, T.,</p>	<p>This study used fMRI to address two</p>	<p>Four groups of participants recruited from the</p>	<p>25 male participants were</p>	<p><i>Aggressive Behavior</i></p>	<p>USA</p>	<p>Violent offenders who had suffered</p>

<p>Pollak, S., Klorman, R., Thatcher, J., Cicchetti, D. 2001, P3b reflects maltreated children's reactions to facial displays of emotion', <i>Psychophysiology</i>, vol. 38, no. 2, pp. 267-274.</p>	<p>Processing of emotion information by maltreated and control children were assessed with event-related brain potentials (ERPs).</p>	<p>Maltreated children, for whom negative facial displays may be especially salient, and demographically comparable peers were tested to increase knowledge of differential processing of emotion information.</p>	<p>24 physically abused and 23 non-physically abused children aged between 8 to 10 years.</p>	<p><i>Psychophysiology</i></p>	<p>USA</p>	<p>Maltreated children, for whom negative facial displays may be especially salient, and demographically comparable peers were tested to increase knowledge of differential processing of emotion information. ERPs were measured while children responded to pictures depicting facial displays of anger, fear, and happiness. Maltreated children showed larger P3b amplitude when angry faces appeared as targets than did control children; the two groups did not differ when targets were either happy or fearful facial expressions or for nontargets of any emotional content. These results indicate that aberrant emotional experiences associated with maltreatment may alter the allocation of attention and sensitivity that children develop to process specific emotion information.</p>
<p>De Bellis, M., Keshavan, M., Clark, D., Casey, B., Giedd, J., Boring, A., Frustaci, K., Ryan, N. 1999b, 'Developmental traumatology part II: Brain development', <i>Biological Psychiatry</i>, vol. 45, no. 10, pp. 1271-1284.</p>	<p>To examine whether increased levels of catecholaminergic neurotransmitters and steroid hormones during traumatic experiences in childhood could adversely affect brain development.</p>	<p>44 maltreated children and adolescents with PTSD and 61 matched controls underwent comprehensive psychiatric and neuropsychological assessments and an anatomical magnetic resonance imaging (MRI) brain scan.</p>	<p>44 maltreated children and adolescents with PTSD and 61 matched controls.</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>PTSD subjects had smaller intracranial and cerebral volumes than matched controls. The total mid-sagittal area of corpus callosum and middle and posterior regions remained smaller; while right, left, and total lateral ventricles were proportionally larger than controls, after adjustment for intracranial volume. Brain volume robustly and positively correlated with age of onset of PTSD trauma and negatively correlated with duration of abuse. Symptoms of intrusive thoughts, avoidance, hyperarousal or dissociation correlated positively with ventricular volume, and</p>
<p>De Bellis, M., Keshavan, M.,</p>	<p>To examine whether increased levels of</p>	<p>44 maltreated children and adolescents with PTSD and</p>	<p>44 maltreated children and</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>PTSD subjects had smaller intracranial</p>

De Bellis, M., Baum, A., Birmaher, B., Keshavan, M., Eccard, C., Boring, A., Jenkins, F., Ryan, N. 1999a, 'Developmental traumatology part I: Biological stress systems', <i>Biological Psychiatry</i> , vol. 45, no. 10, pp. 1259-1270.	To examine the relationship between trauma, psychiatric symptoms and urinary free cortisol (UFC) and catecholamine (epinephrine [EPI], norepinephrine [NE], dopamine [DA]) excretion in prepubertal children with posttraumatic stress disorder (PTSD) secondary to past child maltreatment experiences (n = 18), compared to non-traumatised children with over-anxious disorder (OAD) (n = 10) and healthy controls (n = 24).	Subjects underwent comprehensive psychiatric and clinical assessments and 24-hour urine collection for measurements of UFC and urinary catecholamine excretion. Biological and clinical measures were compared using analyses of variance.	Children with maltreatment experiences (n = 18), non-traumatised children with over-anxious disorder (OAD) (n = 10) and healthy controls (n = 24).	<i>Biological Psychiatry</i>	USA	Maltreated subjects with PTSD excreted significantly greater concentrations of urinary DA and NE over 24 hours than OAD and control subjects and greater concentrations of 24 hour UFC than control subjects. Post hoc analysis revealed that maltreated subjects with PTSD excreted significantly greater concentrations of urinary EPI than OAD subjects. Childhood PTSD was associated with greater co-morbid psychopathology including depressive and dissociative symptoms, lower global assessment of functioning, and increased incidents of lifetime suicidal ideation and attempts. Urinary catecholamine and UFC concentrations showed positive correlations with duration of the PTSD trauma and severity of PTSD symptoms. These data suggest that maltreatment experiences are associated with alterations of biological stress systems in maltreated children with PTSD. An improved psychobiological understanding of trauma in childhood may eventually lead to better treatments of childhood PTSD.
De Bellis, M., Hooper, S., Woolley, D. and Shenk, C. 2010, 'Demographic, maltreatment, and neurobiological correlates of PTSD symptoms in children and adolescents', <i>Journal of Pediatric Psychology</i> , vol. 35, no.5, pp.570-577.	To examine the relationships of demographic, maltreatment, neurostructural and neuropsychological measures with total posttraumatic stress disorder (PTSD) symptoms.	Participants received diagnostic interviews, brain imaging, and neuropsychological evaluations.	Participants included 216 children with maltreatment histories (n = 49), maltreatment and PTSD (n = 49), or no maltreatment (n = 118).	<i>Journal of Pediatric Psychology</i>	USA	Pediatric PTSD symptoms are associated with lower Visual Memory performance. It is an important correlate of PTSD beyond established predictors of PTSD symptoms.
De Bellis, M., Chrousos, G., Dorn, L., Burke, L., Hekmers, K., Kling, M., Trickett, P. and Putnam, F.	To characterise the hypothalamic-pituitary-adrenal (HPA) axis of a self-selected sample of sexually abused and control girls recruited	Plasma ACTH and total and free cortisol responses to ovine CRH stimulation were measured. Psychiatric profiles and 24-h urinary free cortisol measures were obtained.	13 sexually abused and 13 control girls aged between 7 and 15 years.	<i>The Journal of Clinical Endocrinology and Metabolism</i>	USA	Sexually abused girls had a greater incidence of suicidal ideation, suicide attempts and dysthymia than control girls.
De Bellis, M., Chrousos, G.,	To characterise the hypothalamic-	Plasma ACTH and total and free cortisol responses	13 sexually abused and 13 control girls	<i>The Journal of Clinical</i>	USA	Sexually abused girls had a greater

<p>Bremner, J., Narayan, M., Staib, L., Southwick, S., McGlashan, T. and Charney, D. 1999, 'Neural correlates of memories of childhood sexual abuse in women with and without posttraumatic stress disorder', <i>American Journal of Psychiatry</i>, vol. 156, pp. 1787-1795.</p>	<p>The purpose of this study was to measure neural correlates of memories of childhood abuse in sexually abused women with and without the diagnosis of PTSD.</p>	<p>22 women with a history of childhood sexual abuse underwent PET imaging of the brain while they listened to neutral and traumatic (personalised childhood sexual abuse events) scripts. Brain blood flow during exposure to traumatic and neutral scripts was compared for sexually abused women with and without PTSD.</p>	<p>22 women with a history of childhood sexual abuse</p>	<p><i>American Journal of Psychiatry</i></p>	<p>USA</p>	<p>Memories of childhood sexual abuse were associated with greater increases in blood flow in portions of anterior prefrontal cortex, posterior cingulate, and motor cortex in sexually abused women with PTSD than in sexually abused women without PTSD. Abuse memories were associated with alterations in blood flow in medial prefrontal cortex, with decreased blood flow in subcallosal gyrus, and a failure of activation in anterior cingulate (area 32). There was also decreased blood flow in right hippocampus, fusiform/inferior temporal gyrus, supramarginal gyrus, and visual association cortex in women with PTSD relative to women without PTSD. These findings implicate dysfunction of medial prefrontal cortex (subcallosal gyrus and anterior cingulate), hippocampus, and visual association cortex in pathological memories of childhood abuse in women with PTSD. Increased activation in posterior cingulate and motor cortex was seen in women with PTSD. Dysfunction in these brain areas may underlie PTSD symptoms provoked by traumatic reminders in subjects with PTSD.</p>
<p>Bremner, J., Randall, P., Vermetten, E., Staib, L., Bronen, R., Mazure, C., Capelli, S., McCarthy, G., Innis, R., Charney, D. 1997, 'Magnetic resonance imaging-based measurement of hippocampal</p>	<p>The purpose of this study was to compare hippocampal volume in adult survivors of childhood abuse to matched controls.</p>	<p>Magnetic resonance imaging was used to measure volume of the hippocampus in adult survivors of childhood abuse (n = 17) and healthy subjects (n = 17) matched on a case-by-case basis for age, sex, race, handedness, years of education, body size, and years of alcohol abuse. All patients met criteria for PTSD secondary to childhood abuse.</p>	<p>17 adult survivors of childhood abuse and 17 matched controls.</p>	<p><i>Biological Psychiatry</i></p>	<p>USA/Netherlands</p>	<p>PTSD patients had a 12% smaller left hippocampal volume relative to the matched controls, without smaller volumes of comparison regions (amygdala, caudate, and temporal lobe). The findings were statistically significant after controlling for alcohol, age, and</p>
<p>Bremner, J., Randall, P.,</p>	<p>The purpose of this study was to</p>	<p>Magnetic resonance imaging was used to</p>	<p>17 adult survivors of childhood abuse</p>	<p><i>Biological Psychiatry</i></p>	<p>USA/Netherlands</p>	<p>PTSD patients had a 18% smaller left</p>

<p>Hart, J., Gunnar, M., and Cicchetti, D. 1995, 'Salivary cortisol in maltreated children: Evidence of relations between neuroendocrine activity and social competence', <i>Development and Psychopathology</i>, vol. 7, no. 1, pp. 11-26.</p>	<p>To examine salivary cortisol in maltreated children.</p>	<p>The maltreated children were studied for 31 days while they attended a therapeutic preschool for abused and neglected children. Children in the comparison sample were studied while attending a preschool serving economically disadvantaged families. Each child's cortisol values over days were used to compute measures of basal activity (median cortisol) and reactivity (ratio of quartile ranges).</p>	<p>33 maltreated (26 boys) and 16 comparison subjects (8 boys).</p>	<p><i>Development and Psychopathology</i></p>	<p>USA</p>	<p>Median cortisol was not significantly correlated with social behaviour measures. Cortisol reactivity was positively correlated with social competence and negatively correlated with shy/internalising behaviour. Maltreated children exhibited less cortisol reactivity than did comparison children. Maltreated children also scored lower in social competence and higher in shy/internalising and acting out/externalising behaviours. In additional analyses, maltreated children failed to show elevations in cortisol on days of high versus low social conflict in the classroom. Social competence was also found to correlate positively with cortisol levels on high-conflict days. In all, the results suggest a reduction in cortisol reactivity in maltreated children related to the impairment in social competence frequently noted among these children.</p>
<p>Kaufman, J., Birmaher, B., Perel, J., Dahl, R., Moreci, P., Nelson, B., Wells, W. and Ryan, N. 1997, 'The corticotropin-releasing hormone challenge in depressed abused, depressed nonabused, and normal control children', <i>Biological Psychiatry</i>, vol. 42, no. 8, pp. 669-679.</p>	<p>To examine HPA axis disturbances in depressed children with a history of abuse.</p>	<p>13 depressed abused, 13 depressed nonabused, and 13 normal control children were given 1.0 µg/kg of human corticotropin-releasing hormone (CRH) intravenously. Blood samples for corticotropin (ACTH) and cortisol were obtained at nine intervals.</p>	<p>13 depressed and abused, 13 depressed and nonabused, and 13 control children.</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>When compared to depressed nonabused and normal control children, depressed abused children had significantly greater peak, total, and net ACTH secretion post-CRH. Increased ACTH secretion was only observed in depressed abused children experiencing ongoing chronic adversity (marital violence, emotional abuse, poverty, lack of supports). The pattern of findings of the depressed abused children experiencing ongoing adversity parallels the pattern of HPA axis dysregulation reported in animal</p>
<p>Kaufman, J., Birmaher, B.,</p>	<p>To examine HPA axis disturbances in</p>	<p>13 depressed abused, 13 depressed nonabused, and</p>	<p>13 depressed and abused, 13</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>When compared to depressed</p>

<p>Shin, L. M., McNally, R. J., Kosslyn, S. M., Thompson, W. L., Rauch, S. L., Alpert, N. M., Metzger, L. J., Lasko, N. B., Orr, S. P., and Pitman, R. K. 1999, 'Regional cerebral blood flow during script-driven imagery in childhood sexual abuse-related PTSD: A PET investigation', <i>American Journal of Psychiatry</i>, vol. 156, no. 4, pp. 575-584.</p>	<p>To determine whether anterior limbic and para-limbic regions of the brain are differentially activated during the recollection and imagery of traumatic events in trauma-exposed individuals with and without PTSD.</p>	<p>PET was used to measure normalised regional cerebral blood flow (CBF) in 16 women with histories of childhood sexual abuse: eight with current PTSD and eight without current PTSD. In separate script-driven imagery conditions, participants recalled and imagined traumatic and neutral autobiographical events. Psychophysiological responses and subjective ratings of emotional state were measured for each condition.</p>	<p>16 women with histories of childhood sexual abuse: eight with current PTSD and eight without current PTSD.</p>	<p><i>American Journal of Psychiatry</i></p>	<p>USA</p>	<p>The recollection and imagery of traumatic events versus neutral events was accompanied by regional CBF increases in anterior paralimbic regions of the brain in trauma-exposed individuals with and without PTSD. However, the PTSD group had greater increases in orbitofrontal cortex and anterior temporal pole, whereas the comparison group had greater increases in anterior cingulate gyrus.</p>
<p>Stein, M. B., Koverola, C., Hanna, C., Torchia, M. G., and McClarty, B. 1997, 'Hippocampal volume in women who were victimised by severe sexual abuse in childhood', <i>Psychological Medicine</i>, vol. 27, pp. 951-959.</p>	<p>To determine if reduced hippocampal volume in victims of psychological trauma with PTSD was evident in women who were victimised by severe sexual abuse in childhood.</p>	<p>Hippocampal volume was measured using quantitative MRI.</p>	<p>21 women who reported being severely sexually abused in childhood and 21 socio-demographically similar women without abuse histories.</p>	<p><i>Psychological Medicine</i></p>	<p>USA</p>	<p>Women who reported sexual victimization in childhood had significantly reduced (5% smaller) left-sided hippocampal volume compared to the non-victimised women. Hippocampal volume was also smaller on the right side, but this failed to reach statistical significance. Left-sided hippocampal volume correlated highly with dissociative symptom severity, but not with indices of explicit memory functioning. These findings, which are generally consistent with prior reports of reduced hippocampal volume in combat veterans with PTSD, suggest that diminished hippocampal size may be either a consequence of trauma exposure or a risk factor for the development of psychiatric complications following trauma exposure. The observed relationship between symptom severity and hippocampal volume suggests that medial temporal lobe dysfunction may directly mediate certain aspects of PTSD and dissociative disorder symptomatology.</p>
<p>Thomas, L. and De Bellis, M.</p>	<p>To examine whether corticotrophin-</p>	<p>Magnetic resonance imaging was used to</p>	<p>61 medication-naïve maltreated</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>No differences were seen between PTSD</p>

<p>Chugani, H.T., Behen, M.E., Muzik, O., Juhasz, C., Nagy, F., and Chugani, D. 2001, 'Local brain functional activity following early deprivation: A study of post-institutionalised Romanian orphans', <i>NeuroImage</i>, vol. 14, 1290–1301.</p>	<p>To examine whether early global deprivation of institutionalised children may result in persistent specific cognitive and behavioural deficits.</p>	<p>Applied PET imaging in 10 children (6 males, 4 females, mean age 8.8 years) adopted from Romanian orphanages. Using statistical parametric mapping (SPM), the pattern of brain glucose metabolism in the orphans was compared to the patterns obtained from two control groups: (i) a group of 17 normal adults (9 males, 8 females, mean age 27.6 years) and (ii) a group of 7 children (5 males and 2 females, mean age 10.7 years) with medically refractory focal epilepsy, but normal glucose metabolism pattern in the contralateral hemisphere.</p>	<p>10 children (6 male, 4 female) adopted from Romanian orphanages and 7 children (5 males and 2 females, mean age 10.7 years) with medically refractory focal epilepsy, but normal glucose metabolism pattern in the contralateral hemisphere.</p>	<p><i>NeuroImage</i></p>	<p>USA</p>	<p>Neuropsychological assessment of Romanian orphans in the present study showed mild neurocognitive impairment, impulsivity, and attention and social deficits. Comparing the normalised glucose metabolic rates to those of normal adults, the Romanian orphans showed significantly decreased metabolism bilaterally in the orbital frontal gyrus, the infralimbic prefrontal cortex, the medial temporal structures (amygdala and head of hippocampus), the lateral temporal cortex, and the brain stem. These findings were confirmed using a region-of-interest approach. SPM analysis showed significantly decreased glucose metabolism in the same brain regions comparing the orphans to the nonepileptic hemisphere of the childhood epilepsy controls. Dysfunction of these brain regions may result from the stress of early global deprivation and may be involved in the long-term cognitive and behavioural deficits displayed by some Romanian orphans.</p>
<p>Rutter, M. and English and Romanian Adoptees study team, 1998, 'Developmental catch-up, and deficit, following adoption after severe global early privation', <i>Journal of Child Psychology and Psychiatry</i>, vol. 39, pp. 465–476.</p>	<p>To examine the extent of developmental deficit and catch-up following adoption after severe global early privation</p>	<p>111 Romanian children at age 4 years who came to the U.K. before the age of 2 years, and compared with respect to their functioning at the same age to a sample of 52 U.K. adopted children placed before the age of 6 months. The measures at 4 years included height, head circumference, and general cognitive level (assessed on both the McCarthy and Denver Scales).</p>	<p>111 Romanian children who came to the U.K. before the age of 2 years, and compared with respect to their functioning at the same age to a sample of 52 U.K. adopted children placed before the age of 6 months.</p>	<p><i>Journal of Child Psychology and Psychiatry</i></p>	<p>UK</p>	<p>The children from Romania were severely developmentally impaired at the time of UK entry, with about half below the third percentile on height, on weight, on head circumference, and on developmental quotient. Many were also in a poor physical state with recurrent intestinal and respiratory infections. The catch-up in both physical growth and cognitive level appeared nearly complete at 4 years for those children</p>
<p>Rutter, M. and English and</p>	<p>To examine the extent of</p>	<p>111 Romanian children at age 4 years who came to the</p>	<p>111 Romanian children who came</p>	<p><i>Journal of Child Psychology and</i></p>	<p>UK</p>	<p>The children from Romania were</p>

Liu, D. and Meaney, M. 1997, 'Maternal care, hippocampal glucocorticoid receptors, and hypothalamic-pituitary-adrenal responses to stress', <i>Science</i> , vol. 277, pp. 1659-1662.	To examine whether variations in maternal care affect the development of individual differences in neuroendocrine responses to stress in rats.	Examined the behaviour of mothers of handled or non-handled litters over the first 10 days of life, a "critical" period for the handling effect on HPA development	Rats	<i>Science</i>	USA	The offspring of mothers that exhibited more licking and grooming of pups during the first 10 days of life showed reduced plasma adrenocorticotrophic hormone and corticosterone responses to acute stress, increased hippocampal glucocorticoid receptor messenger RNA expression, enhanced glucocorticoid feedback sensitivity, and decreased levels of hypothalamic corticotropin-releasing hormone messenger RNA. Each measure was significantly correlated with the frequency of maternal licking and grooming. These findings suggest that maternal behaviour serves to "program" hypothalamic-pituitary-adrenal responses to stress in the offspring.
Andersen, S. and Teicher, M. 2004, 'Delayed effects of early stress on hippocampal development', <i>Neuropsychopharmacology</i> , vol. 11, pp. 1988-1993.	To ascertain whether this normal trajectory was affected by repeated maternal separation.	Rat pups were separated from their mother for 4 h a day between postnatal days 2 and 20 (ISO group), and compared to rat pups that remained with their mother in the animal facilities (AFR group) and were exposed to minimal handling.	Rats	<i>Neuropsychopharmacology</i>	USA	Early maternal separation produced a regionally specific delayed effect on the structure of the hippocampus by attenuating rates of synaptic development.
Teicher, M. Dumont, N., Ito, Y., Vaituzis, C., Giedd, J. and Andersen, S. 2004, 'Childhood neglect is associated with reduced corpus callosum area', <i>Biological Psychiatry</i> , vol. 56, pp. 80-85.	To examine the impact of neglect on brain development.	Regional CC area was measured from magnetic resonance imaging scans in 26 boys and 25 girls admitted for psychiatric evaluation (28 with abuse or neglect) and compared with CC area in 115 healthy control subjects. Data were analyzed by multivariate analysis of covariance, with age and midsagittal area as covariates.	26 boys and 25 girls admitted for psychiatric evaluation (28 with abuse or neglect) and compared with CC area in 115 healthy control subjects.	<i>Biological Psychiatry</i>	USA	Total CC area of the abused/neglected patients was 17% smaller than in control subjects and 11% smaller than in psychiatric patients who had not been abused or neglected. Control subjects and the contrast group did not differ in total CC area. Neglect was the strongest experiential factor and was associated with a 15%-18% reduction in CC regions 3, 4, 5, and 7. In contrast, sexual abuse seemed to be the strongest factor associated with reduced CC size in girls.
Heim, C., Newport, D., Heit, S., Graham, Y., Wilcox, M.,	To determine whether early-life stress results in a persistent sensitization of the	Prospective controlled study conducted from May 1997 to July 1999	49 healthy women aged 18 to 45 years were recruited into 4 study groups: 12 with no history of	<i>Journal of the American Medical Association</i>	USA	Women with a history of childhood abuse exhibited increased pituitary-adrenal and
Heim, C., Newport, D.,	To determine whether early-life	Prospective controlled study conducted from May 1997	49 healthy women aged 18 to 45 years	<i>Journal of the American</i>	USA	Women with a history of childhood

<p>Heim C., Newport D., Bonsall R., Miller, A. and Nemeroff, C. 2001, 'Altered pituitary-adrenal axis responses to provocative challenge tests in adult survivors of childhood abuse', <i>American Journal of Psychiatry</i>, vol.158, no. 4, p.575-581.</p>	<p>To evaluate pituitary-adrenal responses to standard hypothalamic-pituitary-adrenal axis challenge tests in adult female survivors of childhood abuse with and without major depressive disorder.</p>	<p>Plasma ACTH and cortisol responses were measured in healthy women without early life stress (n=20), women with childhood abuse without major depressive disorder (n=20), women with childhood abuse and major depressive disorder (n=15), and women with major depression but no early life stress (n=11).</p>	<p>20 women without early life stress, 20 women with out MDD but with childhood abuse, 15 women with childhood abuse and MDD, 11 women with MDD but no childhood abuse.</p>	<p><i>American Journal of Psychiatry</i></p>	<p>USA</p>	<p>Abused women without major depressive disorder exhibited greater than usual ACTH responses to CRF administration, whereas abused women with major depressive disorder and depressed women without early life stress demonstrated blunted ACTH responses. In the ACTH stimulation test, abused women without major depressive disorder exhibited lower baseline and stimulated plasma cortisol concentrations. Abused women with comorbid depression more often suffered from posttraumatic stress disorder and reported more recent life stress than abused women without major depressive disorder. These findings suggest sensitisation of the anterior pituitary and counterregulative adaptation of the adrenal cortex in abused women without major depressive disorder. On subsequent stress exposure, women with a history of childhood abuse may hypersecrete CRF, resulting in down-regulation of adenohipophyseal CRF receptors and symptoms of depression and anxiety.</p>
<p>Whittle, S., Dennison, M., Vijayakumar, N., Simmons, J., Yücel, M., Lubman, D., Pantelis, C. and Allen, N. 2013, 'Childhood maltreatment and psychopathology affect brain development during adolescence', <i>Journal of the American Academy of Child and Adolescent Psychiatry</i>, vol.</p>	<p>Investigated whether childhood maltreatment was associated with hippocampal and amygdala development from early to mid-adolescence and whether the experience of psychopathology during this period mediated the relation.</p>	<p>117 (60 male) adolescents, recruited as part of a broader adolescent development study, participated in magnetic resonance imaging assessments during early and mid-adolescence (mean age at baseline 12.62 years; mean follow-up period 3.78 years), and completed self-report measurements of childhood maltreatment and diagnostic interviews assessing DSM-IV mental disorders.</p>	<p>117 adolescents.</p>	<p><i>Journal of the American Academy of Child and Adolescent Psychiatry</i></p>	<p>Australia</p>	<p>Childhood maltreatment was associated with larger baseline left hippocampal volumes and retarded growth of the left amygdala over time and was indirectly associated, through the experience of psychopathology, with retarded growth of the left hippocampus and accelerated growth of the left amygdala over time. Exploratory cortical analysis showed that</p>
<p>Whittle, S., Dennison, M.,</p>	<p>Investigated whether childhood</p>	<p>117 (60 male) adolescents, recruited as part of a</p>	<p>117 adolescents.</p>	<p><i>Journal of the American</i></p>	<p>Australia 188</p>	<p>Childhood maltreatment was</p>

<p>Fonzo, G., Flagan, T., Sullivan, S., Allard, C., Grimes, E., Simmons, A., Paulus, M. and Stein, M. 2013, 'Neural functional and structural correlates of childhood maltreatment in women with intimate-partner violence-related posttraumatic stress disorder', <i>Psychiatry Research – Neuroimaging</i>, vol. 211, no. 2., pp. 93-103.</p>	<p>To test the hypothesis that severity of CM history is positively correlated with emotion-processing limbic and prefrontal brain activation/connectivity and negatively correlated with prefrontal gray matter volumes in women with PTSD due to intimate-partner violence (IPV-PTSD).</p>	<p>33 women with IPV-PTSD underwent structural and functional magnetic resonance imaging while completing a facial emotion processing task. Multivariate regressions examined the relationship of CM to patterns of activation, connectivity, and gray matter volumes.</p>	<p>33 women with diagnosed PTSD as a result of IPV.</p>	<p><i>Psychiatry Research – Neuroimaging</i></p>	<p>USA</p>	<p>CM severity was: (a) positively correlated with ventral ACC activation while processing angry faces; (b) negatively correlated with dorsal ACC and insula activation while processing fear and angry faces, arising from positive correlations with the shape-matching baseline; (c) positively correlated with limbic–prefrontal connectivity while processing fear faces but negatively correlated with amygdalo–insular connectivity while processing fear and angry; and (d) negatively correlated with prefrontal gray matter volumes. These results suggest CM exposure may account for variability in limbic/prefrontal brain function and prefrontal structure in adulthood PTSD and offer one potential mechanism through which CM confers risk to future development of PTSD.</p>
<p>Tomoda, A., Sheu, Y., Rabi, K., Suzuki, H., Navalta, C., Polcari, A. and Teicher, M. 2011, 'Exposure to parental verbal abuse is associated with increased gray matter volume in superior temporal gyrus', <i>NeuroImage</i>, vol. 54, suppl. 1, pp. S280-S286.</p>	<p>The aim of this study was to ascertain whether exposure to (parental verbal abuse) PVA was associated with discernible effects on brain morphology.</p>	<p>Optimised voxel-based morphometry was performed on 21 unmedicated, right-handed subjects (18–25 years) with histories of PVA and 19 psychiatrically healthy controls of comparable age and gender. Group differences in gray matter volume (GMV) – covaried by age, gender, parental education, financial stress, and total GMV – were assessed using high-resolution, T1-weighted, volumetric MRI data sets.</p>	<p>21 individuals with histories of PVA and 19 healthy controls.</p>	<p><i>NeuroImage</i></p>	<p>USA</p>	<p>GMV was increased by 14.1% in the left superior temporal gyrus. GMV in this cluster was associated most strongly with levels of maternal and paternal verbal aggression and inversely associated with parental education. Previous studies have demonstrated an increase in STG GMV in children with abuse histories, and found a reduction in fractional anisotropy in the arcuate fasciculus connecting Wernicke's and frontal areas in young adults exposed to PVA. These findings and the present results suggest that the development of auditory association cortex involved in language processing may be affected by</p>
<p>Tomoda, A., Sheu, Y., Rabi,</p>	<p>The aim of this study was to ascertain</p>	<p>Optimised voxel-based morphometry was</p>	<p>21 individuals with histories of PVA</p>	<p><i>NeuroImage</i></p>	<p>USA</p>	<p>GMV was increased by 14.1% in the left</p>

Tomoda, A., Navalta, C., Polcari, A., Sadato, N. and Teicher, M. 2009a, 'Childhood sexual abuse is associated with reduced gray matter volume in visual cortex of young women', <i>Biological Psychiatry</i> , vol. 66, no. 7, pp. 642-648.	This study was designed to ascertain the effects on gray matter volume (GMV) of exposure to CSA in healthy young adult college students selected based on exposure history regardless of psychiatric outcome.	High-resolution T1-weighted MRI datasets were obtained for 23 unmedicated female subjects with CSA and 14 healthy female control subjects of equivalent age and socioeconomic status with no history of trauma.	23 unmedicated female subjects with CSA and 14 healthy female control subjects.	<i>Biological Psychiatry</i>	USA	Gray matter volume was reduced by 12.6% and 18.1% in right and left primary visual (V1) and visual association cortices of abused subjects. This reduction was directly related to duration of CSA before age 12. Gray matter volume of left and right V1 correlated with measure of visual memory. Cortical surface-based analysis indicated that GMV of abused subjects was reduced in the left fusiform, left middle occipital, and right lingual gyri. Early visual experience exerts a strong influence on the developing mammalian visual cortex. Present findings indicate that exposure to CSA may also affect the development of this region and are apparent even in a population of subjects who are sufficiently healthy to matriculate.
Tomoda, A., Suzuki, H., Rabi, K., Sheu, Y., Polcari, A. and Teicher, M. 2009b, 'Reduced prefrontal cortical gray matter volume in young adults exposed to harsh corporal punishment', <i>NeuroImage</i> , vol. 47, suppl. 2, pp. T66-T71.	To investigate whether harsh corporal punishment (HCP) was associated with discernible alterations in gray matter volume (GMV) using voxel-based morphometry (VBM).	1455 young adults (18–25 years) were screened to identify 23 with exposure to HCP (minimum 3 years duration, 12 episodes per year, frequently involving objects) and 22 healthy controls.	1455 young adults.	<i>NeuroImage</i>	USA	GMV was reduced by 19.1% in the right medial frontal gyrus, by 14.5% in the left medial frontal gyrus and by 16.9% in the right anterior cingulate gyrus of HCP subjects. There were significant correlations between GMV in these identified regions and performance IQ. Exposing children to HCP may have detrimental effects on trajectories of brain development. However, it is also conceivable that differences in prefrontal cortical development may increase risk of exposure to HCP.
Miller, J., Kinnally, E., Oden, R., Oquendo, M., Mann, J. and Parsey, R. 2009, 'Reported childhood abuse is associated with	To examine whether reported childhood abuse would be associated with lower brain serotonin transporter (5-HTT) binding potential (BPP, proportional to the number of	Used positron emission tomography to image brain. Compared depressed sample with health controls.	43 healthy volunteers and 23 subjects in a major depressive episode, ten of who reported a history of sexual and/or physical abuse before age 15, and 13 of who	<i>Synapse</i>	USA	Reported childhood abuse is associated with lower 5-HTT BPP in this sample of subjects with major depression, consistent with other reports that childhood adversity
Miller, J., Kinnally, E.,	To examine whether reported childhood	Used positron emission tomography to image brain.	43 healthy volunteers and 23	<i>Synapse</i>	USA	Reported childhood abuse is associated

Choi, J., Jeong, B., Rohan, M., Polcari, A. and Teicher, M. 2009, 'Preliminary evidence for white matter tract abnormalities in young adults exposed to parental verbal abuse', <i>Biological Psychiatry</i> , vol. 65, no. 3, pp. 227-234.	To ascertain whether parental verbal abuse (PVA) was associated with abnormalities in white matter (WM) tract integrity.	1271 healthy young adults were screened for exposure to childhood adversity. Diffusion tensor imaging was collected on 16 unmedicated subjects with history of high-level exposure to PVA but no other form of maltreatment (4 male/12 female subjects, mean age 21 years) and 16 healthy control subjects (5 male/11 female subjects, 21 years). Group differences in fractional anisotropy (FA), covaried by parental education and income, were assessed using tract-based spatial statistics.	1271 young adults.	<i>Biological Psychiatry</i>	USA	Three WM tract regions had significantly reduced FA: 1) arcuate fasciculus in left superior temporal gyrus, 2) cingulum bundle by the posterior tail of the left hippocampus, and 3) the left body of the fornix. Exposure to PVA may be associated with alteration in the integrity of neural pathways with implications for language development and psychopathology.
Bremner, J., Vermetten, E., Schmahl, C., Vaccarino, V., Vythilingam, M., Afzal, N., Grillon, C. and Charney, D. 2005, 'Positron emission tomographic imaging of neural correlates of a fear acquisition and extinction paradigm in women with childhood sexual-abuse-related post-traumatic stress disorder', <i>Psychological Medicine</i> , vol. 35, no.6, pp. 791-806.	To examine the neural correlates of fear conditioning and extinction in patients with post-traumatic stress disorder	Women with early childhood sexual-abuse-related PTSD (n=8) and women without abuse or PTSD (n=11) underwent measurement of psychophysiological (skin conductance) responding as well as PET measurement of cerebral blood flow during habituation, acquisition and extinction conditions.	8 women with early CSA-related PTSD and 11 healthy controls.	<i>Psychological Medicine</i>	USA	Skin conductance responding to the CS was consistent with the development of conditioned responses with this paradigm. PTSD patients had increased left amygdala activation with fear acquisition, and decreased anterior cingulate function during extinction, relative to controls. These findings implicate amygdala and anterior cingulate in the acquisition and extinction of fear responses, respectively, in PTSD.
van Harmelen, A., van Tol, M., van der Wee, N., Veltman, D., Aleman, A., Spinhoven, P., van Buchem, M., Zitman, F., Penninx, B. and Elzinga, B. 2010, 'Reduced medial prefrontal Cortex volume in adults reporting childhood emotional maltreatment', <i>Biological Psychiatry</i> , vol. 68, no. 9, pp. 832-838.	To examine the neurobiological correlates of childhood emotional maltreatment (CEM).	Using high-resolution T1-weighted 3T magnetic resonance imaging, anatomical scans and a whole-brain optimised voxel-based morphometry approach, we examined whether healthy control subjects and unmedicated patients with depression and/or anxiety disorders reporting CEM before age 16 (n = 84; age: mean = 38.7) displayed structural brain changes compared with control subjects and patients who reported no childhood abuse (n = 97; age: mean = 36.6).	84 healthy subjects reporting CEM before age 16 years and 97 control subjects with no CEM.	<i>Biological Psychiatry</i>	Netherlands	Self-reported CEM is associated with a significant reduction in predominantly left dorsal medial prefrontal cortex volume, even in the absence of physical or sexual abuse during childhood. In addition, reduced medial prefrontal cortex in individuals reporting CEM is present in males and females, independent of concomitant psychopathology. CEM is associated with profound reductions of medial prefrontal cortex volume, suggesting that sustained inhibition of growth or structural damage can occur after exposure to CEM. Given the important
van Harmelen, A., van Tol, M.,	To examine the neurobiological	Using high-resolution T1-weighted 3T magnetic	84 healthy subjects reporting CEM	<i>Biological Psychiatry</i>	Netherlands	Self-reported CEM is associated with a

<p>Teicher, M., Anderson, C., Ohashi, K. and Polcari, A. 2014, 'Childhood maltreatment: Altered network centrality of cingulate, precuneus, temporal pole and insula', <i>Biological Psychiatry</i>, vol. 76, no. 4, pp. 297-305.</p>	<p>Previous studies have identified brain differences in maltreated individuals but have not focused on potential differences in network architecture.</p>	<p>High-resolution T1-weighted magnetic resonance imaging scans were obtained from 265 unmedicated, right-handed 18- to 25-year-olds who were classified as maltreated (n = 142, 55 men/87 women) or nonmaltreated (n = 123, 46 men/77 women) based on extensive interviews. Cortical thickness was assessed in 112 cortical regions (nodes) and interregional partial correlations across subjects were calculated to derive the lowest equivalent cost single-cluster group networks.</p>	<p>265 unmedicated, right-handed 18- to 25-year-olds: 142 maltreated, 123 non-maltreated.</p>	<p><i>Biological Psychiatry</i></p>	<p>USA</p>	<p>Marked differences in centrality (connectedness, "importance") were observed in a handful of cortical regions. Left anterior cingulate had the second highest number of connections (degree centrality) and was a component of the "rich club" in the control network but ranked low in connectedness in the network derived from maltreated-subjects. Maltreatment was associated with decreased centrality in regions involved in emotional regulation and ability to accurately attribute thoughts or intentions to others and with enhanced centrality in regions involved in internal emotional perception, self-referential thinking, and self-awareness. This may provide a potential mechanism for how maltreatment increases risk for psychopathology.</p>
<p>Dannlowski, U., Stuhrmann, A., Beutelmann, V., Zwanzger, P., Lenzen, T., Grotegerd, D., Domschke, K., Hohoff, C., Ohrmann, P., Bauer, J., Lindner, C., Postert, C., Konrad, C., Arolt, V., Heindel, W., Suslow, T. and Kugel, H. 2012, 'Limbic Scars: Long-term consequences of childhood maltreatment revealed by functional and structural magnetic resonance imaging', <i>Biological Psychiatry</i>, vol. 71, no. 4, pp. 286-293.</p>	<p>To investigate the extent to which childhood maltreatment represents a strong risk factor for the development of depression and PTSD in later life by examining functional and structural alterations of the brain.</p>	<p>Subjects recruited by newspaper announcements and public notices. Amygdala responsiveness was measured by means of fMRI imaging and an emotional face-matching paradigm particularly designed to activate the amygdala in response to threat-related faces. Voxel-based morphometry was used to study morphological alterations. Childhood maltreatment was assessed using the 25-item Childhood Trauma Questionnaire (CTQ).</p>	<p>148 healthy subjects.</p>	<p><i>Biological Psychiatry</i></p>	<p>Germany</p>	<p>We observed a strong association of CTQ scores with amygdala responsiveness to threat-related facial expressions. The morphometric analysis yielded reduced gray matter volumes in the hippocampus, insula, orbitofrontal cortex, anterior cingulate gyrus, and caudate in subjects with high CTQ scores. Both of these associations were not influenced by trait anxiety, depression level, age, intelligence, education, or more recent stressful life events. Childhood maltreatment is associated with remarkable functional and structural changes even decades later in adulthood. These changes strongly resemble findings described in</p>
<p>Dannlowski, U., Stuhrmann, A.,</p>	<p>To investigate the extent to which</p>	<p>Subjects recruited by newspaper announcements</p>	<p>148 healthy subjects.</p>	<p><i>Biological Psychiatry</i></p>	<p>Germany</p>	<p>We observed a strong association of</p>

<p>Samplin, E., Ikuta, T., Malhotra, A., Szeszko, P. and DeRosse, P. 2013, 'Sex differences in resilience to childhood maltreatment: Effects of trauma history on hippocampal volume, general cognition and subclinical psychosis in healthy adults, <i>Journal of Psychiatric Research</i>, vol. 47, no. 9, pp. 1174-1179.</p>	<p>To investigate childhood maltreatment in relationship to hippocampal volumes in healthy adults and to address the question of whether the putative resiliency extends to other domains of functioning.</p>	<p>Participants with and without histories of abuse or neglect were compared on measures of total hippocampal volume, general cognitive ability and subclinical psychopathology.</p>	<p>66 healthy adults.</p>	<p><i>Journal of Psychiatric Research</i></p>	<p>USA</p>	<p>Results suggest that childhood emotional abuse is associated with reduced hippocampus volume in males, but not in females. However, emotional abuse was associated with higher levels of subclinical psychopathology in both males and females. These data suggest that while females may be more resilient to the neurological effects of childhood maltreatment, they are not more resilient to the psychiatric symptoms associated with childhood maltreatment.</p>
<p>Peng, H., Ning, Y., Zhang, Y., Yang, H., Zhang, L., He, Z., Li, Z., Wang, L., Lu, S., Zhou, J., Zhang, Z. and Li, L. 2013, 'White-matter density abnormalities in depressive patients with and without childhood neglect: A voxel-based morphometry (VBM) analysis, <i>Neuroscience Letters</i>, vol. 550, pp. 23-28.</p>	<p>To examine the impact of childhood maltreatment on white-matter microstructure.</p>	<p>The Childhood Trauma Questionnaire (CTQ), Hamilton Depressive Rating Scale (HAMD), Self-Rating Depression Scale (SDS), and Dysfunctional Attitude Scale (DAS) were used to evaluate each subject. High-resolution T1-weighted 3 T magnetic resonance imaging scans and a whole-brain optimised voxel-based morphometry (VBM) approach were also used.</p>	<p>19 depressive patients who experienced childhood neglect, 21 depressive patients who did not experience childhood neglect, and 20 healthy control subjects.</p>	<p><i>Neuroscience Letters</i></p>	<p>China</p>	<p>Compared with healthy controls, the depressive group of subjects with childhood neglect showed significantly lower white-matter densities in the bilateral inferior parietal lobe (IPL), whereas the depressive group without childhood neglect showed significantly lower densities in bilateral sub-lobar extra-nuclear white matter. White-matter densities in the bilateral sub-lobar extra-nuclear and right brainstem midbrain regions were higher in the depressive patients with childhood neglect than in the depressive patients without childhood neglect. White-matter densities in the bilateral inferior parietal lobe were negatively correlated with neglect total scores on the CTQ and with HAMD and DAS scores. White-matter densities in the bilateral sub-lobar extra-nuclear region were only negatively correlated with HAMD scores. Subjects that have depression with or without childhood neglect show different white-matter microstructural</p>
<p>Peng, H., Ning, Y., Zhang, Y.,</p>	<p>To examine the impact of childhood</p>	<p>The Childhood Trauma Questionnaire (CTQ),</p>	<p>19 depressive patients who</p>	<p><i>Neuroscience Letters</i></p>	<p>China</p>	<p>Compared with healthy controls, the</p>

<p>Kumari, V., Gudjonsson, G., Raghuvanshi, S., Barkataki, I., Taylor, P., Sumich, A., Das, K., Kuipers, E., Ffytche, D. and Das, M. 2013, 'Reduced thalamic volume in men with antisocial personality disorder or schizophrenia and a history of serious violence and childhood abuse, <i>European Psychiatry</i>, vol. 28, no. 4, pp. 225-234.</p>	<p>To examine the role of psychosocial deprivation (PSD), including childhood physical and sexual abuse, in structural brain volumes of violent individuals with ASPD or schizophrenia.</p>	<p>56 men (26 with ASPD or schizophrenia and a history of serious violence, 30 non-violent) underwent magnetic resonance imaging and were assessed on PSD. Stereological volumetric brain ratings were examined for group differences and their association with PSD ratings. PSD-brain associations were examined further using voxel-based-morphometry.</p>	<p>56 men</p>	<p><i>European Psychiatry</i></p>	<p>UK</p>	<p>The findings revealed: reduced thalamic volume in psychosocially-deprived violent individuals, relative to non-deprived violent individuals and healthy controls; negative association between thalamic volume and abuse ratings (physical and sexual) in violent individuals; and trend-level negative associations between PSD and hippocampal and prefrontal volumes in non-violent individuals. The voxel-based-morphometry analysis detected a negative association between PSD and localised grey matter volumes in the left inferior frontal region across all individuals, and additionally in the left middle frontal and precentral gyri in non-violent individuals. Violent mentally-disordered individuals with PSD, relative to those with no or minimal PSD, suffer from an additional brain deficit, i.e., reduced thalamic volume; this may affect sensory information processing, and have implications for management, of these individuals. PSD may have a stronger relationship with volumetric loss of stress-linked regions, namely the frontal cortex, in non-violent individuals.</p>
<p>Woon, F. and Hedges, D. 2008, 'Hippocampal and amygdala volumes in children and adults with childhood maltreatment-related posttraumatic stress disorder: A meta-analysis', <i>Hippocampus</i>, vol. 18, no. 8, pp. 729-736.</p>	<p>(1) To meta-analytically determine whether hippocampal and amygdala volumes in children and adults with PTSD from childhood maltreatment differ from those in healthy controls, and (2) to use cross-sectional findings performed with meta-analyses as a proxy for longitudinal studies to estimate the</p>	<p>Using electronic databases, we identified articles containing hippocampal and amygdala data for children with PTSD and adults with PTSD from childhood maltreatment. Data were extracted and effect sizes were calculated using Comprehensive Meta-Analysis Version 2.0.</p>	<p>Meta-analysis</p>	<p><i>Hippocampus</i></p>	<p>USA</p>	<p>Reduced bilateral hippocampal volume was found in adults with childhood maltreatment-related PTSD compared with healthy controls, but this deficit was not seen in children with maltreatment-related PTSD, suggesting hippocampal volume deficits from childhood</p>
<p>Woon, F. and Hedges, D.</p>	<p>(1) To meta-analytically</p>	<p>Using electronic databases, we identified articles</p>	<p>Meta-analysis</p>	<p><i>Hippocampus</i></p>	<p>USA</p>	<p>Reduced bilateral hippocampal</p>

Perry, B. and Pollard, R. 1997, 'Altered brain development following global neglect in early childhood', <i>Society for Neuroscience: Proceedings from Annual Meeting</i> , New Orleans.	To examine brain growth in a large group of a neglected children.	Comprehensive physical, developmental, neuropsychiatric and event histories were obtained.	Children aged between 0 to 17 years were referred to the clinic from Child Protective Services. Children were divided into 4 groups depending on type of neglect: Global neglect (n:40), Global neglect with prenatal drug exposure (n=18), chaotic neglect (n=36), chaotic neglect with prenatal drug exposure (n=28). Total number: 122.	<i>Society for Neuroscience: Proceedings from Annual Meeting</i>	USA	Global neglect exhibited the most significant differences on brain growth, particularly when combined with pre-natal drug exposure. The majority of abnormal neuroimaging scans for neglected children involved enlarged ventricles or cortical atrophy. Children exposed to global neglect during the first 3 years of life were most at risk of abnormal brain development. Whilst the actual size of the brain did not demonstrate significant differences for children who had experienced chaotic neglect, Perry and Pollard hypothesise that organizational abnormalities exist in actual brain function
Carrion, V., Weems, C. and Reiss, A. 2007, 'Stress predicts brain changes in children: A pilot longitudinal study on youth stress, posttraumatic stress disorder, and the hippocampus', <i>Pediatrics</i> , vol. 119, pp. 509-516.	To examine whether cortisol volumes would predict hippocampal volume reduction in adolescent patients with posttraumatic symptoms.	Longitudinal study of children (n = 15) with history of maltreatment who underwent clinical evaluation for posttraumatic stress disorder, cortisol, and neuroimaging.	15 children with a history of maltreatment	<i>Pediatrics</i>	USA	The experience of stress was associated with hippocampal reduction in children with PTSD symptoms and provides preliminary evidence in humans that stress damages the hippocampus.
Beers, S. and De Bellis, M. 2002, 'Neuropsychological function in children with maltreatment-related posttraumatic stress disorder', <i>American Journal of Psychiatry</i> , vol. 159, pp. 483-486.	To evaluate cognition in children with PTSD.	Used neuropsychological instruments to measure language, attention, abstract reasoning/executive function, learning and memory, visual-spatial processing, and psychomotor function.	14 pediatric psychiatric outpatients with maltreatment-related PTSD and 15 demographically similar healthy children with no history of maltreatment.	<i>American Journal of Psychiatry</i>	USA	Children with maltreatment-related PTSD performed poorly in measures of attention, abstract reasoning, and executive function.
Heim, C., Young, L., Newport, D., Mletzko, T., Miller, A. and Nemeroff, C. 2008, 'Lower CSF oxytocin concentrations in women with a history of childhood abuse', <i>Molecular Psychiatry</i> , vol.14, pp. 954-958.	To examine the central nervous system oxytocin (OT) activity after childhood maltreatment in adult women.	Measured OT concentrations in cerebrospinal fluid (CSF).	22 adult women categorised into none-mild childhood maltreatment and moderate to severe exposure.	<i>Molecular Psychiatry</i>	USA	Exposure to maltreatment was associated with decreased CSF OT concentrations. A particularly strong effect was identified for emotional abuse.
Taylor, S., Eisenberger, N.,	To examine the neural mechanisms	fMRI used to investigate amygdala reactivity to	30 healthy adults	<i>Biological Psychiatry</i>	USA	Offspring from risky families exhibited

Pechtel, P., Lyons-Ruth, K., Anderson, C. and Teicher, M. 2014, 'Sensitive periods of amygdala development: The role of maltreatment in preadolescence', <i>NeuroImage</i> , vol. 97, pp. 236-244.	To compare amygdala volume in adults with childhood maltreatment to that in healthy controls.	MRI scan and use of the Maltreatment and Abuse Chronology of Exposure scale.	18 participants from a longitudinal cohort and 33 cross-sectional controls.	<i>NeuroImage</i>	USA	Adults with childhood maltreatment show increased amygdala volume. Severity of adversity accounts for 27% of variance in right amygdala volume. Adversity at age 10–11 contributes to larger right but not left amygdala volume. Results suggest a potential sensitive period of the amygdala in preadolescence.
Hanson, J., Adluru, N., Chung, M., Alexander, A., Davidson, R. and Pollak, S. 2013, 'Early neglect is associated with alterations in white matter integrity and cognitive functioning', <i>Child Development</i> , vol. 84, no. 5, pp. 1566-1578.	To examine whether early neglect may differentially affect the directional organization of white matter in the PFC.	MRI, fetal alcohol exposure screening test and pubertal examination. Neurocognitive functioning was assessed using the Cambridge Neuropsychological Test Automated Battery (CANTAB).	63 children (mean age 11.75 years): 25 who experienced early neglect and 38 comparison children who had not experienced neglect.	<i>Child Development</i>	USA	Prefrontal white matter microstructure was affected, consistent with more diffuse organization, in children that suffered early neglect and this was related to neurocognitive deficits. Such findings underscore how early adversity may affect the PFC and explain cognitive deficits associated with neglect.
Teicher, M., Anderson, C. and Polcari, A. 2012, 'Childhood maltreatment is associated with reduced volume in the hippocampal subfields CA3, dentate gyrus, and subiculum', <i>Proceedings of the National Academy of Sciences of the United States of America</i> , vol. 109, no. 9, pp. E563-E572.	To examine whether maltreatment is associated with volume reductions in 3-T MRI subfields containing the DG and CA3.	Maltreatment was quantified using the Adverse Childhood Experience study and Childhood Trauma Questionnaire scores and MRI scanning.	193 subjects selected from the community.	<i>Proceedings of the National Academy of Sciences of the United States of America</i>	USA	Exposure to early stress in humans affects left hippocampal subfield development.
Ladd, C., Huot, R., Thirivikraman, K., Nemeroff, C., Meaney, M. and Plotsky, P. 1999, 'Long-term behavioral and neuroendocrine adaptations to adverse early experience', <i>Progress in Brain Research</i> , vol. 122, pp. 81-103.	To synthesise data on whether exposure to adverse early environments may create an underlying vulnerability to psychopathy.	Research synthesis	N/A	<i>Progress in Brain Research</i>	USA	There are critical developmental windows within which the neurocircuitry of the central nervous system is particularly susceptible to external environmental influences.
Teicher, M., Andersen, S., Polcari, M., Anderson, S., Navalta, C. and	To examine the neurological impact of childhood maltreatment.	Literature review	N/A	<i>Neuroscience & Biobehavioral Reviews</i>	USA	The major structural consequences of
Anderson, C., Navalta, C. and	To examine the neurological impact of childhood maltreatment.	Literature review	N/A	<i>Neuroscience & Biobehavioral Reviews</i>	USA	The major structural consequences of the mid-portion of the

Hanson, J., Nacewicz, B., Sutterer, M., Cayo, A., Schaefer, S., Rudolph, K., Shirtcliff, E., Pollak, S. and Davidson, R. 2015b, 'Behavioral problems after early life stress: contributions of the hippocampus and amygdala', <i>Biological Psychiatry</i> , vol. 77, no. 4, pp. 314-323.	To examine the contributions of the hippocampus and amygdala to behavioural problems as a result of early life stress.	Completed rigorous hand-tracing of the amygdala and hippocampus using MRI. Behavioural problems were assessed using the Youth Life Stress Interview.	3 samples of children who had experienced different forms of child maltreatment: physical abuse, early neglect or low socioeconomic status. A fourth sample of comparison children were used who had not experienced child maltreatment. 128 children (61 girls and 67 boys). 36 children who had experienced neglect through experience of international institutions being orphaned or abandoned children. 31 experienced physical abuse. 20 experienced low socio-economic backgrounds.	<i>Biological Psychiatry</i>	USA	Smaller amygdala volumes were found for children exposed to these different forms of ELS. Smaller hippocampal volumes were also noted for children who were physically abused or from low socioeconomic status households. Smaller amygdala and hippocampal volumes were also associated with greater cumulative stress exposure and behavioural problems. Hippocampal volumes partially mediated the relationship between ELS and greater behavioural problems. This study suggests ELS may shape the development of brain areas involved with emotion processing and regulation in similar ways. Differences in the amygdala and hippocampus may be a shared diathesis for later negative outcomes related to ELS.
Edmiston, E., Wang, F., Mazure, C., Guiney, J., Sinha, R., Mayes, L. and Blumberg, H. 2011, 'Corticostriatal- limbic gray matter morphology in adolescents with self-reported exposure to childhood maltreatment', <i>JAMA Pediatrics</i> , vol. 165, no. 12, pp. 1069-1077.	To study the relationship between self-reported exposure to CM and cerebral gray matter (GM) morphology in adolescents without psychiatric diagnoses.	Associations were examined between regional GM morphology and exposure to CM (measured using a childhood trauma self-report questionnaire for physical, emotional, and sexual abuse and for physical and emotional neglect).	42 adolescents without psychiatric diagnoses.	<i>JAMA Pediatrics</i>	USA	Exposure to CM was associated with corticostriatal- limbic GM reductions in adolescents. Even if adolescents reporting exposure to CM do not present with symptoms that meet full criteria for psychiatric disorders, they may have corticostriatal- limbic GM morphologic alterations that place them at risk for behavioural difficulties. Vulnerabilities may be moderated by sex and by subtypes of exposure to CM.
Tottenham, N., Hare, T., Quinn, B., McCary, T., Nurse, M., Gilhooly, T., Millner, A., Galvan, A., Davidson, M., Eigsti, I., Thomas, K., Freed, P., Booma, E.,	To examine the impact of institutional rearing on brain development.	MRI was used to measure brain volume and limbic structure volume. Psychological screening tests and structured clinical interviews were used to examine emotion regulation	78 children (38 who were reared in an institution and 40 control subjects).	<i>Developmental Science</i>	USA	Late adoption was associated with larger corrected amygdala volumes, poorer emotion regulation, and increased anxiety. The findings are consistent with previous reports describing negative effects of prolonged orphanage care on
Tottenham, N., Hare, T.,	To examine the impact of	MRI was used to measure brain volume and limbic	78 children (38 who were reared in an	<i>Developmental Science</i>	USA	Late adoption was associated with

Mehta, M., Golemb, N., Nosarti, C., Colvert, E., Mota, A., Williams, S., Rutter, M. and Sonuga-Barke, E. 2009, 'Amygdala, hippocampal and corpus callosum size following severe early institutional deprivation: The English and Romanian Adoptees Study Pilot', <i>Journal of Child Psychology and Psychiatry</i> , vol. 50, no. 8, pp. 943-951.	A pilot study to quantify the effects of early deprivation on later brain structure.	Used MRI to measure the sizes of three key brain regions hypothesised to be sensitive to early adverse experiences.	Adoptee adolescents ($N = 14$) who had experienced severe early institutional deprivation in Romania and a group of non-institutionalised controls ($N = 11$).	<i>Journal of Child Psychology and Psychiatry</i>	UK	The total grey and white matter volumes were significantly smaller in the institutionalised group compared with a group of non-deprived, non-adopted UK controls. After correcting for difference in brain volume, the institutionalised group had greater amygdala volumes, especially on the right, but no differences were observed in hippocampal volume or corpus callosum mid-sagittal area. The left amygdala volume was also related to the time spent in institutions, with those experiencing longer periods of deprivation having a smaller left amygdala volume.
Maheu, F., Dozier, M., Guyer, A., Mandell, D., Peloso, E., Poeth, K., Jenness, J., Lau, J., Ackerman, J., Pine, D. and Ernst, M. 2010, 'A preliminary study of medial temporal lobe function in youths with a history of caregiver deprivation and emotional neglect', <i>Cognitive, Affective and Behavioral Neuroscience</i> , vol. 10, no. 1, pp. 34-49.	To examine medial temporal lobe responses to emotional faces (angry, fearful, happy, neutral)	fMRI	30 youths, 11 with a history of caregiver deprivation and emotional neglect.	<i>Cognitive, Affective and Behavioral Neuroscience</i>	Canada	Youths with a history of caregiver deprivation and emotional neglect showed significantly greater left amygdala and left anterior hippocampus activation during the processing of threatening information.
McCrorry, E., DeBrito, S., Sebastian, C., Mechelli, A., Bird, G., Kelly, P. and Viding, E. 2011, 'Heightened neural reactivity to threat in child victims of family violence', <i>Current Biology</i> , vol. 21, no. 23, pp. R947-R948.	To examine neural correlates of emotional processing in children exposed to family violence.	Used fMRI to investigate brain responses to threatening (angry) and non-threatening (sad) facial expressions relative to neutral faces	20 children who had been exposed to documented violence in the home were compared with 23 children in a matched comparison group.	<i>Current Biology</i>	UK	Compared to our comparison group, the family violence group exhibited greater activation in the right amygdala and in the AI bilaterally when angry faces, but not sad faces, were contrasted with neutral faces. The degree of activation to angry faces in the left anterior insula was positively correlated with the severity of violence exposure
Tottenham, N., Hare, T.,	To examine the long-term neural	fMRI and an emotional processing psychological	22 children (average age 9	<i>Developmental Science</i>	USA	198 Previously institutionalised

Carrion, V., Weems, C., Eliez, S., Patwardhan, A., Brown, W., Ray, R. and Reiss, A. 2001, 'Attenuation of frontal asymmetry in pediatric posttraumatic stress disorder', <i>Biological Psychiatry</i> , vol. 50, no. 12, pp. 943-951.	To examine brain imaging findings from a study of children with PTSD symptoms.	MRI examined brain morphology, whilst the Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA) measured PTSD symptoms.	24 children between the ages of 7 and 14 years with a history of trauma and PTSD symptoms. Images were compared with age and gender matched healthy control subjects.	<i>Biological Psychiatry</i>	USA	The clinical group demonstrated attenuation of frontal lobe asymmetry and smaller total brain and cerebral volumes when compared with the control group. There were no statistically significant differences in hippocampal volume between clinical and control subjects.
Vythilingam, M., Heim, C., Newport, J., Miller, A., Anderson, E., Bronen, R., Brummer, M., Staib, L., Vermetten, E., Charney, D., Nemeroff, C. and Bremner, J. 2002, 'Childhood trauma associated with smaller hippocampal volume in women with major depression', <i>American Journal of Psychiatry</i> , vol. 159, no. 12, pp. 2072-2080.	The volumes of the hippocampus were measured in depressed women with and without childhood abuse and in healthy nonabused comparison subjects.	The volumes of the whole hippocampus, temporal lobe, and whole brain were measured on coronal MRI scans by a single rater who was blind to the subjects' diagnoses.	32 women with current unipolar major depressive disorder (21 with a history of prepubertal physical and/or sexual abuse and 11 without a history of prepubertal abuse) and 14 healthy nonabused female volunteers.	<i>American Journal of Psychiatry</i>	USA	A smaller hippocampal volume in adult women with major depressive disorder was observed exclusively in those who had a history of severe and prolonged physical and/or sexual abuse in childhood.
Bernard, K., Butzin-Dozier, Z., Rittenhouse, J. and Dozier, M. 2010, 'Cortisol production patterns in young children living with birth parents vs children placed in foster care following involvement of child protective services', <i>JAMA Pediatrics</i> , vol. 164, no. 5, pp. 428-443.	To examine differences in waking to bedtime cortisol production between children who remained with birth parents vs children placed in foster care following involvement of Child Protective Services.	Between-subject comparison of cortisol patterns between 2 groups of children.	339 children aged 2.9 to 31.4 months who were living with birth parents (n = 155) or placed in foster care (n = 184) following CPS involvement as well as 96 unmatched children from low-risk environments.	<i>JAMA Pediatrics</i>	USA	Child Protective Services-involved children who continued to live with birth parents and CPS-involved children placed in foster care differed in cortisol production, with children living with their birth parents showing flatter slopes in waking to bedtime values. Continuing to live with birth parents following involvement of CPS is associated with greater perturbation to the diurnal pattern of cortisol production than living with foster parents. Foster care may have a regulating influence on children's cortisol among children who have experienced maltreatment.
Doom, J., Cicchetti, D. and Rogosch, F. 2014,	Child maltreatment is associated with dysregulation of stress-mediating	This study modeled cortisol activity over 20 weeks. Maltreatment was assessed through coding of	187 maltreated and 154 nonmaltreated children (mean = 8.4 years, SD = 1.8	<i>Journal of the American Academy of Child and</i>	USA	Multiple-group growth curves indicated that maltreated and non-

Bos, K., Fox, N., Zeanah, C. and Nelson, C. 2009, 'Effects of early psychosocial deprivation on the development of memory and executive function', <i>Frontiers in Behavioral Neuroscience</i> , vol. 3, no. 16, pp. 1-7.	To examine the effects of early institutional care on memory and executive functioning.	Memory and executive functioning was tested at age 8 years using the Cambridge Neuropsychological Test and Automated Battery (CANTAB).	Participants in the BEIP. Compared institutionalised children (n=93) who had been placed in institutional care at an average age of 3 months, with never institutionalized children (n=48). Institutionalised children were assigned either to foster care placement between the ages of 9-33 months (average age of 23.6 months) or continued in institutional care.	<i>Frontiers in Behavioral Neuroscience</i>	Romania	Children with a history of institutionalisation exhibited deficits in memory and executive functioning compared with never-institutionalised children.
Carpenter, L., Shattuck, T., Tyrka, A., Geraciotti, T. and Price, L. 2011, 'Effect of childhood physical abuse on cortisol stress response', <i>Psychopharmacology</i> , vol. 214, pp. 367-375.	To examine whether childhood maltreatment was associated with attenuated cortisol responses to stress and determine whether the type of maltreatment was a determinant of the stress response.	Salivary cortisol response to the Trier Social Stress Test (TSST) was examined. Effects of five maltreatment types, as measured by the Childhood Trauma Questionnaire, on cortisol response to the TSST were investigated.	110 women recruited through advertisements.	<i>Psychopharmacology</i>	USA	In a non-clinical sample of women with minimal or no current psychopathology, physical abuse is associated with a blunted cortisol response to a psychosocial stress task.
Carpenter, L., Tyrka, A., Ross, N., Khoury, L., Anderson, G. and Price, L. 2009, 'Effect of childhood emotional abuse and age on cortisol responsivity in adulthood', <i>Biological Psychiatry</i> , vol. 66, pp. 69-75.	To examine cortisol reactivity in healthy adults without psychiatric disorders as a function of exposure to adverse early environments.	Childhood maltreatment was evaluated with the Childhood Trauma Questionnaire. Effect of childhood emotional abuse (EA) on cortisol responses to the Dex/CRH test was examined with repeated measures general linear models, including age, gender, and other types of maltreatment.	230 adults without Axis I Disorders.	<i>Biological Psychiatry</i>	USA	A history of self-reported childhood EA independently and significantly diminished cortisol response. This effect was amplified with advancing subject age and was independent of the effects of other types of childhood maltreatment, lifetime diagnoses, and symptom scores.
O'Connor, T., Rutter, M., Beckett, C., Keaveney, L., Kreppner, J. and the English and Romanian Adoptees Study Team. 2000, 'The effects of global severe privation on cognitive competence: extension and longitudinal follow-up', <i>Child Development</i> , vol. 71, no. 2, pp. 376-390.	The study extends previous research on a sample of children adopted into the United Kingdom following severe early deprivation and a comparison sample of nondeprived, within-country, early adoptees.	111 Romanian children at age 6 years who came to the U.K. before the age of 2 years, and compared with respect to their functioning at the same age to a sample of 52 U.K. adopted children placed before the age of 6 months. The measures at 6 years included height, head circumference, and general cognitive level (assessed on both the McCarthy and Denver Scales).	111 Romanian children who came to the U.K. before the age of 2 years, and compared with respect to their functioning at the same age to a sample of 52 U.K. adopted children placed before the age of 6 months.	<i>Child Development</i>	UK	There was considerable catch-up among late-placed Romanian children from entry into the United Kingdom to age 6, but as a group they exhibited lower cognitive scores and general developmental impairment compared with earlier adopted Romanian children.
Domes, G., Mense, J., Vohs, K. and Habermeyer, E. 2013, 'Offenders with antisocial personality disorder show attentional bias	To examine the link between offenders with antisocial personality disorder with attentional bias for violent stimuli with an analysis on the impact of childhood	Participants were compared in an Emotional Stroop Task (EST) using neutral, negative and violent related words. Secondary analysis focused on the effect of psychopathic traits and childhood maltreatment.	35 violent and sexual offenders with ASPD, 34 without ASPD, and 24 healthy non-criminal controls.	<i>Psychiatry Research</i>	Germany/Switzerland	Offenders with ASPD demonstrated a stronger attentional bias to violence-related and negative words compared with control subjects. Offenders with
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						is associated with adverse developmental experiences and delinquency but to a lesser extent with antisocial psychopathic traits.
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APPENDIX B:

Research from systematic review examining the links between the experience of chronic childhood maltreatment and offending behaviour

Reference	Objective	Study Design	Population	Study field	Nationality	Outcome	Theory
Stewart, A., Dennison, S. and Hurren, E. 2005, <i>Juvenile Offending Trajectories: Pathways from Child Maltreatment to Juvenile Offending, and Police Cautioning in Queensland</i> , Griffith University, Queensland.	To examine the links between childhood maltreatment and subsequent juvenile offending.	Longitudinal study using government administrative datasets.	Every Queensland child born within 1983 and 1984 birth cohorts who had contact with either the Department of Families for child protection or juvenile justice and/or the police resulting in a formal police caution. Data pertaining to 24,305 children were collected and analysed.	Criminology	Australia	The experience of childhood maltreatment was found to increase the likelihood of juvenile offending. Chronic maltreatment that persists into adolescence was a significant predictor of juvenile offending, as was more severe maltreatment. Physical abuse and neglect correlated with increased likelihood of future offending, whereas sexual and emotional abuse was not.	
Mazerolle, P. and Legosz, M. 2007, <i>Breaking the Cycle: A Study of Victimization and Violence in the Lives of Non-Custodial Offenders</i> , Crime and Misconduct Commission, Brisbane.	The report documents the Offending Persons Across the Lifecourse (OPAL) project, which aimed to illustrate criminogenic risks associated with non-custodial offenders, and suggestions for treatment programs to reduce recidivism.	Face-to-face structured interviews.	480 offenders (188 females and 292 males) serving intensive correction or probation orders in Queensland.	Criminology	Australia	High rates of family trauma, including chaotic family experiences, parental alcohol and drug use, and violence between adults High rates of childhood maltreatment, including physical and emotional abuse and neglect, with approximately two thirds experiencing extreme neglect Significantly higher levels of sexual abuse than the general community. Poor educational outcomes, higher rates of delinquency, early experiences with juvenile justice system, and widespread illicit drug use. Female victims of childhood sexual abuse demonstrated increases in amounts and varieties of offences during adulthood, particularly in terms of violent and property crime. CSA also correlated with increase in alcohol use for men	

						and increases in depression for females.	
Ryan, J. 2006, 'Dependent youth in juvenile justice: Do positive peer culture programs work for victims of child maltreatment?', <i>Research on Social Work Practice</i> , vol. 16, pp. 511-519.	To determine the individual and group-level factors associated with recidivism for children in a long-term Positive Peer Culture (PPC) program, focusing specifically on the influence of childhood maltreatment and its contribution to risk of recidivism.	Maltreatment data was obtained from the state child welfare agency and included only substantiated reports. Recidivism was measured using official arrest data from the Department of State Police. This does not limit data to a particular type of offence but does limit results to only one State.	286 youth offenders	Social work	USA	It was observed that developing relationships with peers was particularly difficult for young offenders who had experienced child abuse and neglect, particularly if the maltreatment was chronic. Maltreated youth were found to be at significant risk of recidivism.	
Yampolskaya, S. and Chuang, E. 2012, 'Effects of mental health disorders on the risk of juvenile justice system involvement and recidivism among children placed in out-of-home care', <i>American Journal of Orthopsychiatry</i> , vol. 82, no. 4, pp. 585-593.	Examined the effect of specific mental health disorders on the risk of juvenile justice involvement and recidivism among maltreated children placed in out-of-home care.	Longitudinal study over a 24-month period. Data obtained from Child Welfare Information System and Medicaid claims database, which provided information on physical and mental health diagnoses. Child placement in either a detention centre of a juvenile justice facility was tracked for 24 months after the child was first removed from home.	5,720 children aged between 7 and 17 years, placed in out-of-home care between July 1 2004 and June 30 2005.	Psychiatry	USA	Children with diagnosed bipolar disorder or substance abuse disorder were 85% more likely to enter a juvenile justice facility, and children with diagnosed depression were 72% more likely. Children with ADHD were twice as likely and children with ODD were five times (500%) more likely to enter a juvenile justice facility. Overall, children with a diagnosed mental health disorder were 81% more likely to become recidivist offenders than those with no diagnosis. Children who had lost their primary caregivers were more likely to become involved in the juvenile justice system and this occurred more rapidly than those remaining with a primary caregiver. Children who were removed from home at a later age were more likely to enter the justice system compared with those removed at a young age.	
Kingree, J., Phan, D. and Thompson, M. 2003, 'Child maltreatment and recidivism among adolescent detainees', <i>Criminal Justice and Behavior</i> , vol. 30, no. 6, pp. 623-643.	To determine abuse and neglect experiences in childhood and their contribution to recidivism in	Individual interviews	272 adolescents who were being detained in a holding facility for a status offence.	Criminology	USA	Emotional neglect was a more potent predictor of recidivism than other forms of abuse.	

<p>Chu, C., Thoas, S. and Ng, V. 2009, 'Childhood abuse and delinquency: A descriptive study of institutionalized female youth in Singapore', <i>Psychiatry, Psychology and Law</i>, vol. 16, Supplementary 1, pp. 64-73.</p>	<p>adolescence. To explore the characteristics of the female youth who were institutionalized in Singapore, (b) to examine their childhood abuse experiences, (c) to examine current functioning within the institution, and (d) to examine the rates of reoffending among the sample.</p>	<p>Descriptive, exploratory research</p>	<p>Female residents admitted to an adolescent female residential facility in Singapore, for either delinquency or protection reasons, between May and July 2001.</p>	<p>Psychology</p>	<p>Singapore</p>	<p>Two thirds of the participants reported having experienced at least one type of childhood abuse, and one quarter had experienced multiple types of childhood abuse. Follow-up recidivism checks after 6½ years (until end 2007) showed that almost one fifth of the participants had been charged with and convicted of further criminal offences. Of note, although those who reported having been poly-abused self-reported more delinquent behaviours than other groups, official follow-up of criminal convictions did not suggest any statistically significant differences between groups. Several reasons could account for this finding: (a) a number may have reoffended but not been caught, (b) some may have reoffended but had not accrued a further conviction by the end of the follow-up period, or even perhaps that (c) treatment during the institutional stay could have positively impacted upon outcomes in the short to medium term.</p>	
<p>Klika, J., Herrenkohl, T. and Lee, J. 2013, 'School factors as moderators of the relationship between physical child abuse and pathways of antisocial behavior', <i>Journal of Interpersonal Violence</i>, vol. 28, no. 4, pp. 852-867.</p>	<p>To investigate the prediction of antisocial behaviour from physical child abuse and the buffering role of 3 school-related factors (i.e., school commitment, school dropout, and IQ), which are hypothesized to change the course of antisocial behaviour from childhood into the adult years.</p>	<p>Data used from the Lehigh Longitudinal Study, which examined the long-term impacts of child abuse and neglect on a broad range of behavioural outcomes spanning multiple developmental periods. Preschool assessment occurred in 1976, reassessed in 1980 and 1982 in elementary school, and again</p>	<p>457 individuals recruited from child protection agencies, day care and nursery programs.</p>	<p>Social Work</p>	<p>USA</p>	<p>Results show an association between physical child abuse and early antisocial behaviour. Early antisocial behaviour predicts antisocial behaviour in adolescence, and that, in turn, predicts antisocial behaviour in adulthood. Child IQ moderated the relationship between child physical abuse and antisocial behaviour in childhood. However, no other moderation effects were observed.</p>	

		between 1990 and 1991, during adolescence. A fourth assessment was conducted between 2008 and 2010 when participants were approximately 36 years of age.					
Root, C., MacKay, S., Henderson, J., Bove, G. and Warling, D. 2008, 'The link between maltreatment and juvenile firesetting: Correlates and underlying mechanisms', <i>Child Abuse and Neglect</i> , vol. 32, pp. 161-176.	To compare fire-setting histories of maltreated youth and non-maltreated youth.	Assessments using a standardised protocol	205 caregivers and their children between 4 and 17 years who were referred to The Arson Prevention Program for Children.	Psychology	Canada	When compared to the non-maltreated group, children with histories of maltreatment demonstrated more frequent fire involvement, more versatility regarding ignition sources and targets, and a greater likelihood of an immediate family stressor as a motive for fire-setting. Maltreated children were more likely to become involved with fire out of anger, and there was also a trend towards higher rates of recidivism. Children's externalising behaviour partially mediated the influence of maltreatment on specific fire-related outcomes of children. Within a juvenile fire-setting population, the presence of maltreatment is a risk factor for a more severe course of fire-setting. The findings also suggest that the link between maltreatment and fire-setting is operating partially through heightened emotional and behavioural difficulties.	Externalising behaviour
Colman, R., Do, K., Mitchell-Herzfeld, S. and Shady, T. 2009, 'Delinquent girls grown up: Young adult offending patterns and their relation to early legal, individual, and family risk', <i>Journal of Youth and Adolescence</i> , vol. 38, no. 3, pp. 355-366.	To examine the adult offending patterns of delinquent girls.	Prospectively track girls discharged from juvenile justice facilities in 1990s and document adult arrests, convictions, and incarcerations between ages 16 and 28 years.	499 girls discharged from juvenile justice facilities.	Social Work	USA	In the 12-year period following release from juvenile justice facility, 81% of girls were rearrested, 69% were convicted and 34% were incarcerated as an adult. Four distinct groups emerged: Rare/Non Offenders, Low Chronics (offend at a modest and gradually decreasing rate), Low-Risers (modest rates in late adolescence but	

						<p>increase during early adulthood, eventually exceeding all other groups), and High Chronics (Offend at high rates into early twenties and steadily decrease offending into later adulthood). Only relying on adult arrests to indicate crime patterns, 19% were classified as desisters. Over the entire 12-year period however, 32% were classified as Rare/Non-Offending adults, 82% were arrest free from 21 years onwards, suggesting most will desist from criminal activity by early adulthood. Girls assigned to Low-Rising and High Chronic offending groups were 14% of sample, however were responsible for 45% of adult arrests. Arrest rates were on average between 13 and 18 times over the 12-year period. Girls in Low Rising group experienced higher rates of family criminality and substance use. Girls in the High Chronic group were more likely to be placed in foster care. There was a greater proportion of girls who had experienced sexual and/or physical abuse in the Low-Rising and High Chronicity trajectory groups.</p>	
<p>Grella, C., Stein, J. and Greenwell, L. 2005, 'Associations among childhood trauma, adolescent problem behaviors, and adverse adult outcomes in substance-abusing women offenders', <i>Psychology of Addictive Behaviors</i>, vol. 19, no. 1, pp. 43-53.</p>	<p>To examine relationships among exposure to childhood abuse and traumatic events, adolescent conduct problems and substance abuse, and adult psychological distress and criminal behaviours in a sample of substance-abusing</p>	<p>Comparison study between women referred to Female Offender Treatment and Employment Program (FOTEP) program and women who declined to participate in the FOTEP program. Three-hour intake assessment and a follow up assessment 12 months later.</p>	<p>440 incarcerated women</p>	<p>Psychology</p>	<p>USA</p>	<p>Direct relationships were found between several childhood traumatic events and greater adolescent conduct problems and substance abuse. Conduct problems were predictive of adult criminal behaviour, and adolescent substance abuse predicted higher levels of psychological distress. Being placed in foster care or adoption lead to a greater risk of</p>	

	women offenders.					engagement in prostitution. This was hypothesised to result from institutionalisation contributing to self-objectification which is similar to the experience of prostitution. The experience of a traumatic event correlated with engagement in violent behaviour. This was hypothesised to be the result of desensitisation. Childhood sexual abuse was directly related to adult criminal behaviour and indirectly related to substance abuse. Physical abuse, family violence and other traumatic experience had no direct correlation to criminal behaviour but were mediated by conduct problems and substance abuse. Early initiation of substance abuse was correlated greater drug use severity and involvement in property crime.	
Topitzes, J., Mersky, J. and Reynolds, A. 2012, 'From child maltreatment to violent offending: An examination of mixed-gender and gender-specific models', <i>Journal of Interpersonal Violence</i> , vol. 27, no. 12, pp. 2322-2347.	To examine associations between child maltreatment and a number of adult measures of violent offending within mixed-gender and gender-specific models.	Data were derived from the Chicago Longitudinal Study, a panel investigation of 1,539 low-income minority participants born in 1979 or 1980. Child welfare, juvenile court, and criminal court records informed the study's explanatory and outcome measures.	989 children who completed the Child Parent Centre kindergarten program in 1986 and a matched comparison group of 550 children who did not attend a CPC kindergarten program.	Psychology	USA	Results indicated that child maltreatment, ages 0 to 11, significantly predicted all study indicators of violence in the full sample and most study outcomes in the male and female subsamples. In no instance did gender moderate the maltreatment–violence association. Late childhood/early adolescence environmental instability, childhood externalising behaviours, and adolescent peer social skills fully mediated the maltreatment–violence nexus among males. Adolescent externalizing behaviour partially mediated the relationship of interest among females. Evidence also indicated that	Externalising behaviour

						internalising processes protected females who had been maltreated in childhood against perpetrating violence later in life.	
De Sanctis, V., Nomura, Y., Newcorn, J. and Halperin, J. 2012, 'Childhood maltreatment and conduct disorder: Independent predictors of criminal outcomes in ADHD youth', <i>Child Abuse and Neglect</i> , vol. 36, pp. 782-789.	To examine the effect of moderate to severe childhood maltreatment on later criminality among adolescents/young adults diagnosed with ADHD in childhood while accounting for the contributions of other known risk factors such as early conduct disorder (CD).	Maltreatment histories were assessed. Detailed juvenile and adult criminal records were obtained from the New York State Division of Criminal Justice Services approximately 3-years after commencement of the follow-up study. They used regression analyses to determine predictors of adolescent/young adult criminal behaviour.	88 adolescents who were part of a 10-year longitudinal study for ADHD.	Neuroscience	USA	Moderate to severe childhood maltreatment increased the risk of adolescent/young adult arrest over and above the risk associated with childhood CD, while both childhood maltreatment and childhood CD significantly increased the risk of recidivism. ADHD youth classified as maltreated were three and a half times more likely to be arrested when compared to ADHD youth without a maltreatment classification.	
Thompson, K., Wonderlich, S., Crosby, R. Ammerman, F., Mitchell, J. and Brownfield, D. 2001, 'An assessment of the recidivism rates of substantiated and unsubstantiated maltreatment cases', <i>Child Abuse and Neglect</i> , vol. 25, no. 9, pp. 1207-1218.	To assess whether the status of a maltreatment case (substantiated vs. unsubstantiated) has implications for recidivism.	Recidivism rates for substantiated and unsubstantiated maltreated juveniles were also compared to juvenile offenders. Juvenile court records for 15,812 juveniles were assessed over a 3-year period. The data included 2558 maltreatment cases. Fifty-four percent of these cases were unsubstantiated. Logistic regression analysis was employed to assess the probability of recidivism based on time one referral status.	15812 juveniles with court records.	Sociology	USA	Youth whose maltreatment allegations were unsubstantiated had significantly lower odds of recidivating than abused youth. Having a case recorded as unsubstantiated lowered a youth's odds of subsequent offending by 55% relative to being abused. The probability of recidivating was highest for juvenile offenders, followed in order by maltreated youth and youth whose reports were unsubstantiated.	Social Control Theory General Strain Theory
Cernkovich, S., Lanctôt, N. and Giordano, P. 2008, 'Predicting adolescent and adult antisocial behavior among adjudicated delinquent females', <i>Crime and Delinquency</i> , vol. 54, no. 1, pp.3-33.	To better identify risk factors associated with females' involvement in crime and delinquency and secondly, to examine whether risk factors associated with adolescent female delinquency	Data is derived from a larger study, which examined the causes and correlates of male and female delinquency and long-term consequences of early involvement in antisocial behaviour. Respondents were initially interviewed in	109 female offenders	Sociology	USA	Increased delinquency correlated with reported lower levels of family caring and trust and increased family conflict. Interestingly, sexual abuse as a minor increased risk of engaging in adult criminality by 264% and 334%, and the experience of physical abuse as a minor increased this likelihood by 579%	

	are also predictive of adult crime.	1982, then in 1992, and 1995. The interviews consisted of highly structured close-ended questions followed by time-varying semi-structured interviews to obtain more qualitative data.				and 605%. Prior delinquency increased the likelihood of being in the high offending group by more than 200%. Abuse did not predict antisocial behaviour during adolescence but did predict adult criminality. Abuse during childhood and adolescence has long-term implications for engagement in antisocial behaviour.	
Bender, K. 2012, 'The mediating effect of school engagement in the relationship between youth maltreatment and juvenile delinquency', <i>Children and Schools</i> , vol. 34, no. 1, pp. 37-48.	This study examines whether a prosocial bond—school engagement—helps to explain the link between maltreatment and delinquency.	Using a national sample of youths involved in the child welfare system, this study uses latent growth curve modeling to investigate the mediating effects of school engagement in the relationship between maltreatment and delinquency.	1179 youths involved in the juvenile justice system.	Social Work	USA	Findings indicate that youths' level of school engagement does explain the effects of maltreatment on initial delinquency such that youths at greater risk of maltreatment are more disengaged at school and youths less engaged at school reported higher rates of delinquency.	
Conrad, S., Tolou-Shams, M., Rizzo, C., Placella, N. and Brown, L. 2013, 'Gender differences in recidivism rates for juvenile justice youth: The impact of sexual abuse', <i>Law and Human Behavior</i> , Advance online publication, doi: 10.1037/lhb0000062.	The aim of this study was to examine gender differences in risk factors for recidivism, including a history of sexual abuse, among a juvenile court clinic sample.	Retrospective review of juvenile offenders who were court-ordered to receive a forensic mental health evaluation at a particular clinic between 2006 and 2008. Court mental health clinic records and court-maintained databases were reviewed to obtain data. Mental health variables were coded for analysis.	402 juvenile offenders.	Psychology	USA	Findings suggest that, even after accounting for previously identified risk factors for recidivism such as prior legal involvement and conduct problems, a history of sexual abuse is the most salient predictor of recidivism for young female offenders, but not for males.	
Ford, J., Chapman, J., Connor, D. and Cruise, K. 2012, 'Complex trauma and aggression in secure juvenile justice settings', <i>Criminal Justice and Behavior</i> , vol. 39, no. 6, pp. 694-724.	To review epidemiological and clinical evidence of the prevalence, impact on development and functioning, comorbidity, and adverse outcomes in adolescence of exposure to complex trauma.	Literature review	N/A	Medicine	USA	Experiences of childhood maltreatment placed youths at risk for a range of serious problems that may lead to reactive aggression (e.g., dysphoria, oppositional-defiance, risk taking, substance abuse, diminished adaptive arousal reactions, episodic maladaptive hyperarousal, impaired information processing and	

						impulse control, self-critical and aggression-endorsing cognitive schemas, and delinquent peer relationships).	
Allwood, M. and Widom, C. 2013, 'Child abuse and neglect, developmental role attainment, and adult arrests', <i>Journal of Research in Crime and Delinquency</i> , vol. 50, no. 4, pp. 551-578.	To examine whether developmental role attainment in 3 areas (high school graduation, employment, and marriage) mediates the relationship between childhood abuse and neglect and adult arrest.	Children with documented cases of physical and sexual abuse and neglect before age 11 years were compared with matched non-abused/neglected children and re-interviewed at 29 years. Arrest records were collected from law enforcement agencies. Data in this prospective study was used from a research project based on a cohort design study.	1169 subjects (676 abused/neglected and 520 comparison subjects).	Criminology	USA	Childhood abuse and neglect predicted a decreased likelihood of high school graduation, employment and marriage, and conversely a greater likelihood of juvenile and adult arrest.	Developmental role attainment in 3 areas: high school graduation, employment and marriage.
Leoni, E. and McGaha, J. 1995, 'Family violence, abuse, and related family issues of incarcerated delinquents with alcoholic parents compared to those with non-alcoholic parents', <i>Adolescence</i> , vol. 30, no. 118, pp. 473-482.	To investigate the family system and individual differences between juvenile offenders who grew up in alcoholic or other substance-abusing homes to those offenders who did not.	Using a sample of juveniles held in a justice facility, a series of questionnaires were administered: Children of Alcoholic Screening Test (CAST), which identifies individuals who have lived with chemically dependent parents; the "Are You Alcoholic/Chemically Dependent Questionnaire (AYAQ), which assesses alcoholic behaviour; the Family Adaptability and Cohesion Evaluation Scales (FACES III), which assesses family cohesion and adaptability as perceived by the individual; and finally a series of subscales designed by the researchers to measure family and individual variables such as abuse and neglect, runaway and delinquent behaviour, and family violence.	68 youths incarcerated in a state juvenile institution.	Psychology	USA	Offenders from substance-abusing families experienced significantly more family dysfunction. Juvenile offenders with an alcoholic parent were found to have been victims of and exposed to much higher levels of family violence and abuse; they responded by running away and becoming substance abusers themselves significantly more than did those from nonalcoholic homes. It is postulated that they might be at much higher risk of continuing anti-social behaviour and chemical dependency than those from non-abusing families. 43% of the juveniles from alcoholic families scored in the highest range of the child abuse subscale compared to only 6 (21%) of those from nonalcoholic families. Five of those from alcoholic families reported that they were hospitalized as a result of a parent's abuse, while none of the juveniles from nonalcoholic families reported	

						<p>this type of abuse. 27 (68%) of the youths from alcoholic families also reported being hit by a parent hard enough to leave a bruise, as compared to only 7 (23%) of those from nonalcoholic families. Another maladaptive response to the stress in an alcoholic family system is law-violating behaviour or delinquency. A delinquent life-style may be a defense mechanism or coping strategy used to suppress feelings of doubt, shame, and fear that one develops in an alcoholic home. It also may be a way to express anger caused by parental maltreatment or rejection. Among the incarcerated delinquent population, 39 (97%) of those from alcoholic homes scored in the high range of the self-reported delinquency scale as compared to 24 (86%) of those from non-alcoholic homes.</p>	
<p>Macmillan, R. 2001, 'Violence and the life course: The consequences of victimization for personal and social development', <i>Annual Review of Sociology</i>, vol. 27, pp. 1-22.</p>	<p>To examine the implications of violent victimization for personal and social development.</p>	<p>Literature review</p>	<p>N/A</p>	<p>Sociology</p>	<p>USA</p>	<p>First, risk of violent victimisation is age-graded with greatest risk occurring typically before the transition to adulthood. Second, violent victimisation is an experience that undermines perceptions of individual agency, disrupts social networks, and increases negative ideation. As violence occurs during a key formative stage of the life course and undermines social and psychological orientations, it plays an important role in shaping life course trajectories. In research on victimisation both within and beyond the family, victimisation has profound effects on child and adolescent development and has consequences</p>	<p>Cycle of violence hypothesis</p>

						that extend deep into the life course. Early victimisation increases psychological distress, both producing postvictimisation distress and increasing the likelihood of recurring distress throughout adulthood. It also increases risks of long-term involvement in crime and deviance and undermines processes of educational achievement and socioeconomic attainment.	
De Lisi, M., Drury, A., Kosloski, A., Caudill, J., Conis, P., Anderson, C., Vaughn, M., Beaver, K. 2010, 'The cycle of violence behind bars: Traumatization and institutional misconduct among juvenile delinquents in confinement', <i>Youth Violence and Juvenile Justice</i> , vol. 8, no. 2, pp. 107-121.	To examine the cycle of violence and three forms of misconduct.	Psychological assessments. Data from confined delinquents selected from the California Youth Authority and the Traumatic Experiences scale from the Massachusetts Youth Screening Instrument Version 2 (MAYSI-2) were used to operationalise the cycle of violence hypothesis.	813 confined delinquents	Criminology	USA	Offenders with greater exposure to early life trauma evidenced more sexual misconduct, suicidal activity, and total misconduct reviewed by the parole board.	Cycle of violence hypothesis
Weatherburn, D. and Lind, B. 2006, 'What mediates the macro-level effects of economic and social stress on crime?', <i>Australian and New Zealand Journal of Criminology</i> , vol. 39, no. 3, pp. 384-397.	To report the results of an aggregate-level study designed to investigate whether the aggregate-level effects of poverty, ethnic heterogeneity and geographic mobility on rates of juvenile participation in crime are produced by raising the level of child neglect in a neighbourhood.	The spatial units of analysis for this study were the urban postcodes in New South Wales (NSW). Aggregate level measures of poverty, ethnic heterogeneity and geographic mobility for these units can be obtained from the 1991 census. We measure the prevalence of child neglect in a postcode via the percentage of children resident in the postcode who have been the subject of a report of neglect to the NSW Department of Community Services. We measure the prevalence of juvenile	Census data, corrections data and community services data.	Criminology	Australia	Child neglect has the strongest causal influence on juvenile participation in crime. The apparent effect of informal social control/collective efficacy may in fact be attributable to defects in the quality of parenting children receive.	Compared developmental theory with social disorganisation theory. Questions the effect of social control theory, arguing that defects in quality of parenting may be more influential on offending behaviour.

		participation in crime via the percentage of juveniles who have appeared in court for a property or violent crime (data on which were obtained from the NSW Department of Juvenile Justice).					
Medrano, M., Hatch, J., Zule, W. and Desmond, D. 2003, 'Childhood trauma and adult prostitution behavior in a multiethnic heterosexual drug-using population', <i>The American Journal of Drug and Alcohol Abuse</i> , vol. 29, no. 2, pp. 463-486.	To examine the link between childhood trauma and adult prostitution behaviour.	Childhood Trauma Questionnaire was completed as part of a comprehensive risk behaviour assessment.	676 heterosexual drug addicts (358 women and 338 men) who were taking part in a national multisite program for AIDS prevention research.	Psychiatry	USA	Childhood trauma was studied as a continuous variable (degree of severity) rather than a dichotomous variable (abused vs. not abused). Women also were more severely emotionally, physically, and sexually abused and emotionally neglected as children. These women may have come from more dysfunctional families, as noted by their higher levels of severe child abuse, and therefore manifested more deviant drug using behaviour than women in other studies.	
Bright, C. and Jonson-Reid, M. 2010, 'Young adult outcomes of juvenile court-involved girls', <i>Journal of Social Service Research</i> , vol. 36, no. 2, pp. 94-106.	To examine young adult outcomes of juvenile court-involved girls using maltreatment and/or impoverished juvenile court-involved females.	Competing risks models were used to control for time from juvenile-court entry to adult outcomes: criminal justice system involvement, use of public mental health or substance use services, and income maintenance use.	700 maltreatment and/or impoverished juvenile court-involved females.	Social Work	USA	Among girls with juvenile court records, more than 80% were reported for childhood maltreatment at least once prior to adulthood. This statistic only related to those who were reported to child welfare system.	
Hämäläinen, T. and Haapasalo, J. 1996, 'Retrospective reports of childhood abuse and neglect among violent and property offenders', <i>Psychology, Crime & Law</i> , vol. 3, pp. 1-13.	The objective of this study was retrospectively to compare childhood abuse and neglect experiences in the groups of Violent and Property offenders.	Review of files including criminal records, social and health documents, mental state examination reports and documents from mental hospitals for prisoners. Used questionnaires and individual interviews.	34 recidivist inmates with the mean age of 26.9 years.	Psychology	Finland	The findings showed that physical, psychological, and sexual abuse and neglect was experienced by 82%, 97%, 3% and 94% of the offenders, respectively. There were no significant differences in the prevalence of abuse or neglect between the Violent and Property offenders. Neither were the groups differentiated by any combination of the abuse and neglect variables. Some differences	

						emerged in the types of physical abuse between the offender groups. The Violent offenders tended to have been subjected to more severe, frequent and versatile abuse and neglect than the Property offenders, although not significantly so. The Homicidal offenders had, however, experienced significantly more severe, frequent, and versatile physical abuse than the Property offenders.	
Hernandez, P., Herz, D. and Ryan, J. 2007, 'Developmental trajectories of offending for male adolescents leaving foster care', <i>Social Work Research</i> , vol. 31, no. 2, pp. 83-93.	To identify the unique developmental trajectories for older wards leaving the foster care system and to investigate the factors associated with membership in each developmental trajectory group.	Data extracted from foster agency management information system, and arrest reports from Department of State Police.	294 adolescents between 16 and 18 years exiting a foster care agency.	Social Work	USA	12% of the sample had at least one arrest before their 16th birthday, and 45% had at least one arrest during the observation period (between 16 and 22 years of age). Twenty-eight percent of the sample was identified as substance abusers. Thirty-three percent of the adolescents returned to the home of a biological parent at termination. At termination, 25% of the adolescents were not enrolled in school. The present study identified three unique developmental offending trajectories for adolescents leaving the foster care system: nonoffenders (52%), desisters (21%), and chronic offenders (27%). Three of the most important predictors of offending patterns are (1) early arrests, (2) school enrollment, and (3) placement instability.	
Burton, D., Leibowitz, G., Eldredge, M., Ryan, G. and Compton, D. 2011, 'The relationship of trauma to nonsexual crimes committed by adolescent sexual abusers: A new area of research', <i>Journal of Aggression, Maltreatment and Trauma</i> , vol. 20, no. 5, pp. 579-593.	To examine nonsexual crimes committed by a sample of juvenile sexual abusers.	Data collected over a 7 year period between 1992-1999. Reviewed data from the intake assessment form completed upon admission.	451 youth in a treatment facility that provides treatment for sexually abusive youth.	Social Work	USA	High rates of abuse, neglect and witnessing violence were found in adolescent sexual offenders. 98.1% had witnessed violence, 40.1% had been physically abused, 27.1% had been sexually abused, 20.6% had been neglected. Sexual victimization	Social Learning theory

						<p>was a robust predictor of the severity of non-sexual crime, however there is also evidence that physical victimisation and witnessing violence are related to the seriousness of nonsexual crimes committed by this population. Over 60% committed serious crimes such as theft, burglary, car theft, or illicit drug use. Nonsexual recidivism rates of adolescent sexual offenders are higher than sexual recidivism rates.</p> <p>Childhood victimisation significantly predicted severity of criminal behaviour for this sample. Over 60% of these youth had committed serious crimes such as theft, burglary, car theft, or illicit drug use. A history of being sexually abused in combination with being physically abused or witnessing violence raises an adolescent sexual abuser's crime score by an average of 2.5 points—an increase that moves them into very serious nonsexual crimes. Based on social learning theory, it might not be surprising that neglect did not remain in the equation, as neglect is a passive behaviour and therefore less likely to lead to externalizing behaviours.</p>
Ryan, J. and Testa, M. 2005, 'Child maltreatment and juvenile delinquency: Investigating the role of placement and placement instability', <i>Children and Youth Services Review</i> , vol. 27, pp. 227-249.	To identify selected factors related to child maltreatment and delinquency and disentangling the timing of delinquency petitions relative to movements within the child welfare	Used administrative records for all children involved in child welfare and juvenile justice systems. Child welfare and juvenile justice data were linked by common identifiers using probabilistic matching software.	18,676 children with at least one substantiated report of maltreatment born between January 1, 1983 and December 31, 1984.	Social work	USA	The results indicate that substantiated victims of maltreatment average 47% higher delinquency rates relative to children not indicated for abuse or neglect. In addition, approximately 16% of children placed into substitute care experience at least one delinquency petition compared

system.

to 7% of all maltreatment victims who are not removed from their family. Placement instability further increases the risk of delinquency for male foster children, but not for female foster children. Despite consistency with prior research, it is still not clear whether placement increases the risk of delinquency directly or is a response to seriously inadequate investments made by parents in the care, education, and supervision of their children. The home environment for children removed from parental custody is unquestionably more deleterious compared to maltreated children whose environment is deemed safe enough for them to remain at home. For males the risk of delinquency increases for children in placement. 11% of males that remain in the family home have a delinquency petition. In contrast, 23% of the males in placement have a delinquency petition. However, this 23% represents the relative risk for all children in placement. The relative risk for children with only one placement (12%) or even two placements (11%) is nearly identical to the relative risk associated with the children that avoid placement all together (11%). This pattern suggests that placement instability, not placement itself, is at least partly responsible for the increased risk of delinquency. This pattern did not emerge as convincingly for females. placement increases

						the risk of delinquency for female victims of maltreatment— regardless of stability. However, it is placement instability, rather than placement itself that increases the risk of delinquency for male victims of maltreatment.	
Lake, E. 1993, 'An exploration of the violent victim experiences of female offenders', <i>Violence and Victims</i> , vol. 8, no. 1, pp. 41-51.	To examine the relationship between violent victimisation and female offenders.	Self-report data were collected in 1986 from incarcerated women serving sentences for violent and nonviolent crimes. Official data on offence histories were obtained from prison files.	83 incarcerated women serving sentences for violent and nonviolent crimes, aged between 18 and 50 years. Average age 29.3 years.	Sociology	USA	Early physical abuse was associated with earlier entry into crime, and with more diverse criminal activity. 28.9% (24) reported receiving physical abuse during childhood. 18% experienced forced sexual contact with relatives. Women who had been abused by their parents were on average younger at first arrest than non-abused women (17.9 years versus 22.6 years), and had committed more kinds of crimes (4.1 kinds of crime versus 2.6). Family sexual assault was not associated with either earlier or more extensive criminal involvement.	
Widom, C. and Ames, M. 1994, 'Criminal consequences of childhood sexual victimization', <i>Child Abuse and Neglect</i> , vol. 18, no. 4, pp. 303-318.	To assess the long-term criminal consequences of childhood sexual abuse through an examination of official criminal histories for a large sample of validated cases of childhood sexual abuse, compared to cases of physical abuse and neglect and a control group matched for age, race, sex, and approximate family socioeconomic status.	Abused and neglected children were matched with non-abused and non-neglected children and followed prospectively into adolescence and young adulthood through the assessment of official criminal histories.	The abused and neglected group consisted of 908 substantiated cases of child abuse and/or neglect that were processed through the courts between 1967 and 1971. There were 667 in the matched control group.	Psychology	USA	Compared to other types of abuse and neglect, early childhood sexual abuse does not uniquely increase an individual's risk for later delinquent and adult criminal behaviour. Childhood sexual abuse victims were at increased risk of arrest as a juvenile for being a runaway. As adults, child sexual abuse victims were at higher risk of arrest for sex crimes than controls, as were victims of physical abuse and neglect. Childhood sexual abuse victims were more likely to be arrested for prostitution as adults than other abuse and neglect victims and controls, regardless of gender. However, there was no support for a direct relationship	

						among child sexual abuse, arrests for running away in adolescence, and adult arrests for prostitution. The findings also suggest an association for males between physical abuse and arrests for violent sex crimes (rape and/or sodomy).	
Nofziger, S. and Kurtz, D. 2005, 'Violent lives: A lifestyle model linking exposure to violence to juvenile violent offending', <i>Crime and Delinquency</i> , vol. 42, no. 1, pp. 3-26.	To examine the relationship between various types of exposure to violence and violent offending.	Used data from the National Survey of Adolescents (NSA), a nationally representative sample of juveniles between the ages of 12 and 17 that was collected in 1995 through a telephone survey. Three variables were used: demographic characteristics, exposure to violence and violent offending.	4023 adolescents aged between 12 and 17 years.	Criminology	USA	Exposure to violence is a significant risk factor for engaging in violent offending.	
Verrecchia, P. Fetzer, M., Lemmon, J. and Austin, T. 2010, 'An examination of direct and indirect effects of maltreatment dimensions and other ecological risks on persistent youth offending', <i>Criminal Justice Review</i> , vol. 35, no. 2, pp. 220-243.	The study examined the ecological model by testing the direct and indirect effects of four maltreatment dimensions (supervisory neglect, age at onset, recurrence, and severity) on persistent youth offending.	Prospective design. A path model was constructed hypothesizing that maltreatment, family functioning, and community risks would increase behaviour and academic problems in childhood and delinquency in adolescence. The design featured within-group analysis that included methodological and statistical controls determining how variations in maltreatment affect delinquent behaviour among maltreated children.	632 individuals selected from the Pennsylvania Department of Public Welfare's Office of Income Maintenance, based on 3 risk factors: low-income status, male gender and place of residence.	Psychology	USA	Supervisory neglect produced direct and indirect effects. Maltreatment severity produced direct effects only. Family functioning and community risks produced indirect effects. The results support the ecological explanation of the maltreatment/delinquency link. Supervisory neglect and maltreatment severity was directly linked with persistent youth offending. The severity of injury from maltreatment correlated with an increase in the number of juvenile court referrals, independent of other ecological risks.	Ecological theory
Baskin, D. and Sommers, I. 2010, 'Child maltreatment, placement strategies, and delinquency', <i>American Journal of Criminal Justice</i> , vol. 36, no. 2, pp. 106-119.	To examine the criminal justice experiences of foster care youth living with relatives, foster families, and living in congregate care; dependents receiving in-	A prospective analysis of official record data followed children in Los Angeles County from the time of a first admission to the Department of Children and Family Services (DCFS) to	The population of DCFS cases included 923 group home, 3,216 foster family, and 5,868 family maintenance placements. A random sample was taken of	Criminology	USA	Only physical abuse was related to arrests for non-violent crimes and sexual abuse was a strong predictor of charging decisions. Violent crime was committed by males who were older at first placement, who remained in DCFS longer, and who had	Developmental stage theory

	<p>home care; and non-dependent youth. Specific attention was directed at uncovering whether form of maltreatment, placement type, and/or placement instability were related to delinquency.</p>	<p>potential involvement in the criminal justice system. The study also utilized a matched control design in which DCFS cases were compared to non-dependent controls.</p>	<p>children from birth to 12 years old for each placement group. The respective study sample sizes were: home = 371, foster family = 446 and family maintenance = 418. A comparison group for the maltreated dependent youth was developed through the use of unfounded referrals to DCFS during a 6-year period, 1990-1995.</p>			<p>experienced placement instability. Placement type had no significant impact on violent crime. For that matter, we found that group home placement was only a factor in the likelihood of total arrests and being arrested for non-violent crimes and that placement instability was consistently found to affect all criminal justice outcomes, from arrest through incarceration. Group home placement was a strong predictor of overall arrests and nonviolent crime arrests but not for violent crime arrests nor for district attorney decisions to charge. The most consistent predictors of delinquency were placement instability and age at placement. Youth who were older at placement and youth with at least one placement change were more likely to be arrested for violent and nonviolent crimes as well as be charged by the district attorney than younger youth with no placement changes. Older youth who are placed in group homes may be developmentally primed to demonstrate their deficits in cognitive, emotional, and neurobiological processing.</p>	
<p>Scudder, R., Blount, W. and Heide, K. 1993, 'Important links between child abuse, neglect, and delinquency', <i>International Journal of Offender Therapy and Comparative Criminology</i>, vol. 37, no. 4, pp. 315-323.</p>	<p>To examine the linkage between child abuse and delinquency using a randomly selected sample of children from a cohort who attended schools in West Central Florida.</p>	<p>Primary data collected from the Client Information System of the Department of Health and Rehabilitation Services dependency and delinquency services.</p>	<p>449 youths aged 14-17 years attending one of two high schools in a particular area.</p>	<p>Criminology</p>	<p>USA</p>	<p>This study found a significant relationship between abuse and delinquency. There was a significantly higher proportion of youths with abuse referrals and delinquency referrals. Males were more likely to fall into both the delinquent and abused/delinquent group than in the abused group.</p>	

						Children in the abused/delinquent group were involved with the system at a much younger age.	
Haapasalo, J. and Moilanen, J. 2004, 'Official and self-reported childhood abuse and adult crime of young offenders', <i>Criminal Justice and Behavior</i> , vol. 31, no. 2, pp. 127-148.	This study sought to predict adult criminal behaviour in a sample of 89 young male prison inmates using self-reported and official data on childhood maltreatment and criminality.	Used a 33-item Self-Reported Criminality Scale and official criminal records and interviews and file reviews.	89 male inmates born after 1972 (aged between 16 and 22 years).	Criminology	Finland	Children who are physically abused tend to report having committed violent crime to a great extent in young adulthood.	
Benda, B., Harm, N. and Toombs, N. 2005, 'Survival analysis of recidivism of male and female boot camp graduates using life-course theory', <i>Journal of Offender Rehabilitation</i> , vol. 40, no. 3-4, pp. 87-113.	To examine what elements of life-course theory predict recidivism (felony conviction or parole violation), gender differences in predictors, and some issues regarding the effects of boot camp.	5-year longitudinal study, using questionnaires and file data on arrest records.	572 male and 120 female graduates from a boot camp.	Social Work	USA	Childhood sexual abuse, sexual and physical maltreatments in adolescence, and current sexual assaults are related to increases in the hazard rates of recidivism. In support of life-course theory, ameliorating experiences, such as having a conventional partner and full-time employment, did significantly reduce the hazard rates of most predictors studied. Childhood and current sexual abuse were positively associated with recidivism, irrespective of gender, and are significant predictors of recidivism after accounting for ameliorating factors.	Life course theory
Heck, C. and Walsh, 2000, 'The effects of maltreatment and family structure on minor and serious delinquency', <i>International Journal of Offender Therapy and Comparative Criminology</i> , vol. 44, no. 2, pp. 178-193.	To explore the influence of maltreatment on serious violent and property delinquency as well as on minor misbehaviour offences among a sample of White male delinquents.	Review of files.	489 white males processed by juvenile probation authorities.	Criminology	USA	Boys in the family desertion category committed significantly more frequent and serious offences. These boys also had significantly lower verbal IQs, lower SES, came from larger families, and experienced more maltreatment.	
Nyamathi, A., Marlow, E., Zhang, S., Hall, E., Farabee, D., Marfisee, M., Khalilifard, F., Faucette, M., Leake, B. 2012, 'Correlates of serious violent crime for recently released parolees with a history of homelessness', <i>Violence and Victims</i> , vol. 27, no. 5, pp. 793-810.	This study used baseline data on recently released paroled men who are homeless, residing in a residential drug	Sociodemographic information was collected by a structured questionnaire; Crime was assessed by the Texas Christian University (TCU) correctional	The sample included 157 parolees who were released from prison and jails within a month before recruitment. These men all met the following	Criminology	USA	Participants who had committed serious violent crimes were more likely to have experienced childhood sexual abuse, poor parental relationships, and early-onset incarceration (prior	

	<p>treatment program, and enrolled in a longitudinal study to examine personal, developmental, and social correlates of parolees who are homeless and who have committed serious violent offences.</p>	<p>assessment intake crime grid; Self-esteem was measured using the revised 23-item Self-Esteem Inventory (SEI); Coping behaviours were measured by a 12-item Brief COPE; Drug and alcohol use behaviours were measured by a modified TCU Drug History form; Depressive symptoms were assessed with the 10-item short form of the Center for Epidemiological Studies Depression (CES-D) Scale; Emotional well-being was measured by the five-item mental health index (MHI-5); Social support was measured by 18 items from the Medical Outcomes Study (MOS) Social Support Survey.</p>	<p>criteria: (a) had a history of drug use prior to entry into the prison system, (b) aged 18-60 years, (c) entered a participating drug treatment program, and (d) labelled as homeless on their prison exit form.</p>			<p>to 21 years of age). Past gang membership and physical or sexual victimisation within 6 months prior to their current incarceration were also associated with the commission of serious violent crime. Our findings support what is documented in current research, namely, that childhood trauma is strongly associated with violent crime and has a deleterious effect on a young adult's maturation. Family dynamics, in particular, parental relationships, also influenced participants' commission of serious violent crimes. Of those participants committing such crimes, two thirds had poor parental relationships and close to one half described their families as not being close. 64% of the violent offenders in this sample were either poor or working class.</p>	
<p>Silva, T., Larm, P., Vitaro, F., Tremblay, R., Hodgins, S. 2012, 'The association between maltreatment in childhood and criminal convictions to age 24: A prospective study of a community sample of males from disadvantaged neighbourhoods', <i>European Child and Adolescent Psychiatry</i>, vol. 21, no. 7, pp. 403-413.</p>	<p>To examine the association between maltreatment in childhood and criminal convictions to age 24.</p>	<p>Calculated hierarchical logistic regression models to estimate the associations of boys' self-reports of neglect, emotional abuse, and physical abuse at ages 10 and 12, with convictions for criminal offences from age 12 to 24. In 1984 parents of boys attending kindergarten in the lowest socioeconomic area of Canada were invited to participate in a longitudinal study.</p>	<p>A community sample of 1037 males.</p>	<p>Psychology</p>	<p>Canada</p>	<p>Results showed that child characteristics and parents' criminality were more strongly associated subsequent criminal activity than maltreatment in childhood. Criminality among parents, high levels of conduct problems (CP) and hurtful and uncaring behaviours (HUB) in childhood were found to be strong predictors of criminal offending in adolescence and early adulthood. The study was biased because most of the boys with high levels of CP did not complete the follow up questionnaires.</p>	
<p>Graham, N., Kimonis, E., Wasserman, A., Kline, S. 2012, 'Associations among childhood abuse and psychopathy facets in male sexual offenders', <i>Personality Disorders: Theory, Research, and</i></p>	<p>To examine the association between specific types of maltreatment (i.e., physical,</p>	<p>Data were collected via a thorough review of archived evaluation reports housed at the Florida</p>	<p>The sample was extracted from the total population of 34,911 SVP referrals to DCF between</p>	<p>Psychology</p>	<p>USA</p>	<p>Childhood sexual abuse is associated with higher PCL-R total scores and facets tapping a grandiose and manipulative</p>	

<p><i>Treatment</i>, vol. 3, no. 1, pp. 66-75.</p>	<p>emotional, sexual abuse, neglect) and PCL-R total and facet scores among a sample of 223 adult men convicted of sexual offences and evaluated for civil commitment</p>	<p>Department of Children and Families' (DCF) Sexually Violent Predator (SVP) Program headquarters in Tallahassee.</p>	<p>January 1, 1999 and June 1, 2009. A total of 313 participants, of which a smaller subsample (n = 226) was randomly selected.</p>			<p>interpersonal style, impulsive-irresponsible lifestyle, and antisocial behaviour. Also, childhood physical abuse and neglect are associated with antisocial behaviour. Emotional detachment traits of psychopathy (i.e., lack of empathy, shallow affect) are associated with childhood neglect for child molesters, although rapists scored higher on these traits irrespective of neglect history. A history of childhood abuse was associated with higher PCL-R lifestyle scores, reflecting traits including impulsivity, irresponsibility, and proneness toward boredom and need for stimulation. Second, this association was primarily driven by sexual abuse, which also statistically predicted interpersonal and behavioural facet scores. Third, PCL-R behavioural facet scores were also higher among offenders with a history of physical abuse and neglect.</p>	
<p>Yampolskaya, S., Armstrong, M.I., McNeish, R. 2011, 'Children placed in out-of-home care: Risk factors for involvement with the juvenile justice system', <i>Violence and Victims</i>, vol. 26, no. 2, pp. 231-245.</p>	<p>To examine risk factors for involvement with the juvenile justice system for children in out-of-home care.</p>	<p>Used administrative data to examine risk factors, including the severity and chronicity of maltreatment, for juvenile justice involvement among children, ages 7 to 17, who were placed in out-of-home care in Florida.</p>	<p>13212 children aged between 7 and 17 years, placed in out-of-home care.</p>	<p>Psychology</p>	<p>USA</p>	<p>Among specific types of maltreatment, sexual abuse was associated with the risk of faster placement only in a detention centre. Maltreatment chronicity but not maltreatment severity increases the chances of earlier involvement with the juvenile justice system among children who were placed in an out-of-home care.</p>	
<p>Burton, D., Leibowitz, G., Eldredge, M., Ryan, G. and Compton, D. 2011, 'The relationship of trauma to nonsexual crimes committed by adolescent sexual abusers: A new area of research', <i>Journal of Aggression, Maltreatment and Trauma</i>, vol. 20, no. 5, pp.</p>	<p>To answer the following questions: What is the extent and nature of the nonsexual crimes committed by a sample of</p>	<p>Data were collected for this study over a 7-year period between 1992 and 1999. The data-collection site was at a large, nonsecure, nonprofit</p>	<p>451 youth in a Midwestern facility that provides treatment for sexually abusive youth.</p>	<p>Social Science</p>	<p>USA</p>	<p>Childhood victimisation significantly predicted severity of criminal behaviour for this sample. Over 60% of these youth had committed serious crimes such as theft,</p>	<p>Social learning theory</p>

579-593.	adolescent sexual abusers? Second, based on the research just reviewed, does childhood trauma predict the severity of delinquent acts committed by adolescent sexual abusers?	treatment facility that provides services to children, adolescents, and adults through residential, outpatient, and emergency shelter programs.				burglary, car theft, or illicit drug use. A history of being sexually abused in combination with being physically abused or witnessing violence raises an adolescent sexual abuser's crime score by an average of 2.5 points—an increase that moves them into very serious nonsexual crimes. Based on social learning theory, it might not be surprising that neglect did not remain in the equation, as neglect is a passive behaviour and therefore less likely to lead to externalising behaviours.	
Gold, J., Sullivan, M.W., Lewis, M. 2011, 'The relation between abuse and violent delinquency: The conversion of shame to blame in juvenile offenders', <i>Child Abuse and Neglect</i> , vol. 35, no. 7, pp. 459-467.	The objective of this work is to apply a conceptual abusive parenting to the conversion of shame into blaming others and therefore to violent delinquency.	A retrospective study of 112 adolescents who were incarcerated in a juvenile detention facility pending criminal charges, completed measures of exposure to abusive and nonabusive discipline, expressed and converted shame, and violent delinquency.	112 incarcerated adolescents (90 male; 22 female; ages 12-19 years; M= 15.6; SD= 1.4).	Pediatrics	USA	Subjects who converted shame (i.e., low expressed shame, high blaming others) tended to have more exposure to abusive parenting and showed more violent delinquent behaviour than their peers who showed expressed shame. Subjects who showed expressed shame (i.e., high expressed shame, low blaming others) showed less violent delinquency than those who showed converted shame. Abusive parenting impacts delinquency directly and indirectly through the effects of shame that is converted. Abusive parenting leads to the conversion of shame to blaming others, which in turn leads to violent delinquent behaviour.	Conversion of shame model
Topitzes, J., Mersky, J.P., Reynolds, A.J. 2011, 'Child maltreatment and offending behavior: Gender-specific effects and pathways', <i>Criminal Justice and Behavior</i> , vol. 38, no. 5, pp. 492-510.	This study assessed the association between child maltreatment (ages 0-11) and offending behaviour within gender-specific models.	Prospectively collected data, including official measures of maltreatment and offending, were derived from the Chicago Longitudinal Study, a panel study of 1,539 low-income minority participants. Data was largely	1,539 low-income minority participants who were followed from birth to 24 years of age.	Criminology	USA	Multivariate probit analyses revealed that maltreatment significantly predicted delinquency for males but not females yet forged a significant relation to adult crime for both genders. Exploratory, confirmatory, and comparative analyses suggested that mechanisms linking	Externalising behaviour

		derived from governmental databases and official records.				maltreatment to adult crime primarily differed across gender. For males, childhood-era externalizing behaviour and school commitment along with adolescent-era socioemotional skills, delinquency, and educational attainment explained the maltreatment-crime nexus. For females, childhood-era parent factors along with adolescent indicators of externalizing behaviour, cognitive performance, mobility, and educational attainment partially mediated the maltreatment-crime relation.	
Carlson, B.E., Shafer, M.S. 2010, 'Traumatic histories and stressful life events of incarcerated parents: Childhood and adult trauma histories', <i>Prison Journal</i> , vol. 90, no. 4, pp. 475-493.	This article presents the results of research on the trauma histories and stressful life events experienced by 2,279 male and female inmate parents in Arizona, with a particular focus on gender and ethnic differences across inmates.	A sample of 838 incarcerated fathers and 1,441 mothers completed anonymous questionnaires regarding traumatic and stressful events experienced as children and/or adults.	838 incarcerated fathers and 1,441 mothers.	Social Work	USA	High rates of exposure to childhood and adult traumatic events, especially child abuse, were found for both males and females and across ethnic groups.	
Kimonis, E.R., Skeem, J.L., Edens, J.F., Douglas, K.S., Lilienfeld, S.O., Poythress, N.G. 2010, 'Suicidal and criminal behavior among female offenders: The role of abuse and psychopathology', <i>Journal of Personality Disorders</i> , vol. 24, no. 5, pp. 581-609.	To assess whether internalising (depression and anxiety) and externalising (substance abuse and antisocial behaviour) psychopathology mediate the relation between abuse on the one hand, and SRB or criminal behaviour, on the other.	Participants engaged in IQ screening tests, Personality Assessment Inventory (PAI) was administered, and Child Abuse and Trauma Scale (CATS) completed by participants on a laptop computer.	266 female offenders; 129 incarcerated, 137 housed in substance abuse treatment facility.	Psychology	USA	Results indicate that externalizing problems mediate the relation between childhood abuse and both lifetime SRB (fully) and lifetime criminality (partially). None of the measures (including the PCL-R) predicted future recidivism.	Externalising behaviour
Mersky, J.P., Topitzes, J. 2010, 'Comparing early adult outcomes of maltreated and non-maltreated children: A prospective longitudinal investigation', <i>Children and</i>	To examine associations between child maltreatment and an array of outcomes in early	This investigation uses data from the Chicago Longitudinal Study (CLS), a panel study of	989 children who attended preschool in a Chicago Child-Parent Center (CPC) in 1983 or	Social Work	USA	Maltreatment victims fared significantly worse than participants without an indicated maltreatment report on indicators of	

<p><i>Youth Services Review</i>, vol. 32, no. 8, pp. 1086-1096.</p>	<p>adulthood.</p>	<p>1539 minority children (93% African American; 7% Hispanic) from economically disadvantaged families. CLS data have been gathered prospectively at multiple time points since kindergarten from several sources, including study participants, parents, teachers, and records from public databases.</p>	<p>1984. All other CLS participants (n = 550) attended full-day kindergarten programs in Chicago public schools that were randomly selected from community areas comparable to areas served by the CPCs.</p>			<p>educational and economic attainment, criminal offending, and behavioural and mental health. Results also revealed that, while many maltreated children appeared to function well on individual outcomes, a large majority did not achieve criteria for resilience when development was assessed across domains. For example, non-maltreated participants were more than twice as likely to attain five or more positive outcomes (38.2%) on an aggregate seven-item index as the maltreated group (15.7%). These findings suggest that child maltreatment is associated with extensive and enduring impacts, reinforcing the need to develop and implement effective maltreatment prevention and intervention strategies.</p>	
<p>Spidel, A., Lecomte, T., Greaves, C., Sahlstrom, K., Yuille, J.C. 2010, 'Early psychosis and aggression: Predictors and prevalence of violent behaviour amongst individuals with early onset psychosis', <i>International Journal of Law and Psychiatry</i>, vol. 33, no. 3, pp. 171-176.</p>	<p>This study was a first step towards identifying persons suffering from a mental illness who may be at risk for violence by identifying who, among first episode clients, may be more likely to perpetrate violent behaviours.</p>	<p>A sample of 118 participants with a primary diagnosis of psychosis were interviewed and prevalence rates for aggressive experiences were as follows: history of trouble with the law (45%), history of emotional abuse (9.6%), physical abuse (38.8%), and sexual abuse (60.2%). With regard to perpetration, 69.6% reported verbal or physical aggression (69.6%), and further, 61% reported problems with substances. Logistic regression procedures were used with a number of the variables under study and relationships</p>	<p>118 participants with a primary diagnosis of psychosis.</p>	<p>Psychology</p>	<p>Canada</p>	<p>History of child abuse was related to violence history, with those who were victims of child abuse being more likely to be violent in later life. In addition higher scores on the psychopathy measure were linked with violence history. Close to 70% of the current sample reported perpetrating at least one physical and/or verbal violent act during the course of the previous 12 months. There was a significant correlation linking violence history and psychopathy scores, however it did not significantly predict violence. Individuals who were abused as children are also more likely to perpetrate violence, whether verbal or physical in nature</p>	<p>Perception of the world as "treacherous" but no mention of SRS.</p>

		were evidenced between psychopathy scores, history of abuse, and regular drug use.				(Williams & Chang, 2000). These researchers suggest that a reason for this may be that child abuse increases individuals' feelings of vulnerability and in turn their perceptions of the world as a treacherous place (Morrison, Frame, & Larkin, 2003).	
Benda, B. 2005, 'Gender differences in life-course theory of recidivism: a survival analysis', <i>International Journal of Offender Therapy and Comparative Criminology</i> , vol. 49, no. 3, pp. 325-342.	To determine gender differences in predictors of recidivism over a 5-year period.	Three questionnaires were administered; the first 2 weeks after entry to the facility, the second a week before graduation, and the third 2 months after release from bootcamp.	300 male and 300 female graduates over the age of 20 years who had participated in a boot camp in Midwest America that was provided as an option to incarceration.	Social Work	USA	Childhood sexual abuse, physical abuse, drug use, and living with a criminal partner were the most potent predictors of recidivism for females. Men are more likely to reoffend if the engage in alcohol abuse, associate with other criminals, carry weapons, and display aggressive tendencies.	
Dietrich, A., Carson Smiley, W., and Frederick, C. 2007, 'The roles of childhood maltreatment and psychopathy in sexual recidivism of treated sex offenders', <i>Journal of Aggression, Maltreatment and Trauma</i> , vol. 14, no. 3, pp. 19-31.	To examine psychopathy and childhood maltreatment history as potential predictors of recidivism using Survival Analysis.	PCL-R rates were obtained prior to treatment and were categorised as high, medium and low. Childhood abuse histories were coded. Survival analyses with Cox regression were calculated for 115 men who had been released back into the community.	149 incarcerated male sex offenders who completed the Intensive Treatment Program for Sexual Offenders (ITPSO) between 1988 and 1995. Average age of 34 years at the time of treatment.	Psychology	Canada	Offenders who had been placed in foster care as a child were more likely to recidivate; however when PCL-R Factor 2 scores (a history of antisocial behaviour) were entered, they predicted over and above foster care history. Childhood physical abuse predicted sexual recidivism; however, childhood sexual abuse and PCL-R scores did not predict sexual recidivism. PCL-R Factor 2 scores predicted violent recidivism.	
Kingree, J.B., Phan, D. and Thompson, M. 2003, 'Child maltreatment and recidivism among adolescent detainees', <i>Criminal Justice and Behavior</i> , vol. 30, pp. 623-643.	To examine predictors of recidivism among adolescent detainees.	Individual interview with each participant at the facility and 9 months later arrest records maintained by the Court were analysed to determine recidivism.	272 adolescents below the age of 16 ½ years who were detained in a holding facility for juveniles in metropolitan Atlanta.	Public Health Science	USA	Race (African-American), prior detention, and substance use were significant predictors of recidivism. Emotional neglect was statistically significant variables associated with high rates of recidivism. Physical neglect was inversely associated with recidivism. Consistent with literature that neglect and limited parental monitoring increases risk for delinquency.	
Kenny, D.T., Lennings, C.J., Nelson, P.K. 2007, 'The mental health of young offenders serving orders in	To examine the mental health of young	A number of psychological assessments were conducted, most	800 young offenders serving community-	Psychology	Australia	This sample reported high rates of child abuse and neglect on the	

the community: Implications for rehabilitation', <i>Journal of Offender Rehabilitation</i> , vol. 45, no. 1-2, pp. 123-148.	offenders serving community-based orders.	notably the Childhood Trauma Questionnaire (CTQ).	based orders: 682 males, and 118 females.			Childhood Trauma Questionnaire and these experiences were associated with more severe externalizing pathology. 72% had experienced some form of childhood maltreatment. Females reported abuse and neglect in the more severe range than males. Young people in the severe range for Conduct Disorder scored significantly higher on emotional and physical abuse scales than those not scoring for CD. Similarly, young people scoring high for substance abuse also scored high on the CTQ.	
Heide, K. and Solomon, E. 2009, 'Female juvenile murderers: Biological and psychological dynamics leading to homicide', <i>International Journal of Law and Psychiatry</i> , vol. 32, no. 4, pp. 244-252.	Reviews the arrests of female juveniles for violent crime, specifically involvement in homicide. Reviews three case studies focusing on the biological and psychological dynamics that help explain their violent behaviour. To discuss the effects of insecure attachment and child maltreatment, and trace a critical pathway between these early experiences and future risk of violent behaviour.	Case study analysis.	3 adolescent girls who had committed homicide were referred to authors for pre-trial forensic evaluations.	Neuropsychology	USA	Demonstrate that theories as to why female adolescents kill do not take into account recent scientific findings on brain development and the biological effects of early trauma in explaining serious violent behaviour by girls. Argue that a large number of homicides committed by female juveniles could be prevented by healthy parenting and early intervention of children who experience abuse and neglect. Traditional therapies do not target the physiological hyperarousal and therefore certain stimuli continue to trip the limbic system and result in maladaptive responses.	Biologically Informed Theory
Grogan-Kaylor, A., and Otis, M. D. 2003, 'The effect of childhood maltreatment on adult criminality: A tobit regression analysis', <i>Child Maltreatment</i> , vol. 8, no. 2, pp. 129-137.	To examine the effect of childhood maltreatment on adult criminality using a tobit regression analysis.	Analysed an archived data set containing information on 667 nonmaltreated and 908 maltreated children. The data also contain information on whether the study subjects were arrested in early adulthood.	667 nonmaltreated and 908 maltreated children.	Criminology	USA	The analysis finds that children's age, race, and sex and experiences of child neglect all have an impact on subsequent adult arrests. However, physical abuse and sexual abuse do not emerge as statistically significant predictors of arrests in this model.	
Watts, S.J. and McNulty, T.L. 2013, 'Childhood	To draw on General	Utilise data from the first three	9002 cases with data	Criminology	USA	Early childhood physical and sexual	General Strain

<p>abuse and criminal behaviour: Testing a General Strain Theory Model', <i>Journal of Interpersonal Violence</i>, vol. 28, no. 15, pp. 3023-3040.</p>	<p>Strain Theory (GST) to develop and test a model of the childhood abuse-crime relationship.</p>	<p>waves of the National Longitudinal Study of Adolescent Health, which is a nationally representative sample of American adolescents recruited in 1994-1995 whilst in Grades 7 to 12. Wave 2 was collected 1-2 years after the first collection and Wave 3 was collected during 2001-2002 when respondents were 18 to 26 years old.</p>	<p>collected across all 3 waves.</p>			<p>abuses were found to be robust predictors of adolescent offending. GST was partially supported in that the effects of childhood physical abuse were mediated by an index of depression symptoms. The effect of sexual abuse on females was mediated by closeness to the mother. The effect of childhood sexual abuse for males was found to be more robust, persisting despite controls for low self-control, ties to delinquent peers, school attachment, and closeness to the mother. The effect of childhood abuse largely worked through depressive symptoms, low self-control, affiliation with deviant peers, and closeness to mother to predict offending. Findings support GST as a useful explanatory framework for linking childhood abuse with later offending.</p>	<p>Theory</p>
<p>Forsman, M. and Långström, N. 2012, 'Child maltreatment and adult violent offending: population-based twin study addressing the 'cycle of violence' hypothesis', <i>Psychological Medicine</i>, vol. 42, no. 9, pp. 1977-1983.</p>	<p>To determine whether child maltreatment causes adult violent offending or whether suggested links are due to genetic or family environment confounding.</p>	<p>Information was linked on self-reported child maltreatment with national register data on convictions for adult crime. Used a case-control design to elucidate associations among unrelated individuals, and conducted within-discordant twin pair analyses to estimate the influence of familial confounding on this association.</p>	<p>18083 sets of 20-47 year old twins from the Swedish population-based Study of Twin Adults: Genes and Environment (STAGE).</p>	<p>Criminology</p>	<p>Sweden</p>	<p>Childhood maltreatment was found to have a weak causal link for adult violent offending meaning that reducing maltreatment might decrease violent crime by less than previously expected. Considerable familial confounding of the link between child maltreatment and adult violent offending suggests that prevention strategies need to address overlapping genetic and/or familial environmental liability for abusive and violent behaviour.</p>	
<p>Mersky, J.P., Topitzes, J. and Reynolds, A.J. 2012, 'Unsafe at any age: Linking childhood and adolescent maltreatment to delinquency and crime', <i>Journal of Research in Crime and Delinquency</i>, vol. 49, no. 2, pp. 295-318.</p>	<p>To compare the effects of childhood and adolescent maltreatment on delinquency and crime.</p>	<p>Data derived from the Chicago Longitudinal Study. Arrest histories were self-reported. Delinquency data was</p>	<p>1539 underprivileged minority subjects, including 989 children who had attended a Child-Parent Centre</p>	<p>Social Work</p>	<p>USA</p>	<p>Rates of delinquency, and violent, drug and property offending were elevated among childhood and adolescent victims of maltreatment</p>	

		gathered from Court records and incarceration records.	preschool operating in high-poverty neighbourhoods.			compared with normal peers. Childhood maltreatment was associated with delinquency independent of adolescent maltreatment experiences. Strong connections between adolescent maltreatment and delinquency independent of prior victimisation. Childhood maltreatment was significantly correlated to a number of adult crime measures, whereas the effects of adolescent maltreatment on adult crime were less robust.	
Tikkanen, R., Holi, M., Lindberg, N., Tiihonen, J., Virkkunen, M. 2009, 'Recidivistic offending and mortality in alcoholic violent offenders: A prospective follow-up study', <i>Psychiatry Research</i> , vol. 168, no. 1, pp. 18-25.	To examine the risk factors for recidivism and mortality among non-psychotic alcoholic violent offenders, the majority having antisocial or borderline personality disorders, or both, which is a group that commits the majority of violent offences in Finland.	Criminal records and mortality data on 242 male alcoholic violent offenders were analysed after a 7- to 15-year follow-up and compared between themselves and with those of 1210 age-, sex- and municipality-matched controls.	242 male alcoholic violent offenders.	Psychiatry	Finland	Recidivism and mortality rates were high. The risk of recidivistic violence was increased by antisocial or borderline personality disorder, or both, childhood maltreatment, and a combination of these. A combination of borderline personality disorder and childhood maltreatment was particularly noxious, suggesting an additive risk increase for a poor outcome. Accurate diagnosis and careful childhood interview may help to predict recidivism and premature death.	
Roe-Sepowitz, D.E. 2009, 'Comparing male and female juveniles charged with homicide: Child maltreatment, substance abuse, and crime details', <i>Journal of Interpersonal Violence</i> , vol. 24, no. 4, pp. 601-617.	To explore the differences between nondirect file male and female juvenile homicide offenders regarding individual, family, and crime circumstances.	Analysis of case files from the Department of Juvenile Justice, which included questionnaires and screening interviews, details of crime by law enforcement, information on past schooling from education department, drug and gang history from guardian, and information from the juveniles regarding criminogenic risk factors as part of the Supervision Risk	136 male and female juveniles charged with attempted homicide or homicide.	Social Work	USA	Findings suggest that compared to male juvenile offenders, female juvenile homicide offenders have higher rates of reported childhood abuse, more serious substance abuse, and mental health problems including suicidal ideations, depression, anxiety, anger, and irritability. Male juvenile homicide offenders reported higher rates of substance use than their female counterparts but the females had more serious substance abuse problems. Female juveniles	

		Classification Instrument. The juveniles then independently completed the Massachusetts Juveniles Screening Instrument-2.				were found to more often kill a person known to them and male homicide offenders were found to more often kill a stranger. These findings suggest strongly that male and female juvenile homicide offenders are dissimilar and require unique assessment and treatment.	
Pollock, J.M, Mullings, J.L. and Crouch, B.M. 2006, 'Violent women: Findings from the Texas women inmates study', <i>Journal of Interpersonal Violence</i> , vol. 21, no. 4, pp. 485-502.	To examine the link between drug abuse and crime in women.	Used data from face-to face interviews conducted for the Texas Commission on Alcohol and Drug Abuse which were administered to newly admitted female inmates between January 1998 to November 1998.	657 incoming female prisoners to a detention facility, with an average age of 33 years.	Criminology	USA	Women who were violent were more likely to have been victims of childhood abuse.	
Brewer-Smyth, K., Burgess, A.W., and Shults, J. 2004, 'Physical and sexual abuse, salivary cortisol, and neurologic correlates of violent criminal behavior in female prison inmates', <i>Biological Psychiatry</i> , vol. 55, no. 1, pp. 21-31.	To examine whether physical and emotional traumas are related to neurologic and neuroendocrine abnormalities that may be associated with violent behaviour.	Modified case-control design was used for blinded comparison of 113 female inmates convicted of violent and nonviolent crimes. History of having been physically or sexually abused, neurologic history and physical examination, basal salivary cortisol levels, and associated variables were investigated to identify possible risk factors for violent compared to nonviolent criminal convictions.	113 female inmates convicted of violent and nonviolent crimes.	Medicine	USA	95% had neurologic histories predating the current crime and/or neurologic examination abnormalities. Logistic regression revealed morning cortisol levels, number of years since last abuse, number of prior suicide attempts, and traumatic brain injuries with loss of consciousness to be significantly associated with current violent convictions, with a mean of two brain injuries with loss of consciousness per subject in the violent group. Conclusions: A greater number of traumatic brain injuries with loss of consciousness and suicide attempts, more recent abuse, and low morning basal salivary cortisol levels could be associated with dangerous violent criminal behaviour, including murder, in female prison inmates.	
Hamilton, C. E., Falshaw, L., and Browne, K. D. 2002, 'The link between recurrent maltreatment and offending behaviour', <i>International Journal of Offender Therapy and Comparative Criminology</i> , vol. 46, no. 1, pp. 75-94.	To examine the link between recurrent maltreatment and offending behaviour.	Information obtained from the admission file for each young person residing within a secure centre for young people. Information was	79 young people (60 males and 19 females) who were resident within a secure centre for young people between	Psychology	England	20.8% had not experienced maltreatment, 6.5% had experienced a single incident, 11.7% were repeat victims with the same perpetrator, 6.5% were re-	

		also sought from staff and social workers.	December 1994 and May 1996.			victimised by different perpetrators, and 54.5% had experienced both repeat and revictimisation. 74% who had committed a violent and/or sexual crime had experienced some form of victimisation. The young people most likely to have committed a violent and/or sexual offence were those who had been victims of recurrent extrafamilial maltreatment, with many also experiencing intrafamilial maltreatment	
Lemmon, J. H. 1999, 'How child maltreatment affects dimensions of juvenile delinquency in a cohort of low-income urban youths', <i>Justice Quarterly</i> , vol. 16, no.2, pp. 357-376.	To examine how the presence and types of maltreatment affect dimensions of delinquency.	Used data from child welfare and juvenile justice systems.	632 males from low-income families in Pennsylvania. 632 males from low-income families in Pennsylvania.	Criminology	USA	Maltreatment significantly impacted on initiation and continuation of delinquent behaviours. Neglect was found to be a highly criminogenic factor.	
Smith, C. and Thornberry, T. P. 1995, 'The relationship between childhood maltreatment and adolescent involvement in delinquency', <i>Criminology</i> , vol. 33, no. 4, pp. 451-461.	To examine the link between childhood maltreatment and later involvement in delinquency.	Used a multi-wave panel study, wherein youths and their carers were interviewed every 6 months across a 4 ½ year period. Data was also collected from schools, the Police Department, and Department of Social Services.	1000 students and their carers from a high school in New York. The sample was stratified so as to over-represent the number of students at high risk of delinquency and drug use.	Criminology	USA	A history of maltreatment increases the risk of being arrested and the frequency of arrests. It also was found to be related to more serious forms of self-reported delinquency, including violence. Maltreatment was not found to be linked with more minor forms of delinquency. Maltreatment was found to be a significant predictor of delinquency when controlling for race, sex, social class, family structure and mobility. The more extensive the maltreatment, the higher the rates of delinquency. Overall, having a maltreatment history serious enough to warrant child protection investigation is a significant risk factor for involvement in serious delinquency.	
Reckdenwald, A., Mancini, C. and Beauregard, E. 2013, 'The cycle of violence: Examining the impact of maltreatment early in life on	To examine the impact of abuse experienced in childhood	Used retrospective data from sexual offenders in a Canadian	576 sexual offenders.	Criminology	USA	Demonstrates the lasting effects of maltreatment experienced early in life on subsequent	Cycle of violence hypothesis

adult offending', <i>Violence and Victims</i> , vol. 28, no. 3, pp. 466-482.	and adolescence on offending in adulthood.	penitentiary. The database includes information from a sample of adult males convicted of a sex crime who received a prison sentence of at least 2 years between 1994 and 2005 and who were assessed for treatment options and risk level.				offending. As predicted, results indicate that type of abuse does in fact have a differential impact on offending in this group of convicted sex offenders. Drawing on the cycle of violence, it appears that individuals learn how to treat others through the type of abuse inflicted on them and will be more prone to later inflict that specific type of abuse on to others. The harms of experiencing trauma early in life clearly manifests differently depending on the type of abuse experienced. Specifically, results from our study indicate three important findings in relation to our main predictors of interest even with the addition of controls: (a) experiencing prior psychological abuse is positively related to the frequency of total offending; (b) experiencing prior physical abuse is positively associated with the frequency of violent offending; and (c) experiencing prior sexual abuse is positively related with the frequency of sexual offending. Exposure to abuse is positively related to violent and total offending and borderline significant in predicting sex offending.	
Lee, C. and White, H. 2012, 'Effects of childhood maltreatment on violent injuries and premature death during young adulthood among urban high-risk men', <i>Archives of Pediatrics and Adolescent Medicine</i> , vol. 166, no. 9, p. 814.	To assess childhood maltreatment as a risk factor for violent injuries and premature death in young adulthood and whether these associations are mediated by adolescent heavy drinking, hard drug use, hard drug selling, and violent offending.	Prospective longitudinal study of boys followed from childhood into young adulthood.	1009 men from the Pittsburgh Youth Study. Initial screening identified the top 30% at greatest risk for antisocial behaviour and were included for follow-up, plus 30% who were randomly selected from the remainder.	Medical science	USA	Young men who experienced childhood maltreatment, compared with their counterparts who did not experience it, had a greater risk of violent injuries (relative risk = 1.61; 95% CI, 1.10-2.35) and death (hazard ratio = 2.85; 95% CI, 1.37-5.93) during young adulthood. Adolescent violent offending and hard drug selling explained the	

						association between childhood maltreatment and violent injuries, and violent offending partially accounted for the association between childhood maltreatment and premature death. Although adolescent violent offending predicted both outcomes, maltreated boys still had an increased risk of premature death (hazard ratio = 2.54; 95% CI, 1.21-5.34) after accounting for their adolescent violence. Childhood maltreatment significantly predicts premature death and violent injuries during young adulthood. These associations are partially explained by adolescent involvement in violence and drug dealing.	
Bright, C.L. and Jonson-Reid, M. 2008, 'Onset of juvenile court involvement: Exploring gender-specific associations with maltreatment and poverty', <i>Children and Youth Services Review</i> , vol. 30, no. 8, pp. 914-927.	To examine the differential impact of maltreatment and poverty on the onset and status of delinquency comparing girls and boys.	Use of Cox proportional hazards models and data from individual files from various agencies.	1701 girls, 1752 boys from a low-income geographical region.	Social Science	USA	The combination of poverty and maltreatment increased the risk for juvenile court petition compared to maltreatment only. This risk held true only for boys in the maltreatment subsample. The notion of these risk factors being additive is supported with males but only for females when comparing to a non-maltreatment sample. Gender creates distinct pathways into juvenile justice.	
Stewart, A., Livingston, M and Dennison, S. 2008, 'Transitions and turning points: Examining the links between child maltreatment and juvenile offending', <i>Child Abuse & Neglect</i> , vol. 32, no. 1, pp. 51-66.	To examine the impact of timing and chronicity of child maltreatment on juvenile offending.	Used administrative data from individual records. Used Semi-Parametric Group-Based trajectory analyses.	5849 children born in Queensland who had contact with child protective services between 1983 or 1984.	Social Sciences	Australia	Maltreatment trajectories were significant predictors of juvenile offending.	
Hosser, D., Raddatz, S. and Windzio, M. 2007, 'Child maltreatment, revictimisation, and violent behaviour', <i>Violence and Victims</i> , vol. 22, no. 3, pp. 318-33.	To investigate the cumulative impact of child maltreatment and victimisation in adolescence on violent behaviour in young-	Interviews using standard instruments.	1526 incarcerated young men.	Criminology	Germany	Child maltreatment doubles the risk of adolescent violent victimisation. Repeated violent victimisation in adolescence then increases the risk for later violent offending. Being repeatedly victimised	Violent victimisation

	adulthood.					throughout the early life cycle slightly reduces the probability of being a frequent offender.	
Lemmon, J. 2006, 'The effects of maltreatment recurrence and child welfare services on dimensions of delinquency', <i>Criminal Justice Review</i> , vol. 31, no. 1, pp. 5-32.	To examine the relationship between maltreatment recurrence and various dimensions of delinquency in at-risk youths.	Used statewide databases and employed a non-current, prospective design.	632 were selected from the Department of Public Welfare's Office of Income Maintenance. Selection criteria based on low-income status, year of birth and gender. Must have continually received financial assistance from birth to age 18 years.	Criminology	USA	Maltreatment recurrence is a significant predictor of initiation, continuation and severity of delinquency. This relationship exists in the presence of other delinquency risk factors. Child welfare placement reduces the effects of maltreatment recurrence on chronic and violent offending. The maltreatment recurrence-delinquency relationship follows a linear pattern among youths receiving in-home services and a curvilinear pattern among those receiving placement services.	
Gover, A. 2002, 'The effects of child maltreatment on violent offending among institutionalized youth', <i>Violence and Victims</i> , vol. 17, no. 6, pp. 655-68.	To examine the link between child maltreatment and violent offending among serious juvenile offenders.	Self-reported data on child maltreatment, general delinquency risk factors, and violent offending.	3694 juvenile offenders.	Criminology	USA	Family and peer functioning increases the risk for violent offending. The influence of child maltreatment on engaging in frequent and violent offending is mediated by other social learning and social control factors. Therefore the influence of child maltreatment on violent offending is not inevitable. Attachment to prosocial institutions appears to be a substantive protective factor.	Social Learning Theory Social Control Theory
Ireland, T., Smith, C. and Thornberry, T. 2002, 'Developmental issues in the impact of child maltreatment on later delinquency and drug use', <i>Criminology</i> , vol. 40, no. 2, pp. 359-399.	To examine whether the developmental timeframe during which maltreatment takes place has an impact on delinquency and drug use.	Subjects were interviewed every 6 months from age 14 years for nine waves.	1000 students and their carers were selected after stratification of sex and grade and highest resident arrest rate in the area.	Criminology	USA	If childhood maltreatment does not persist into adolescence it poses less risk for engagement in adolescent delinquency and drug use. Adolescent maltreatment was more likely to result in delinquency. The continuation of maltreatment through childhood and adolescence increases the risk of delinquency and drug use in adolescence, however this does not surpass the effect	

						of adolescent-limited maltreatment.	
Stouthamer-Loeber, M., Loeber, R., Homish, L. and Wei, E. 2001, 'Maltreatment of boys and the development of disruptive and delinquent behavior', <i>Development and Psychopathology</i> , vol. 13, no. 4, pp. 941-955.	To examine the prevalence of child maltreatment in males and relate this to disruptive and delinquent behaviours.	Data collected on maltreatment from CYS records. Used Maltreatment Classification System for analysis.	506 males who were first assessed in 7th Grade from a public school in Pittsburgh.	Psychology	USA	Maltreatment was related to boys progressing on 3 pathways: authority conflict (66%), overt, and covert. All boys displayed overt and covert behaviours. Victims, compared with controls were more likely to engage in authority conflict and were more likely to have a referral to juvenile court. Most of the CYS contact tended to precede or co-occur with onset of overt and covert problem behaviour, but approximately half of authority conflict behaviours preceded contact with CYS.	Behavioural explanation (overt, covert and authority conflict).
Spaccarelli, S., Coatsworth, D. and Bowden, B. 1995, 'Exposure to serious family violence among incarcerated boys: Its association with violent offending and potential mediating variables', <i>Violence and Victims</i> , vol. 10, no. 3, pp. 163-182.	To compare delinquent adolescent males on interview-based measures concerning exposure to interadult family violence and physical abuse, attitudes towards aggression, self-reported competence and coping strategies.	Interviews and self-reports.	213 delinquent male adolescents.	Criminology	USA	Violent offenders and undetected violent offenders had higher rates of exposure to serious physical abuse, and weapons violence between adults, than controls and deniers. Exposure to serious violence was associated with lower self-reported competence, attitudes more supportive of aggression and more use of aggressive control as a form of coping. Effects of family violence on serious violent offending are mediated by beliefs supporting aggression and the tendency to cope through aggressive control-seeking.	
Silva, T.C., Graña, J.L. and González-Cieza, L. 2014, 'Self-reported physical and emotional abuse among youth offenders and their association with internalizing and externalizing psychopathology: A preliminary study', <i>International Journal of Offender Therapy and Comparative Criminology</i> , vol. 58, no. 5, pp. 590-606.	To explore the severity of physical and emotional abuse perpetrated by parents and its association with internalising and externalising problems and to examine moderate effect of callous-unemotional traits on the relation between	An anonymous psychological questionnaire was self-filled in by participants to determine maltreatment levels. Staff responsible for the youths completed the psychopathy and callous unemotional traits questionnaire on behalf of the youths. Criminal files were used to obtain data on criminal history.	104 male and female youth offenders recruited through two secure correctional facilities.	Criminology	Spain	A high percentage of youth offenders reported having been physically abused. More severe physical abuse was not related to higher levels of internalizing or externalizing problems. Young offenders' emotional abuse levels were low; however, this type of abuse was positively associated with externalizing problems among boys, regardless of the level of callous-unemotional traits.	Internalising/externalising behaviour

	physical and emotional victimisation and internalising and externalising problems in boys.						
Barrett, D.E., Katsiyannis, A., Zhang, D. and Zhang, D. 2014a, 'Delinquency and recidivism: A multicohort, matched-control study of the role of early adverse experiences, mental health problems, and disabilities', <i>Journal of Emotional and Behavioral Disorders</i> , vol. 22, no.1, pp. 3-15.	To explore the role of early adverse experiences, mental health problems, and disabilities in the prediction of juvenile delinquency and recidivism.	Used a matched-control group design. The delinquent group comprised 99,602 youth, born between 1981 and 1988, whose cases had been processed by the South Carolina Department of Juvenile Justice. Records of 99,602 controls, matched by age, race, and gender were drawn from the records of the South Carolina Department of Education. Data on Child Protective Services, foster care, mental health referrals, and diagnoses as well as information about eligibility for free/reduced-price lunch were obtained from the South Carolina Budget and Control Board, Office of Research and Statistics.	99,602 youth, born between 1981 and 1988, whose cases had been processed by the South Carolina Department of Juvenile Justice. Records of 99,602 controls, matched by age, race, and gender were drawn from the records of the South Carolina Department of Education.	Psychology	USA	Parental maltreatment and foster care made unique contributions to the prediction of membership in a delinquent sample. Presence of a public school classification of learning disability or emotional/behavioral disorder was also predictive of delinquent outcomes. A prearrest <i>Diagnostic and Statistical Manual of Mental Disorders</i> (4th ed.) diagnosis relating to aggressive behaviour (e.g., conduct disorder) was the strongest predictor of delinquency. Analyses conducted on the delinquent sample to predict recidivism showed a similar pattern, with an early mental health diagnosis of an aggressive disorder the strongest predictor of recidivism. The earlier the first referral to juvenile justice the greater the chance of recidivism. Pre-existing mental health problems, particularly aggression, contribute substantially to delinquency and recidivism. DSM-IV diagnosis was also correlated with increased likelihood of poverty, involvement with CPS and learning difficulties.	"...we contend that preexisting psychological characteristics are the strongest predictors of delinquent behaviour" (p.11). [There is no matching between the experience of childhood maltreatment and subsequent mental health problems and therefore the contribution of childhood maltreatment to delinquency remains unknown and poorly thought out]. The researchers did acknowledge the contribution of recent research into the biological basis of chronic conduct problems. Also acknowledge the link between learning difficulties or school failures and childhood maltreatment and therefore

							<p>caution the extrapolation of these results.</p> <p>State that their conclusions are consistent with those of a developmental science perspective, which recognises the influence of external influences, such as parents, peers, or culture, and internal influences, including biological, cognitive, and neurobiological, on development and functioning (p. 11). They therefore argue for a multisystemic approach towards addressing these issues (p.12).</p>
<p>Oriol-Granado, X., Sala-Roca, J. and Gulu, G.F. 2014, 'Juvenile delinquency in youths from residential care', <i>European Journal of Social Work</i>, DOI: 10.1080/13691457.2014.892475.</p>	<p>To present a comparative analysis of the profile of youths from residential care and their peers in the juvenile justice system.</p>	<p>All the psychosocial reports and files on the 255 youths interned in the seven juvenile detention centres in Catalonia in January 2011 were examined.</p>	<p>255 youths were interned, of which 247 were boys and only 8 were girls, all aged between 14 and 18 years</p>	<p>Social Work</p>	<p>Spain</p>	<p>There is a high population of youths in care in juvenile detention centres, and that more than half of them are of immigrant origin. Youths from residential care present differences when compared with youths who are not in care in terms of background, delinquency profile and the consumption of toxic substances. Youths from residential care begin to commit offences (on average) a year later and commit more offences, mostly without interpersonal confrontation from</p>	

						<p>their peers. Specifically, they commit more robberies with and without violence, but commit crimes against authorities and fewer murders. There are some differences in the consumption of toxic substances between both groups. Youths from residential care consume less hashish and alcohol</p>
<p>Barrett, D.E., Katsiyannis, A., Zhang, D. and Zhang, D. 2014b, 'A structural equation modelling analysis of influences on juvenile delinquency', <i>Behavioral Disorders</i>, vol. 39, no.3, pp. 113-127.</p>	<p>To examine the influences on delinquency and recidivism using structural equation modeling.</p>	<p>Data were collected from multiple state agencies on two large samples of youth. Data included information on mental health history, parental maltreatment of the child and foster care, special education diagnoses, family economic status, and delinquency history. Data for this study were obtained from two sources: the South Carolina Department of Juvenile Justice (DJJ) and the South Carolina Budget and Control Board's Office of Research and Statistics (ORS). The ORS houses data from all of the state agencies in South Carolina, including the South Carolina Department of Education (SCDE), the South Carolina Department of Social Services (SCDSS), and the South Carolina Department of Mental Health (SCDMH), as well as the DJJ and other state agencies.</p>	<p>199,204 individuals: 99,602 youth whose cases had been processed by the South Carolina Department of Juvenile Justice and a matched control group of 99,602 youth without juvenile records.</p>	<p>Psychology</p>	<p>USA</p>	<p>Developmental exceptionalities and parenting problems accounted for more than 40% of the variance in delinquency status indicates the importance of continued attention to the mental health needs of children as an important facet of juvenile delinquency prevention. Female delinquents in particular appear to have acute mental health needs. there is a need for interdisciplinary models that place behaviours in social, psychological, and biological context.</p> <p>The results of the study indicate the need for continued attention to early starting, multisystemic programs of services for youth at risk for delinquent behaviour. They also suggest that early intervention for boys and girls might take different forms. In particular, we suggest that attention be given to the fact that girls who are at risk for delinquent behaviour have an elevated need for close nurturing relationships with dependable caregivers so that the child experiences the unconditional support and acceptance necessary for a healthy self-conception. Although we do not minimize the need</p>

						for a similarly supportive caregiving environment for boys, the evidence is accumulating that the course of early development for girls is particularly sensitive to the nuances of the early caregiving environment.	
Baskin, D. and Sommers, I. 2014, 'Exposure to community violence and trajectories of violent offending', <i>Youth Violence and Juvenile Justice</i> , vol. 12, no. 4, pp. 367-385.	To investigate the extent to which trajectories of violent youth offending are affected by exposure to community violence.	Data was extracted from the Pathways to Desistance project, which is a longitudinal study of serious juvenile offenders that began in 2000. A four-hour baseline interview was conducted with each adolescent. Follow-up interviews were conducted every 6-months for the first 3-years and annually after that.	1170 adolescents (including n=184 females) who were adjudicated delinquents or had been found guilty of a serious offence.	Criminology	USA	Youths who had more chronic and direct exposure to community violence were more likely to engage in violent criminal behaviour, independent of other risk factors. Identified four trajectories of violent offending among serious adolescent offenders: 34.4% had low-level offending that remained stable, 28.1% had moderate level offending that decreased across a 6 year period, 20.2% had low level offending that steadily increased across time, and 7.7% started and remain high offenders across a 6 year period. Youth with more chronic or direct exposure to community violence and/or who were involved in high levels of substance abuse were more likely to remain engaged in criminal behaviour.	

APPENDIX C:

Basic concepts in brain anatomy and development

The actual structure of the brain is comprised of a series of folds (sulci) and ridges (called gyri), which increase the size of the brain tissue whilst still allowing it to fit into the skull (Stiles & Jernigan, 2010:238). The cells of the brain are classified into glia and neurons, with glial cells being responsible for essential functions, such as generating nutrients, removing toxins, and providing physical support for brain function, whilst neurons act as the information processing cells of the body and are responsible for cellular communication (Kandel et al., 2000:20; Stiles & Jernigan, 2010:238; Wright L & Perrot, 2013:13). The adult brain is believed to contain around 60 trillion neurons (Kandel et al., 2000:335; Stiles & Jernigan, 2010:238). A neuron is made up of a cell body (the soma), which contains the vital information to maintain the structure and function of the cell, the dendrites, which act as signal receivers, and the axon, which conducts the nerve signal (Clark et al., 2010:20; Jacobson & Marcus, 2011:3; Stiles & Jernigan, 2010:330). When a neuron is stimulated a nerve impulse is triggered at the cell body, travelling down the axon to the axon terminal, located at the end of the axon (Kandel et al., 2000:22). The axon terminal transmits a neurochemical signal across the synapse, which is the gap between the axon terminal and the receiving neuron (Wright L & Perrot, 2013:13). When the neurochemical binds to the postsynaptic neuron it alters the shape of the receptor, which triggers a cascade of further chemical reactions that are transmitted by secondary messengers (Perry, 2002:84). Neurons join together to create networks, which then work together to form systems that mediate a specific set of functions (Perry et al., 1995:273).

There are eight critical neurodevelopmental processes that characterise brain development: neurogenesis, migration, differentiation, apoptosis, arborisation, synaptogenesis, synaptic sculpting and myelination. These are briefly described below, and provide a context for the material presented in this chapter.

Neurogenesis is the term used to describe the birth of neurons (Kolb & Frantie, 2009:21). Brain development involves the overproduction of neurons in utero, through the process of neurogenesis, followed by the selective elimination of unwanted neurons (apoptosis) and the strengthening of important neural pathways (myelination) (Kandel et al., 2000:1061). During the intrauterine and immediate perinatal period these neurons organise, move, and settle into unique positions through a process known as migration (Kolb & Frantie, 2009:21; Perry, 2002:82). Whilst all nerve cells in the brain share similar properties, the way in which they connect and interact means that they can produce a multitude of different actions (Kandel et al., 2000:19). It is during early development that

neurons undertake a process called differentiation wherein neurons become specialised to undertake particular activities. Neurons change in response to chemical signals within the brain, making them highly responsive to macro environmental cues (Perry, 2002:83). The net result of this is that any experience that changes the neurochemical signals during development will result in alterations to the way in which neurons differentiate, and in turn will affect the way in which neural networks function (Kolb & Frantie, 2009:21; Perry, 2002:83).

There are four use-dependent processes that are significant to brain development: synaptogenesis, myelination, apoptosis and arborisation. Synaptogenesis describes the process by which synaptic connections are generated, and is the physiological basis for how learning takes place (Lefmann & Combs-Orme, 2013:642). For optimal functioning during development, neurons must connect with the correct neurons, and it is during the first few months of life that the synaptic density rapidly increases in response to patterned repetitive experiences (Perry, 2002:84). Synapses are strengthened when there is a consistent active process of neurotransmitter release, with synaptic neurons becoming more efficient as they grow closer together (Perry, 2002:85). Conversely, where there is limited activity the synapses dissolve (Perry, 2002:85). In children, new synapses are developed in response to environmental stimuli through processes of arborisation and synaptogenesis, which allows for optimal learning (Perry, 2002:243; Weber & Reynolds, 2004:117). The development and elimination of synapses is dependent on experience-expectant and experience-dependent mechanisms of development (Kolb & Frantie, 2009:25). This will be discussed in greater detail later in the chapter, and this process, known as synaptic sculpting, is a crucial concept to understand when examining the impact of chronic childhood maltreatment.

In addition to synaptogenesis and synaptic sculpting, another important use-dependent process that occurs during development is one in which the myelin sheath, made up of lipids and proteins, wraps around axons as a form of insulation called myelination (Lefmann & Combs-Orme, 2013:642). Repeated signalling strengthens the neuronal connections, increasing myelination and therefore the speed within which information can be transmitted (Lefmann & Combs-Orme, 2013:642). Myelination develops in a use-dependent manner in order to create more efficient electrochemical signals between synapses, and allow for more complex functioning and learning to take place (Kolb & Frantie, 2009:26; Perry, 2002:85). The speed within which electrochemical signals occur depends on the degree of myelination (or insulation) of the neuron (Fields, 2010:768; Wright L & Perrot, 2013:13). The term ‘white matter’ describes myelinated cells and is often a characteristic that is studied due to it being an indicator of areas of the brain that

are used repetitively (Wright L & Perrot, 2013:13). Myelination begins in the early phase of life and continues throughout the period of brain development, with the myelination of key cortical areas occurring during adolescence (Perry, 2002:85).

Apoptosis represents one of two neurodevelopmental events that involve a substantial loss of neurons (Stiles & Jernigan, 2010:330). Apoptosis, or programmed cell death, occurs during development and describes the pruning away of under-activated neurons (Kolb & Frantie, 2009:21; Perry, 2002:81). A lack of stimulation during critical periods of development can increase apoptosis in the under-utilised pathways of the brain (Perry, 2008:81). Of relevance to this thesis is the increased vulnerability to apoptosis from the age of six months gestation into early childhood that correlates with the period of life during which there is a rapid development of synaptic pathways (Ikonomidou et al., 2000). Arborisation is the second neurodevelopmental event that involves substantial loss of neurons, and describes the process by which neurons differentiate and emit dendrites that become the receptive area for other neurons connect (Perry, 2002:84; Stiles & Jernigan, 2010:330). The more intense and frequent the incoming signals, the denser the development of dendritic branches and conversely, the lesser used dendritic pathways are pruned via arborisation (Perry, 2002:84). It is these processes, apoptosis and arborisation, which result in neuronal loss that are particularly relevant to experiences of childhood neglect where the timely and repetitive stimulation of neural pathways is absent.

BIBLIOGRAPHY

- Abercrombie, E. and Jacobs, B. 1987, 'Single-unit response of noradrenergic neurons in the locus coeruleus of freely moving cats. I. Acutely presented stressful and non-stressful stimuli', *Journal of Neuroscience*, vol. 7, pp. 2837-2847.
- Adolphs, R., Tranel, D. and Damasio, A. 2003, 'Dissociable neural systems for recognizing emotions', *Brain and Cognition*, vol. 52, no. 1, pp. 61-69.
- Agnew, R. 1985, 'A revised strain theory of delinquency', *Social Forces*, vol. 64, pp. 151-167.
- Agnew, R. 2011, *Towards a Unified Criminology: Integrating Assumptions about Crime, People and Society*, New York University Press: New York.
- Aguilera, G. 2012, 'Chapter 8: The hypothalamic-pituitary-adrenal axis and neuroendocrine response to stress', *Handbook of Endocrinology*, in G. Fink, D. Pfaff and J. Levine, Elsevier Science: Burlington, pp. 175-196.
- Akers, R. 1985, *Deviant Behavior: A Social Learning Approach*, 3rd edition, Wadsworth: Belmont.
- Alberici, E. 1 October 2012, 'Social media could hurt Jill Meagher case', *Lateline*, retrieved from <http://www.abc.net.au/lateline/content/2012/s3601568.htm>.
- Alexander, B. 2001, *The Myth of Drug-Induced Addiction*, a paper delivered to the Canadian Senate, January 2001, available online: www.parl.gc.ca/Content/SEN/Committee/371/ille/presentation/alexander-e.htm.
- Alexander, B. 2010, *A Change of Venue for Addiction from Medicine to Social Science*, available online: www.brucealexander.com/articles-speeches/dislocation-theory-addiction/250-change-of-venue-3.
- Alexander, J., Hillier, A., Smith, R., Tivarus, M. and Beversdorf, D. 2007, 'Beta-adrenergic modulation of cognitive flexibility during stress', *Journal of Cognitive Neuroscience*, vol. 19, no. 3, pp. 468-478.

Allwood, M. and Widom, C. 2013, 'Child abuse and neglect, developmental role attainment, and adult arrests', *Journal of Research in Crime and Delinquency*, vol. 50, no. 4, pp. 551-578.

Alper, K., Shah, J., Howard, B., Roy, J. and Prichep, L. 2013, 'Childhood abuse and EEG source localization in crack cocaine dependence', *Psychiatry Research: Neuroimaging*, vol. 213, no. 1, pp. 63-70.

Althaus, C. Bridgman, P. and Davis, G. 2013, *The Australian Policy Handbook*, 5th edition, Allen & Unwin: Sydney.

Ambrey, C., Fleming, C. and Manning, M. 2014, 'Perception or reality, what matters most when it comes to crime in your neighbourhood?', *Social Indicators Research*, vol. 119, no. 2, pp. 877-896.

American Psychiatric Association. 2013, *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition, APA, Washington.

Amico, F., Meisenzahl, E., Koutsouleris, N., Reiser, M., Möller, H. and Frodl, T. 2011, 'Structural MRI correlates for vulnerability and resilience to major depressive disorder', *Journal of Psychiatric Neuroscience*, vol. 36, pp. 15-22.

Amodio, D. and Frith, C. 2006, 'Meeting of minds: The medial frontal cortex and social cognition', *Nature Review Neuroscience*, vol. 7, no.4, pp. 268-277.

Anda, R., Felitti, V., Bremner, J., Walker, J., Whitfield, C., Perry, B., Dube, S., Giles, W. 2006, 'The enduring effects of abuse and related adverse experiences in childhood', *European Archives of Psychiatry and Clinical Neuroscience*, vol. 256, no. 3, pp. 174-186.

Andersen, S. and Teicher, M. 2004, 'Delayed effects of early stress on hippocampal development', *Neuropsychopharmacology*, vol. 29, pp. 1988-1993.

Andersen, S. and Teicher, M. 2008, 'Stress, sensitive periods and maturational events in adolescent depression', *Trends in Neuroscience*, vol. 31, no. 4, pp. 183-191.

Andersen, S. and Teicher, M. 2009, 'Desperately driven and no brakes: Developmental stress exposure and subsequent risk for substance abuse', *Neuroscience Behavioral Review*, vol. 33, no. 4, pp. 516-524.

Anderson, C., Teicher, M., Polcari, A. and Renshaw, P. 2002, 'Abnormal T2 relaxation time in the cerebellar vermis of adults sexually abused in childhood: Potential role of the vermis in stress-enhanced risk for drug abuse', *Psychoneuroendocrinology*, vol. 27, no. 1-2, pp. 231-244.

Andrews, D. 1982, *A Personal, Interpersonal and Community-Reinforcement Perspective on Deviant Behaviour (PIC-R)*, Ministry of Correctional Services: Washington.

Andrews, D. and Bonta, J. 1998, *The Psychology of Criminal Conduct*, Anderson, Cincinnati.

Anleu, S. 1998, 'The role of civil sanctions in social control: a socio-legal examination', *Crime Prevention Strategies*, vol. 9, pp. 21-43.

Arnsten, A. 2009, 'Stress signaling pathways that impair prefrontal cortex structure and functions' *National Review of Neuroscience*, vol. 10, no. 6, pp. 410-422.

Arnsten, A., Wang, M. and Paspalas, C. 2012, 'Neuromodulation of thought: Flexibilities and vulnerabilities in prefrontal cortical network synapses', *Neuron*, vol. 76, no. 1, pp. 223-239.

Australian Bureau of Statistics. 2008, *Recorded Crime – Victims, 2007*, cat. no. 4510.0, ABS: Canberra.

Australian Bureau of Statistics. 2012, *Year Book Australia, 2012*, no. 1301.0, ABS, Canberra

Australian Bureau of Statistics. 2014, *Prisoners in Australia 2013*, Number 4517.0, ABS: Canberra.

Australian Bureau of Statistics. 11 June 2015, *Prisoner Numbers Pass 35,000 for the First Time*, Media Release 70/2015, ABS: Canberra.

Australian Government, 2015, *Our Government*, on-line available:

<http://www.australia.gov.au/about-australia/our-government>, accessed 25 March 2015.

Australian Institute of Criminology. 2010b, *Criminal Justice System*, on-line available: http://www.aic.gov.au/criminal_justice_system.html, accessed 25 March 2015.

Australian Institute of Criminology. 2012, *Australian Crime: Facts and Figures 2011*, AIC: Canberra.

Australian Institute of Criminology. 2014, *Australian Crime: Facts and Figures 2013*, Australian Institute of Criminology: Canberra.

Australian Institute of Health and Welfare. 1999, *Comparability of Child Protection Data*, category no. CWS 9, Canberra: AIHW.

Australian Institute of Health and Welfare. 2012, *The Health of Australia's Prisoners 2012*, Cat. No. PHE170, AIHW: Canberra.

Australian Institute of Health and Welfare. 2013, *Child Protection Australia*, Child Welfare Series no. 55, category no. CWS 43, Canberra: AIHW.

Australian Institute of Health and Welfare. 2014, *Child Protection Australia 2012-13*, Child Welfare Series 58, cat. No. CWS49, AIHW: Canberra.

Avery, A. and Kinner, S. 2015, 'A robust estimate of the number and characteristics of persons released from prison in Australia', *Australian and New Zealand Journal of Public Health*, online: doi:10.1111/1753-6405.12346.

Ayers, A. 2004, *Sensory Integration and the Child*, 2nd edition, Western Psychological Services: Las Angeles.

Bacchi, C. 2000, 'Policy as discourse: What does it mean? Where does it get us?', *Discourse: Studies in the Cultural Politics of Education*, vol. 21, no.1, pp. 45-57.

Bacchi, C. 2009, *Analysing Policy: What's the Problem Represented to Be?*, Pearson Education Australia, Frenches Forrest, NSW.

Baker, E. and Roberts, J. 2013, 'Globalization and the new punitiveness', in *The New Punitiveness*, J. Pratt, D. Brown, S. Hallsworth and W. Morrison (eds.), Willan Publishing: Devon, UK.

Barn, R. and Tan, J. 2013, 'Foster youth and crime: Employing a general strain theory to promote understanding', *Journal of Criminal Justice*, vol. 40, no. 3, pp. 212-220.

Barratt, E., Stanford, M., Kent, T., Felthous, A. 1997, 'Neuropsychological and cognitive psychophysiological substrates of impulsive aggression', *Biological Psychiatry*, vol. 41, no. 10, pp. 1045-1061.

Barrett, D.E., Katsiyannis, A., Zhang, D. and Zhang, D. 2014a, 'Delinquency and recidivism: A multicohort, matched-control study of the role of early adverse experiences, mental health problems, and disabilities', *Journal of Emotional and Behavioral Disorders*, vol. 22, no.1, pp. 3-15.

Barrett, D.E., Katsiyannis, A., Zhang, D. and Zhang, D. 2014b, 'A structural equation modelling analysis of influences on juvenile delinquency', *Behavioral Disorders*, vol. 39, no.3, pp. 113-127.

Barriga, A., Gibbs, J., Landau, J., Liao, A. and Stinson, B. 2000, 'Cognitive distortion and problem behaviors in adolescents', *Criminal Justice and Behavior*, vol. 27, no. 1, pp. 36-56.

Bartels, L. 2009, 'Challenges in mainstreaming specialty courts', *Trends and Issues in Crime and Criminal Justice*, no. 383, Australian Institute of Criminology: Canberra.

Bartlett, H. 1970, *The Common Base of Social Work Practice*, National Association of Social Workers, New York.

Baskin, D. and Sommers, I. 2010, 'Child maltreatment, placement strategies, and delinquency', *American Journal of Criminal Justice*, vol. 36, no. 2, pp. 106-119.

Baskin, D. and Sommers, I. 2014, 'Exposure to community violence and trajectories of violent offending', *Youth Violence and Juvenile Justice*, vol. 12, no. 4, pp. 367-385.

- Bayes, H. 1999, 'Punishment is blind: Mandatory sentencing of children in Western Australia and the Northern Territory', *University of New South Wales Law Journal*, vol. 22, no. 1, pp. 286-289.
- Bechara, A., Damasio, A., Damasio, H. Anderson, S. 1994, 'Insensitivity to future consequences following damage to prefrontal cortex', *Cognition*, vol. 50, pp. 7-15.
- Beck, U. 1992, *Risk Society: Towards a New Modernity*, Sage: London.
- Beck, U., Bonns, W. and Lau, C. 2003, 'The theory of reflexive modernization: Problematic hypotheses and research programme', *Theory, Culture & Society*, vol. 20, no. 2, pp. 1-33.
- Becker, H. 1963, *Outsiders: Studies in the Sociology of Deviance*, Free Press, New York.
- Beer, S. and De Bellis, M. 2002, 'Neuropsychological function in children with maltreatment-related posttraumatic stress disorder', *American Journal of Psychiatry*, vol. 159, no. 3, pp. 483-486.
- Benarroch, E. 2009, 'The locus ceruleus norepinephrine system: functional organization and potential clinical significance', *Neurology*, vol. 73, no. 20, pp. 1699-1704.
- Benda, B. 2005, 'Gender differences in life-course theory of recidivism: a survival analysis', *International Journal of Offender Therapy and Comparative Criminology*, vol. 49, no. 3, pp. 325-342.
- Benda, B., Harm, N. and Toombs, N. 2005, 'Survival analysis of recidivism of male and female boot camp graduates using life-course theory', *Journal of Offender Rehabilitation*, vol. 40, no. 3-4, pp. 87-113.
- Bender, K. 2012, 'The mediating effect of school engagement in the relationship between youth maltreatment and juvenile delinquency', *Children and Schools*, vol. 34, no. 1, pp. 37-48.
- Bensley, L., Spieker, S., Van Eenwyk, J. and Schoder, J. 1999, 'Self-reported abuse history and adolescent behaviors. II. Alcohol and drug use', *Journal of Adolescent Health*, vol. 24, no. 3, pp. 173-180.

Beresford, P. 2000, 'Service users' knowledge and social work theory: conflict or collaboration', *British Journal of Social Work*, vol. 30, pp. 489-503.

Bergman, B. and Brismar, B. 1994, 'Hormone levels and personality traits in abusive and suicidal male alcoholics', *Alcoholism: Clinical and Experimental Research*, vol. 18, no. 2, pp. 311-316.

Berking, M. & Wupperman, P. 2012, 'Emotion regulation and mental health: recent findings, current challenges and future direction', *Current Opinions in Psychiatry*, vol. 25, no. 2, pp. 128-134.

Berman, G. and Feinblatt, J. 2001, 'Problem-solving courts: A brief primer', *Law and Policy*, vol. 23, pp. 125-140.

Berman, G. and Fox, A. 2009, *Lasting Change or Passing Fad? Problem-Solving Justice in England and Wales*, London: Policy Exchange.

Bernard, K., Butzin-Dozier, Z., Rittenhouse, J. and Dozier, M. 2010, 'Cortisol production patterns in young children living with birth parents vs children placed in foster care following involvement of child protective services', *JAMA Pediatrics*, vol. 164, no. 5, pp. 428-443.

Bernard, K., Lind, T. and Dozier, M. 2014, 'Chapter 11: Neurobiological consequences of neglect and abuse', in *Handbook of Child Maltreatment*, J. Korbin and R. Krugman (Ed.'s), Springer: Dordrecht.

Bernardi, L., Gabutti, A., Porta, C. and Spicuzza, L. 2001, 'Slow breathing reduces chemoreflex response to hypoxia and hypercapnia, and increases baroreflex sensitivity', *Journal of Hypertension*, vol. 19, no. 12, pp. 2221-2229.

Bernburg, J. and Krohn, M. 2003, 'Labeling, life chances and adult crime: The direct and indirect effects of official intervention in adolescence on crime in early adulthood', *Criminology*, vol. 41, pp. 1287-1318.

Bernburg, J., Krohn, M. and Rivera, C. 2006, 'Official labeling, criminal embeddedness, and subsequent delinquency: A longitudinal test of labelling theory', *Journal of Research in Crime and Delinquency*, vol. 43, no. 1, pp. 67-88.

- Bernstein, D.P. and Fink, L. 1998, *Childhood Trauma Questionnaire: A Retrospective Self-Report Manual*, The Psychological Corporation: San Antonio, Texas.
- Bertalanffy, L. 1968, *General Systems Theory: Foundation, Development, Application*, George Braziller: New York.
- Bhaskar, R. 1997, *A Realist Theory of Science*, Verso, London.
- Bhaskar, R. 1998, *The Possibility of Naturalism; A Philosophical Critique of the Contemporary Human Sciences*, Routledge, London.
- Birgden, A. 2004, 'Therapeutic jurisprudence: The role of forensic psychology', in *Key Issues in Criminal Justice*, R. Sarre & J. Tomaino (eds), Australian Humanities Press: Adelaide, pp. 166–191.
- Björkman, M. and Widmalm, S. 2010, 'Selling eugenics: The case of Sweden', *Notes and Records of the Royal Society of London*, vol. 64, no. 4, pp. 379-400.
- Black, J., Jones, T., Nelson, C. and Greenough, W. 1998, 'Neuronal plasticity and the developing brain', in J. Noshpitz (ed), *Handbook of Child and Adolescent Psychiatry*, vol. 6, John Wiley and Sons: New York, pp. 31-53.
- Blakemore, S. 2012, 'Imaging brain development: the adolescent brain', *NeuroImage*, vol. 61, pp. 397-406.
- Blokland, A. and Nagin, D. 2012, 'Estimating the effects of imprisonment: Intended and unintended consequences of incarceration', in *Incapacitation: Trends and New Perspectives*, M Malsch and M. Duker (eds), Ashgate Publishing Ltd.: Surrey, England.
- Boaz, A., Ashby, D. and Young, K. 2002, *Systematic Reviews: What Have They got to Offer Evidence Based Policy and Practice?*, ESRC UK Centre for Evidence Based Policy and Practice: London.
- Bockting, C., Lok, A., Visser, I., Assies, J., Koeter, M. and Schene, A. 2012, 'Lower cortisol levels predict recurrence in remitted patients with recurrent depression: A 5.5 year prospective study', *Psychiatry Research*, vol. 200, no. 2-3, pp. 281-287.

Boldeman, L. 2007, *Cult of the Market: Economic Fundamentalism and its Discontents*, ANU Press, Canberra.

Bolognini, N., Rossetti, A., Convento, S. and Vallar, G. 2013, 'Understanding others' feelings: the role of the right primary somatosensory cortex in encoding the affective valence of others' touch', *Journal of Neuroscience*, vol. 33, pp. 4201–4205.

Bonta, J. and Andrews, D. 2003, 'A commentary on Ward and Stewart's model of human needs', *Psychology, Crime & Law*, vol. 9, no. 3, pp. 215-218.

Booth, A., Clarke, M., Ghersi, D., Moher, D., Petticrew, M. and Stewart, L. 2010, 'An international registry of systematic-review protocols', *The Lancet*, vol. 377, pp. 108-109.

Bos, K, Fox, N., Zeanah, C. and Nelson, C. 2009, 'Effects of early psychosocial deprivation on the development of memory and executive function', *Frontiers in Behavioral Neuroscience*, vol. 3, no. 16, pp. 1-7.

Bottoms, A. 1995, 'The philosophy and politics of punishment and sentencing', in *The Politics of Sentencing Reform*, C. Clarkson and R. Morgan (Eds.), Clarendon Press: Oxford, pp. 17-49.

Bowlby, J. 1958, 'The Nature of the Child's Tie to His Mother', *International Journal of Psycho-Analysis*, XXXIX, 1-23.

Bowlby, J. 1959, 'Separation Anxiety', *International Journal of Psycho-Analysts*, XLI, 1-25.

Bowlby, J. 1960, 'Grief and Mourning in Infancy and Early Childhood', *The Psychoanalytic Study of the Child*, VX, 3-39.

Bowlby, J. 1969, *Attachment and Loss, Vol.1: Attachment*. New York: Basic Books.

Braithwaite, J. 1989, *Crime, Shame and Reintegration*, Cambridge University Press, Cambridge.

Brancucci, A., Lucci G., Mazzatenta A. and Tommasi L. 2009, 'Asymmetries of the human social brain in the visual, auditory and chemical modalities', *Philosophical Transactions of the Royal Society B: Biological Sciences*, vol. 364: pp. 895–914.

Bright, C. and Jonson-Reid, M. 2010, 'Young adult outcomes of juvenile court-involved girls', *Journal of Social Service Research*, vol. 36, no. 2, pp. 94-106.

Bremner, J. 2006, 'The relationship between cognitive and brain changes in posttraumatic stress disorder', *Annals of the New York Academy of Sciences*, vol. 1071, pp. 80-86.

Bremner, J., Narayan, M., Staib, L., Southwick, S., McGlasan, T. and Charney, D. 1999, 'Neural correlates of memories of childhood sexual abuse in women with and without posttraumatic stress disorder', *American Journal of Psychiatry*, vol. 156, no. 11, pp. 1787-1795.

Bremner, J., Randall, P., Vermetten, E., Staib, L., Bronen, R., Mazure, C., Capelli, S., McCarthy, G., Innis, R. and Charney, D. 1997, 'Magnetic resonance imaging-based measurement of hippocampal volume in posttraumatic stress disorder related to childhood physical and sexual abuse - a preliminary report', *Biological Psychiatry*, vol. 41, no. 1, pp. 23-32.

Bremner, J., Southwick, M., Darnell, M. and Charney, D. 1996, 'Chronic PTSD in Vietnam combat veterans: Course of illness and substance abuse', *American Journal of Psychiatry*, vol. 153, pp. 369-375.

Bremner, J., Vermetten, E., Schmahl, C., Vaccarino, V., Vythilingam, M., Afzal, N., Grillon, C. and Charney, D. 2005, 'Positron emission tomographic imaging of neural correlates of a fear acquisition and extinction paradigm in women with childhood-sexual-abuse-related post-traumatic stress disorder', *Psychological Medicine*, vol. 35, no. 6, pp. 791-806.

Brewer-Smyth, K., Burgess, A.W., and Shults, J. 2004, 'Physical and sexual abuse, salivary cortisol, and neurologic correlates of violent criminal behavior in female prison inmates', *Biological Psychiatry*, vol. 55, no. 1, pp. 21-31.

Bright, C.L. and Jonson-Reid, M. 2008, 'Onset of juvenile court involvement: Exploring gender-specific associations with maltreatment and poverty', *Children and Youth Services Review*, vol. 30, no. 8, pp. 914-927.

Bromfield, L. and Higgins, D. 2004, 'The limitations of using statutory child protection data for research into child maltreatment', *Australian Social Work*, vol. 57, no. 1, pp. 19-30.

Bronfenbrenner, U. 1979, *The Ecology of Human Development: Experiments by Nature and Design*, Harvard University Press: Cambridge.

Bronner, S.E. 2011, *Critical Theory: A Very Short Introduction*, Oxford University Press; Oxford, USA.

Brothers, L. 1997, *Friday's Footprint: How Society Shapes the Human Mind*, Oxford University Press, New York.

Brown, D. 2010, 'The limited benefit of prison in controlling crime', *Current Issues in Criminal Justice*, vol. 22, no. 1, pp. 137-148.

Brown, D. 2013, 'Continuity, rupture, or just more of the 'volatile and contradictory'? Glimpses of New South Wales' penal practice behind and through the discursive', in *The New Punitiveness*, J. Pratt, D. Brown, S. Hallsworth and W. Morrison (eds.), Willan Publishing: Devon, UK.

Brown, R. and Gerbarg, P. 2005, 'Sudarshan Kriya yogic breathing in the treatment of stress, anxiety, and depression, part 1: neurophysiological model', *Journal of Alternative and Complimentary Medicine*, vol. 11, no. 4, pp. 711-717.

Brownell, P. and Roberts, A. 2002, 'A century of social work in criminal justice and correctional settings', *Journal of Offender Rehabilitation*, vol. 35, no. 2, pp. 1-17.

Bucharest Early Intervention Project. 2014, *About Us*, available on-line at: <http://www.bucharestearlyinterventionproject.org/About-Us.html>.

Buckholtz, J., Asplund, C., Dux, P., Zald, D., Gore, J., Jones, O. and Marois R. 2008, 'The neural correlates of third-party punishment', *Neuron*, vol. 60, no. 5, pp. 930-940.

Bufkin, J. and Luttrell, V. 2005, 'Neuroimaging studies of aggressive and violent behavior: Current findings and implications for criminology and criminal justice', *Trauma, Violence and Abuse*, vol. 6, no. 2, pp. 176-191.

Bugental, D, Martorell, G. and Barraza, V. 2003, 'The hormonal costs of subtle forms of infant maltreatment', *Hormones and Behavior*, vol. 43, no. 1, pp. 237-244.

Bunge, S. and Kahn, I. 2009, 'Cognition: an overview of neuroimaging techniques', *Encyclopedia of Neuroscience*, vol. 2, pp. 1063-1067.

Buonanno, P. and Leonida, L. 2006, 'Education and crime: Evidence from Italian regions', *Applied Economics Letters*, vol. 13, no. 11, pp. 709-713.

Burke, A. and Miczek, K.2014, 'Stress in adolescence and drugs of abuse in rodent models: role of dopamine, CRF, and HPA axis', *Psychopharmacology*, vol. 231, no. 8, pp. 1557-1580.

Burton, D., Leibowitz, G., Eldredge, M., Ryan, G. and Compton, D. 2011, 'The relationship of trauma to nonsexual crimes committed by adolescent sexual abusers: A new area of research', *Journal of Aggression, Maltreatment and Trauma*, vol. 20, no. 5, pp. 579-593.

Byrne, D.S. 1998, *Complexity Theory and the Social Sciences: An Introduction*, Routledge, London.

Cacioppo, J. and Bernston, G. 1992, 'Social psychological contributions to the decade of the brain', *American Psychologist*, vol. 47, no. 8, pp. 1019-1028.

Callinan, I. 2013, *Review of the Parole System in Victoria*, Department of Justice, Corrections Victoria, Melbourne.

Campbell, C. 2015, 'Popular punitivism: finding a balance between the politics, presentation, and fear of crime', *Sociology Compass*, vol. 9, no. 3, pp. 180-195.

Campbell-Sills, L., Simmons, A., Levoro, K., Rochlin, A., Paulus, M. and Stein, M. 2011, 'Functioning of neural systems supporting emotion regulation in anxiety-prone individuals', *NeuroImage*, vol. 54, no. 1, pp. 689-696.

Cann, J. 2006, *Cognitive Skills Programmes: Impact on Reducing Reconviction Among a Sample of Female Prisoners*, Home Office Research Findings No. 276, Home Office, London.

Cann, J., Falshaw, L. and Friendship, C. 2005, 'Understanding 'what works': Accredited cognitive skills programmes for young offenders', *Youth Justice*, vol. 5, no. 3, pp. 165-179.

Cannon, W.B. 1914, 'The emergency function of the adrenal medulla in pain and the major emotions', *American Journal of Physiology*, vol. 33, pp. 356-372.

Carlson, B.E., Shafer, M.S. 2010, 'Traumatic histories and stressful life events of incarcerated parents: Childhood and adult trauma histories', *Prison Journal*, vol. 90, no. 4, pp. 475-493.

Carpenter, L., Carvalho, J., Tyrka, A., Wier, L., Mello, M., Anderson, G., Wilkinson, C. and Price, L. 2007, 'Decreased adrenocorticotropic hormone and cortisol responses to stress in healthy adults reporting significant childhood maltreatment', *Biological Psychiatry*, vol. 62, no. 10, pp. 1080-1087.

Carpenter, L., Shattuck, T., Tyrka, A., Geraciotti, T. and Price, L. 2011, 'Effect of childhood physical abuse on cortisol stress response', *Psychopharmacology*, vol. 214, pp. 367-375.

Carpenter, L., Tyrka, A., Ross, N., Khoury, L., Anderson, G. and Price, L. 2009, 'Effect of childhood emotional abuse and age on cortisol responsivity in adulthood', *Biological Psychiatry*, vol. 66, no. 1, pp. 69-75.

Carrion, V., Weems, C., Eliez, S., Patwardhan, A., Brown, W., Ray, R. and Reiss, A. 2001, 'Attenuation of frontal asymmetry in pediatric posttraumatic stress disorder', *Biological Psychiatry*, vol. 50, no. 12, pp. 943-951.

Carter, A., Capps, B. and Hall, W. 2009, *Addiction Neurobiology: Ethical and Social Implications*, European Monitoring Centre for Drugs and Drug Addiction: Luxembourg.

Cashmore, J. 2012, 'Abuse and neglect', *Hot Topics: Legal Issues in Plain Language*, vol. 81, pp. 4-11.

Cass, W. 1997, 'Decreases in evoked overflow of dopamine in rat striatum after neurotoxic doses of methamphetamine', *Journal of Pharmacology and Experimental Therapy*, vol. 280, pp. 105-113.

Cavadino, M. and Dignan, J. 2006, 'Penal policy and political economy', *Criminology and Criminal Justice*, vol. 6, no. 4, pp. 435-456.

Centers for Disease Control and Prevention, 13 May 2014, *ACE Study Participant Demographics*, online: <http://www.cdc.gov/violenceprevention/acestudy/demographics.html>, accessed 23 April 2015.

Cernkovich, S., Lanctôt, N. and Giordano, P. 2008, 'Predicting adolescent and adult antisocial behavior among adjudicated delinquent females', *Crime and Delinquency*, vol. 54, no. 1, pp.3-33.

Chang, L., Smith, L., Lo Presti, C., Yonekura, M., Kuo, J., Walot, I. and Ernst, T. 2004, 'Smaller subcortical volumes and cognitive deficits in children with prenatal methamphetamine expose', *Psychiatry Research Neuroimaging*, vol. 132, pp. 95-106.

Charney, D. 2004, 'Psychobiological mechanisms of resilience and vulnerability: implications for successful adaptation to extreme stress', *American Journal of Psychiatry*, vol. 161, no. 2, pp. 195-216.

Chen, M., Hamilton, J. and Gotlib, I. 2010, 'Decreased hippocampal volume in healthy girls at risk of depression', *Archives of General Psychiatry*, vol. 67, pp. 270-276.

Chen, M. and Shapiro, J. 2007, 'Do harsher prison conditions reduce recidivism? A discontinuity-based approach', *American Law and Economics Review*, vol. 9, no. 1, pp. 1-29.

Chiricos, T., Barrick, K., Bales, W. and Bontrager, S. 2007, 'The labelling of convicted felons and its consequences for recidivism', *Criminology*, vol. 45, no. 3, pp. 547-581.

Choi, J., Jeong, B., Rohan, M., Polcari, A. and Teicher, M. 2009, 'Preliminary evidence for white matter tract abnormalities in young adults exposed to parental verbal abuse', *Biological Psychiatry*, vol. 65, no. 3, pp. 227-234.

Christie, N. 2000, *Crime Control as Industry: Towards Gulags, Western Style?*, Routledge, London.

Chu, C., Thoas, S. and Ng, V. 2009, 'Childhood abuse and delinquency: A descriptive study of institutionalized female youth in Singapore', *Psychiatry, Psychology and Law*, vol. 16, Supplementary 1, pp. 64-73.

Chugani, H., Behen, M., Muzik, O., Juhász, C. and Chugani, D. 2001, 'Local brain functional activity following early deprivation: A study of postinstitutionalized Romanian orphans', *NeuroImage*, vol. 14, no. 6, pp. 1290-1301.

Cicchetti, D. and Barnett, D. 1991, 'Toward the development of a scientific nosology of child maltreatment', in W. Grover and D. Cicchetti (eds.), *Thinking Clearly About Psychology: Essays in Honor of Paum E. Meehl*, vol. 2: Personality and Psychopathology, Minneapolis: University of Minnesota Press.

Cicchetti, D. 2002, 'How the child builds a brain: Insights from normality and psychopathology', *Minnesota Symposia of Child Psychology: Child Psychology in Retrospect and Prospect*, W. Hertup and R. Weinberg, M. (Ed.'s), Lawrence Erlbaum Associates: Mahwah, New Jersey.

Cicchetti, D. and Rogosch, F. 2001, 'The impact of child maltreatment and psychopathology on neuroendocrine functioning', *Development and Psychopathology*, vol. 13, no. 4, pp. 783-804.

CINCH, accessed 28 February 2015, RMIT Publishing, available online at: <http://search.informit.com.au.ezproxy.flinders.edu.au/databaseInfo;res=CINCH>

Clark, D., Boutros, N. and Mendez, M. 2010, *The Brain and Behavior: An Introduction to Behavioral Neuroanatomy*, 3rd Edition, Cambridge University Press: New York.

Clarke, R. and Cornish, D. 1985, 'Modeling offenders' decisions: A framework for research and policy', in *Crime and Justice: An Annual Review of Research*, vol. 6, M. Tonry and N. Morris (Ed.'s), University of Chicago Press: Chicago.

Cloak, C., Ernst, T., Fujii, L., Hedemark, B. and Chang, L. 2009, 'Lower diffusion in white matter of children with prenatal methamphetamine exposure', *Neurology*, vol. 72, pp. 2068-2075.

Cobley, C. 2006, 'The quest for truth: Substantiating allegations of physical abuse in criminal prosecutions and care proceedings', *International Journal of Law, Policy and the Family*, vol. 20, no. 3, pp. 317-343.

Cochrane, A. 1979, '1931-1971: a critical review, with particular reference to the medical profession', in *Medicines for the year 2000*, Office of Health Economics: London, pp. 1-11.

Cohen, L. 2005, 'Neurobiology of antisociality', in C. Stough (Ed.), *Neurobiology of Exceptionality*, Kluwer Academic/Plenum Publishers: New York.

Cohen, L., Manion, L. and Morrison, K. 2007, *Research Methods in Education*, (6th edn.), Routledge, London.

Colman, R., Do, K., Mitchell-Herzfeld, S. and Shady, T. 2009, 'Delinquent girls grown up: Young adult offending patterns and their relation to early legal, individual, and family risk', *Journal of Youth and Adolescence*, vol. 38, no. 3, pp. 355-366.

Combs-Orme, T. 2013, 'Epigenetics and the social work imperative', *Social Work*, vol. 58, no. 1, pp. 23-30.

Community Law Australia. 2012, *Unaffordable and Out of Reach: The Problem of Access to the Australian Legal System*, Community Law Australia, available online: <http://www.communitylawaustralia.org.au>.

Conference of Correctional Administrators. 2012, *Standard Guidelines for Corrections in Australia*, Conference of Correctional Administrators: Australia.

Conrad, S., Tolou-Shams, M., Rizzo, C., Placella, N. and Brown, L. 2013, 'Gender differences in recidivism rates for juvenile justice youth: The impact of sexual abuse', *Law and Human Behavior*, Advance online publication, doi: 10.1037/lhb0000062.

Cook, C., Creyke, R., Geddes, R. and Hamer, D. 2009, *Laying Down the Law*, 7th Edition, LexisNexis Butterworths: Chatswood, NSW.

Corrections Corporation of America. 2010, *2010 Annual Report on Form 10-K*, CCA, Tennessee.

Craig, A. 2003, 'Interoception: the sense of the physiological condition of the body', *Current Opinion in Neurobiology*, vol. 13, no. 4, pp. 500-505.

Crispin, K. 2010, *The Quest for Justice*, Scribe Publications Pty Ltd: Carlton North.

Critchley, H., Wiens, S., Rotshtein, P., Ohman, A. and Dolan, R. 2004, 'Neural systems supporting interoceptive awareness', *Nature Neuroscience*, vol. 7, pp. 189-195.

Crotty, M. 1998, *The Foundations of Social Research: Meaning and Perspective in the Research Process*, SAGE Publications, London.

Cullen, F., Jonson, C. and Nagin, D. 2011, 'Prisons do not reduce recidivism: The high cost of ignoring science', *The Prison Journal*, vol. 19, supplement 3, pp. 48-65.

Cummins, P., Scott, D. and Scales, B. 2012, *Report of the Protecting Victoria's Vulnerable Children Inquiry*, Department of Premier and Cabinet, Melbourne.

Curtis, W. and Cicchetti, D. 2007, 'Emotion and resilience: A multilevel investigation of hemispheric electroencephalogram asymmetry and emotion regulation in maltreated and nonmaltreated children', *Development and Psychopathology*, vol. 19, no. 3, pp. 811-40.

Cutuli, J., Wiik, K., Herbers, J., Gunnar, M. and Masten, A. 2010, 'Cortisol function among early school-aged homeless children', *Psychoneuroendocrinology*, vol. 35, no. 6, pp. 833-845.

Dackis, M., Rogosch, F., Oshri, A. and Cicchetti, D. 2012, 'The role of limbic system irritability in linking history of childhood maltreatment and psychiatric outcomes in low-income, high-risk women: moderation by FK506 binding protein 5 haplotype', *Developmental Psychopathology*, vol. 24, no. 4, pp. 1237-1252.

Daly, K. 2012, 'Aims of the criminal justice system', in *Crime and Justice: A Guide to Criminology*, 4th edition, M. Marmo, W. de Lint and D. Palmer (eds.), Law Book Company: Sydney, Chapter 17.

Damasio, A. 2003, 'Feelings of emotion and the self', *Annals of the New York Academy of Sciences*, vol. 100, no. 1, pp. 253-261.

Damasio, H., Grabowski, T., Frank, R., Galaburda, A. and Damasio, A. 1994, 'The return of Phineas Gage: Clues about the brain from the skull of a famous patient', *Science*, vol. 264, pp. 1102-1105.

Dannlowski, U., Ohrmann, P., Bauer, J., Kugel, H., Arolt, V., Heindel, W., Kersting, A., Baune, B. and Suslow, T. 2007, 'Amygdala reactivity to masked negative faces is associated with automatic judgemental bias in major depression: a 3T fMRI study', *Journal of Psychiatry and Neuroscience*, vol. 32, no., 6, pp. 423-429.

Dannlowski, U., Stuhrmann, A., Beutelmann, V., Zwanzger, P., Lenzen, T., Grotegerd, D., Domschke, K., Hohoff, C., Ohrmann, P., Bauer, J., Lidner, C., Postert, C., Konrad, C., Arolt, V., Heindel, W., Suslow, T. and Kugel, H. 2012, 'Limbic scars: Long-haired consequences of childhood maltreatment revealed by functional and structural magnetic resonance imaging', *Biological Psychiatry*, vol. 71, no. 4, pp. 286-293.

Davidson, R. and McEwen, B. 2012, 'Social influence on neuroplasticity: Stress and intervention to promote well-being', *Nature Neuroscience*, vol. 15, no. 5, pp. 689-695.

Davidson, R., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S., Urbanowski, F., Harrington, A., Bonus, K., Sheridan, J. 2003, 'Alterations in brain and immune functions produced by mindfulness meditation', *Psychosomatic Medicine*, vol. 65, pp. 564-570.

Davidson, R., Putnam, K. and Larson, C. 2000, 'Dysfunction in the neural circuitry of emotion regulation: A possible prelude to violence', *Science*, vol. 289, no. 5479, pp. 591-594.

Davis, B. and Dossetor, K. 2010, '(Mis)perceptions of crime in Australia', *Trends and Issues in Crime and Criminal Justice*, vol. 396, pp. 1-6.

Day, A. 2011, 'Offender rehabilitation: Current problems and ethically informed approaches to intervention', *Ethics and Social Welfare*, vol. 5, no. 4, pp. 348-360.

Day, A., Howells, K. and Rickwood, D. 2004, 'Current trends in the rehabilitation of juvenile offenders', *Trends and Issues in Crime and Criminal Justice*, no. 284, AIC: Canberra.

De Bellis, M. 2002, 'Developmental traumatology: a contributory mechanism for alcohol and substance abuse disorders', *Psychoneuroendocrinology*, vol. 27, pp. 155-170.

De Bellis, M. 2005, 'The psychobiology of neglect', *Child Maltreatment*, vol. 10, no. 2, pp. 150-172.

De Bellis, M., Baum, A., Birmaher, B., Keshavan, M., Eccard, C., Boring, A., Jenkins, F. and Ryan, N. 1999, 'Developmental traumatology part I: Biological stress systems', *Biological Psychiatry*, vol. 45, no. 10, pp. 1259-1270.

De Bellis, M., Chrousos, G., Dorn, L., Burke, L., Helmers, K., Kling, M., Trickett, P. and Putnam, F. 1994, 'Hypothalamic-pituitary-adrenal axis dysregulation in sexually abused girls', *The Journal of Clinical Endocrinology and Metabolism*, vol. 78, no.2, pp. 249-255.

De Bellis, M., Hooper, S., Woolley, D. and Shenk, C. 2010, 'Demographic, maltreatment, and neurobiological correlates of neurobiological correlates of PTSD symptoms in children', *Journal of Pediatric Psychology*, vol. 35, no. 5, pp. 570-577.

De Bellis, M. and Keshavan, M. 2003, 'Sex differences in brain maturation in maltreatment-related pediatric posttraumatic stress disorder', *Neuroscience and Biobehavioral Reviews*, vol. 27, no. 1-2, pp. 103-117.

De Bellis, M., M. Keshavan, M., Clark, D., Casey, B., Giedd, J., Boring, A., Frustaci, K., Ryan, N. 1999, 'Developmental traumatology part II: brain development', *Biological Psychiatry*, vol. 45, no. 10, pp. 1271-1284.

De Bellis, M., Keshavan, M., Frustaci, K., Shifflett, H., Iyengar, S., Beers, S. and Hall, J. 2002a, 'Superior temporal gyrus volumes in maltreated children and adolescents with PTSD', *Biological Psychiatry*, vol. 51, pp. 544-552.

De Bellis, M., Keshavan, M., Shifflett, H., Iyengar, S., Beers, S., Hall, J. and Moritz, G. 2002b, 'Brain structures in pediatric maltreatment-related posttraumatic stress disorder: A sociodemographically matched study', *Biological Psychiatry*, vol. 52, no. 11, pp. 1066-1078.

De Bellis, M., Keshavan, M., Spencer, S. and Hall, J. 2000, '*N*-Acetylaspartate concentration in the anterior cingulate of maltreated children and adolescents with PTSD', *The American Journal of Psychiatry*, vol. 157, no. 7, pp. 1175-1177.

De Bellis, M. and Kuchibhatla, M. 2006, 'Cerebellar volumes in pediatric maltreatment-related posttraumatic stress disorder', *Biological Psychiatry*, vol. 60, no. 7, pp. 697-703.

Decety, J. and Cacioppo, S. 2012, 'The speed of morality: a high-density electrical neuroimaging study', *Journal of Neurophysiology*, vol. 108, no. 11, pp. 3068-3072.

De Lisi, M., Drury, A., Kosloski, A., Caudill, J., Conis, P., Anderson, C., Vaughn, M., Beaver, K. 2010, 'The cycle of violence behind bars: Traumatization and institutional misconduct among juvenile delinquents in confinement', *Youth Violence and Juvenile Justice*, vol. 8, no. 2, pp. 107-121.

Department of Corrective Services. 2013, *Annual Report 2012/13*, Department of Corrective Services: Perth.

Department of Foreign Affairs and Trade. 2012, *Legal System*, available online: https://www.dfat.gov.au/facts/legal_system.html, accessed 1 June 2014.

Department of Justice and Regulation, 2015, *Alcohol and Other Drug Services*, State Government of Victoria, Melbourne, on-line (available): <http://www.corrections.vic.gov.au/home/prison/health+care/alcohol+and+other+drug+services/>, accessed 2 September 2015.

De Quardo, J., Tandon, R., Goldman, R., Meador-Woodruff, J., McGrath-Giroux, M., Brunberg, J., Kim, L. 1994, 'Ventricular enlargement, neuropsychological status, and premorbid function in schizophrenia', *Society of Biological Psychiatry*, vol. 35, pp. 517-524.

De Ribaupierre, A. 2001, 'Piaget's Theory of Child Development', in *International Encyclopedia of the Social and Behavioural Sciences*, N.J. Smelser and P.B. Baltes (Ed.'s), Pergamon: Oxford, pp. 11434-11437.

De Sanctis, V., Nomura, Y., Newcorn, J. and Halperin, J. 2012, 'Childhood maltreatment and conduct disorder: Independent predictors of criminal outcomes in ADHD youth', *Child Abuse and Neglect*, vol. 36, pp. 782-789.

Devlin, J., Jamison, H., Gonnerman, L. and Matthews, P. 2006, 'The role of the posterior fusiform gyrus in reading', *Journal of Cognitive Neuroscience*, vol. 18, no. 6, pp. 911-922.

De Young, C., Grazioplene, R. and Peterson, J. 2012, 'From madness to genius: The openness/intellect trait domain as a paradoxical simplex', *Journal of Research in Personality*, vol. 46, no. 1, pp. 63-78.

Dhawan, A. 2011, 'Medical Imaging Modalities: Magnetic Resonance Imaging', in *Medical Image Analysis*, 2nd edition, A. Dhawan (ed.), Wiley-IEEE Press, Piscataway, NJ, pp. 99-138.

Dickerson, S. and Kemeny, M. 2004, 'Acute stressors and cortisol responses: A theoretical integration, and synthesis of laboratory research', *Psychological Bulletin*, vol. 130, no. 3, pp. 355-391.

Dietrich, A., Carson Smiley, W., and Frederick, C. 2007, 'The roles of childhood maltreatment and psychopathy in sexual recidivism of treated sex offenders', *Journal of Aggression, Maltreatment and Trauma*, vol. 14, no. 3, pp. 19-31.

Dixon-Woods, M., Cavers, D., Agarwal, S., Annandale, A., Harvey, J., Hsu, R., Katbamna, S., Olsen, R., Smith, L., Riley, R. and Sutton, A. 2006, 'Conducting a critical interpretive synthesis of the literature on access to healthcare by vulnerable groups', *BMC Medical Research Methodology*, vol. 6, pp. 35-49.

Domes, G., Mense, J., Vohs, K. and Habermeyer, E. 2013, 'Offenders with antisocial personality disorder show attentional bias for violence-related stimuli', *Psychiatry Research*, vol. 209, no. 1, pp. 78-84.

Domínguez Duque, J., Turner, R., Lewis, E. and Egan, G. 2010, 'Neuroanthropology: A humanistic science for the study of culture-brain nexus', *Social Cognitive and Affective Neuroscience*, vol. 5, no. 2-3, pp. 138-147.

Donnelly, K. 2010, 'So, Where is the Justice?', *Herald Sun*, 15 January, p. 13.

Doom, J., Cicchetti, D., Rogosch, F. and Dackis, M. 2013, 'Child maltreatment and gender interactions as predictors of differential neuroendocrine profiles', *Psychoneuroendocrinology*, vol. 38, no. 8, pp. 1442-1454.

Drabsch, T. 2006, *Reducing the Risk of Recidivism*, Briefing paper no 15/06, NSW Parliamentary Library Research Service: Sydney.

Drake, D. 2012, *Prisons, Punishment and the Pursuit of Security*, Palgrave Macmillan, Basingstoke.

Dube, S., Felitti, V., Dong, M., Chapman, D., Giles, W. and Anda, R. 2003, 'Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: the adverse childhood experience study', *Pediatrics*, vol. 111, no. 3, pp. 564-572.

Dube, S., Felitti, V., Dong, M., Giles, W. and Anda, R. 2003, 'The impact of adverse childhood experiences on health problems: evidence from four birth cohorts dating back to 1900', *Preventative Medicine*, vol. 37, no. 3, pp. 268-277.

Duncko, R., Johnson, L., Merikangas, K. and Grillon, C. 2009, 'Working memory performance after acute exposure to the cold pressure stress in healthy volunteers', *Neurobiology of Learning and Memory*, vol. 91, no. 4, pp. 377-381.

Dunham, J. and Davenport, T. 2012, *Neuroscience Research Progress: Handedness: Theories, Genetics and Psychology*, USA Nova Science Publishers, New York.

Dunk-West, P. and Verity, F. 2013, *Sociological Social Work*, Ashgate Publishing: Surrey, England.

Eastman, N. and Campbell, C. 2006, 'Neuroscience and legal determination of criminal responsibility', *Nature Reviews Neuroscience*, vol. 7, no. 4, pp. 311-318.

Edmiston, E., Wang, F., Mazure, C., Guiney, J., Sinha, R., Mayes, L. and Blumberg, H. 2011, 'Corticostriatal-limbic gray matter morphology in adolescents with self-reported exposure to childhood maltreatment', *JAMA Pediatrics*, vol. 165, no. 12, pp. 1069-1077.

Edwards, L. and Ray, J. 2005, 'Judicial perspectives on family drug treatment courts', *Juvenile and Family Court Journal*, vol. 56, no. 3, pp. 1-27.

Egan, M., Combs-Orme, T. and Neely-Barnes, S. 2011, 'Integrating neuroscience knowledge into social work education: A case-based approach', *Journal of Social Work Education*, vol. 47, no. 2, pp. 269-282.

Ekstrand, J., Hellsten, J. and Tingström, A. 2008, 'Environmental enrichment, exercise and corticosterone affect endothelial cell proliferation in adult rat hippocampus and prefrontal cortex', *Neuroscience Letters*, vol. 442, no. 3, pp. 203-207.

Elferink, J. 5 May 2011, *Alcohol Reform (Substance Misuse Assessment and Referral for Treatment Court) Bill* (Serial 159) – second reading in continuation, Parliamentary record number 19, available online: <http://notes.nt.gov.au/lant/hansard/hansard11.nsf/WebbyMember/258D865F20508F9D692578A2000E31B5?opendocument>.

Ellason, J., Ross, C., Sainon, K. and Mayran, L. 1996, 'Axis I and II comorbidity and childhood trauma history in chemical dependency', *Bulletin of the Menninger Clinnic*, vol. 60, no. 1, pp. 39-51.

Elliot, A. 2009, *Contemporary Social Theory*, Routledge, New York.

Elliot, E. and Kiel, L. 1997, 'Introduction', in *Chaos Theory in the Social Sciences: Foundations and Applications*, L. Kiel and E. Elliot (Ed's), University of Michigan Press, Michigan.

Ellis, B. 2009, *Metaphysics of Scientific Realism*, Acumen, Durham.

Elsevier. 2012, *Sciverse SCOPUS Coverage Guide*, Elsevier, Philadelphia, USA.

Elzinga, B. and Roelofs, K. 2005, 'Cortisol-induced impairments of working memory require acute sympathetic activation', *Behavioural Neuroscience*, vol. 119, no. 1, pp. 98-103.

Engel, R. and Schutt, R. 2014, *Fundamentals of Social Work Research*, 2nd Edition, Sage Publications: California.

Evans, J. and Benefield, P. 2001, 'Systematic reviews of educational research: does the medical model fit?', *British Educational Research Journal*, vol. 27, no. 5, pp. 527-541.

Everhart, D., Demaree, H. and Harrison, D. 2008, 'The influence of hostility on electroencephalographic activity and memory functioning during an affective memory task', *Clinical Neurophysiology*, vol. 119, no. 1, pp. 134-143.

Fair, D. and Schlaggar, B. 2008, 'Brain development, in *Encyclopedia of Infant and Early Childhood Development*, M. Haith and J. Benson (Ed.'s), Elsevier/Academic Press, Maryland Heights.

Fairclough, N., Mulderrig, J. and Wodak, R. 2011, 'Chapter 17: Critical Discourse Analysis', in *Discourse Studies: A Multidisciplinary Introduction*, 2nd Edition, Ed. Van Dijk, T.A., Sage Publications Limited, London.

Falshaw, L., Bates, A., Patel, V., Corbett, C. and Friendship, C. 2003, 'Assessing reconviction, reoffending and recidivism in a sample of UK sexual offenders', *Legal and Criminological Psychology*, vol. 8, no. 2, pp. 207-215.

Farmer, D. 2008, 'Invited essay: Epistemic pluralism and neuroscience', *Administrative Theory and Practice*, vol. 30, no. 3, pp. 285-295.

Farmer, R.L. 2009, *Neuroscience and Social Work Practice: The Missing Link*, Sage Publications, California.

Farsworth, S. 23 March 2015, 'Jill Meagher's killer Adrian Bayley had history of violent sex attacks; parole board failed to take him off the streets', ABC News, available online: <http://www.abc.net.au/news/2013-06-11/violent-past-of-jill-meagher-killer-adrian-bayley-revealed/4745406>.

Felitti, V., Anda, R., Nordenberg, D., Williamson, D., Spitz, A., Edwards, V., Koss, M. and Marks, J. 1998, 'Relationship of childhood abuse and household dysfunction to many leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study', *American Journal of Preventative Medicine*, vol. 14, no. 245-258.

Ferguson, H. 2001, 'Social work, individualization and life politics', *British Journal of Social Work*, vol. 31, no. 1, pp. 41-55.

Fields, R. D. 2010, 'Change in the brain's white matter', *Neuroscience*, vol. 330, pp. 768-769.

Figgis, Hon. 1998, *Mandatory and Guideline Sentencing: Recent Developments*, Briefing Paper Number 18/98, New South Wales Parliamentary Library Research Service, Sydney.

Finkelhor, D. and Jones, L. 2004, 'Explanations for decline in child sexual abuse cases', *Juvenile Justice Bulletin*, January 2004, Washington: Office of Juvenile Justice and Delinquency Prevention.

Fisher, G. and Farrow, S. 2014, *Community Correction Orders: Monitoring Report*, Victorian Sentencing Advisory Council: Melbourne.

Fonzo, G., Flagan, T., Sullivan, S., Allard, C., Grimes, E., Simmons, A., Paulus, M. and Stein, M. 2013, 'Neural functional and structural correlates of childhood maltreatment in women with intimate-partner-violence-related posttraumatic stress disorder', *Psychiatry Research – Neuroimaging*, vol. 211, no. 2, pp. 93-103.

Ford, J., Chapman, J., Connor, D. and Cruise, K. 2012, 'Complex trauma and aggression in secure juvenile justice settings', *Criminal Justice and Behavior*, vol. 39, no. 6, pp. 694-724.

Ford, J., Fraleigh, L., Albert, D. and Connor, D. 2010, 'Child abuse and autonomic nervous system hyporesponsivity among psychiatrically impaired children', *Child Abuse and Neglect*, vol. 34, no. 7, pp. 507-515.

Forsman, M. and Långström, N. 2012, 'Child maltreatment and adult violent offending: population-based twin study addressing the 'cycle of violence' hypothesis', *Psychological Medicine*, vol. 42, no. 9, pp. 1977-1983.

Fournier, N., Calverley, K., Wagner, J., Poock, J. and Crossley, M. 2008, 'Impaired social cognition 30 years after hemispherectomy for intractable epilepsy: the importance of the right hemisphere in complex social functioning', *Epilepsy & Behavior*, vol. 12, no. 3, pp. 460-471.

Fox, C. and Albertson, K. 2011, 'Payment by results and social impact bonds in the criminal justice sector: New challenges for the concept of evidence-based policy?', *Criminology and Criminal Justice*, vol. 11, no. 5, pp. 395-413.

- Fraser, M. 2004, 'Intervention research in social work: Recent advances and continuing challenges', *Research on Social Work Practice*, vol. 14, no. 3, pp. 210-222.
- Frazzatto, G. and Anker, S. 2009, 'Neuroculture', *Nature Reviews Neuroscience*, vol. 10, pp. 815-821.
- Freeman, K. 2002, *New South Wales Drug Court Evaluation: Health, Well-being and Participant Satisfaction*, NSW Bureau of Crime and Statistics, Sydney.
- Freiberg, A. 2010, 'Australia: Exercising discretion in sentencing policy and practice', *Federal Sentencing Reporter*, vol. 22, no. 4, pp. 204-212.
- Freiberg, A. and Krasnostein, S. 2011, *Statistics, Damn Statistics and Sentencing*, paper presented at the Australasian Institute of Judicial Administration Conference, 7-9 September 2011.
- Friedman, B. and Neuman Allen, K. 2011, 'Systems theory', in J. Brandell (ed.), *Theory and Practice in Clinical Social Work*, 2nd edition, Sage Publications: California.
- Friendship, C. 2002, *An Evaluation of Cognitive Behavioural Treatment for Prisoners*, Research, Development and Statistics Directorate, London.
- Fries, E., Hesse, J., Hellhammer, J., Hellhammer, D. 2005, 'A new view on hypocortisolism', *Psychoneuroendocrinology*, vol. 30, no. 10, pp. 1010-1016.
- Frodl, T., Reinhold, E., Koutsouleris, N., Reiser, M. and Meisenzahl, E. 2010, 'Interaction of childhood stress with hippocampus and prefrontal cortex volume reduction in major depression', *Journal of Psychiatric Research*, vol. 44, pp. 799-807.
- Frost, D. and Cadet, J. 2000, 'Effects of methamphetamine-induced neurotoxicity on the development of neurocircuitry: a hypothesis', *Brain Research Review*, vol. 34, pp. 103-118.
- Fulcher, P. 2012, '*Hustle and flow*: Prison privatization fueling the Prison Industrial Complex', *Washburn Law Journal*, vol. 51, no. 3, pp. 589-617.

Fulham, M. 2004, 'Neuroimaging', in *Encyclopedia of Neuroscience*, L. Squire (Ed.), Academic Press, Oxford, pp. 459-469.

Functional Magnetic Resonance Imaging. 2009, In *Mosby's Medical Dictionary*, 8th edition, T. Myers (ed.), Mosby Elsevier: Missouri, p. 764.

Gao, W., Lin, W., Chen, Y., Gerig, G., Smith, J., Jewells, V. and Gilmore, J. 2009, 'Temporal and spatial development of axonal maturation and myelination of white matter in the developing brain', *American Journal of Neuroradiology*, vol. 30, no. 2, pp. 290-296.

Gaskill, R. and Perry, B. 2012, 'Child sexual abuse, traumatic experiences, and their impact on the developing brain', *Handbook of Child Sexual Abuse: Identification, Assessment and Treatment*, P. Goodyear-Brown (Ed.), John Wiley and Sons: United States of America.

Gatti, U., Tremblay, R. and Vitaro, F. 2009, 'Latrogenic effect of juvenile justice', *Journal of Child Psychology and Psychiatry*, vol. 50, no. 8, pp. 991-998.

Gelb, K., Fisher, G. and Hudson, N. 2013, *Reoffending Following Sentencing in the Magistrates' Court of Victoria*, Victorian Sentencing Advisory Council: Melbourne.

Gendreau, P. & Goggin, C. 1999, *The Effects of Prison Sentences on Recidivism*, Public Works and Government Services, Canada.

Germain, C. 1973, 'An ecological perspective in casework practice', *Social Casework*, vol. 54, pp. 323-330.

Germain, C. 1978, 'General systems theory and ego psychology: An ecological perspective', *Social Science Review*, vol. 52, pp. 535-550.

Germain, C. 1991, *Human Behaviour in the Social Environment: An Ecological View*, Colombia University Press: New York.

Gerra, G. and Clark, N. 2010, *From Coercion to Cohesion: Treating Drug Dependence Through Health Care, Not Punishment*, United Nations Office on Drugs and Crime, Vienna.

Gilbert, S., Williamson, I., Dumontheil, I., Simons, J., Frith, C. and Burgess, P. 2007, 'Distinct regions of the medial rostral prefrontal cortex supporting social and nonsocial functions', *Social Cognitive and Affective Neuroscience*, vol. 2, no. 3, pp. 217-226.

Gianotti, G. 2007, 'Face familiarity feelings, the right temporal lobe and the possible underlying neural mechanisms', *Brain Research Reviews*, vol. 56, no. 1, pp. 214-235.

Gilbertson, M., SHenton, M., Ciszewski, A., Kasai, K., Lasko, N., Orr, S. and Pitman, R. 2002, 'Smaller hippocampal volume predicts pathologic vulnerability to psychological trauma', *Nature Neuroscience*, vol. 5, pp. 1242-1247.

Glanville, G. 1991, *Romantic Beginnings*, Offenders Aid and Rehabilitation Services of South Australia Inc.: Adelaide.

Glass, D. 2014, *Investigation into the Rehabilitation and Reintegration of Prisoners in Victoria*, Victorian Ombudsman, Melbourne.

Gleick, J. 1987, *Chaos Making a New Science*, Penguin Books, New York.

Gogtay, N., Nugent, J., Herman, D., Ordonez, A., Greenstein, D., Hayashi, K., Clasen, L., Toga, A., Geidd, J., Rapoport, J. and Thompson, P. 2006, 'Dynamic mapping of normal human hippocampal development', *Hippocampus*, vol. 16, pp. 664-672.

Gold, J., Sullivan, M.W., Lewis, M. 2011, 'The relation between abuse and violent delinquency: The conversion of shame to blame in juvenile offenders', *Child Abuse and Neglect*, vol. 35, no. 7, pp. 459-467.

Goldstein, M. 1994, 'Decade of the brain: An agenda for the nineties', *Western Journal of Medicine*, vol. 161, no. 3, pp. 239-241.

Goldstein, R., Craig, A., Bechara, A., Garavan, H., Childress, A., Paulus, M. and Volkow, N. 2009, 'The neurocircuitry of impaired insight in drug addiction', *Trends in Cognitive Sciences*, vol. 13, no. 9, pp. 372-380.

Golub, M., Costa, L., Crofton, K., Frank, D., Fried, P., Gladen, B., Henderson, R., Liebelt, E., Lusskin, S., Marty, S., Rowland, A., Scialli, J. and Vore, M. 2005, 'NTP-CERHR Expert Panel Report on the reproductive and developmental toxicity of

amphetamine and methamphetamine', *Birth Defects Research Part B Developmental and Reproductive Toxicology*, vol. 74, pp.471-584.

Gottfredson, M. and Hirschi, T. 1990, *A General Theory of Crime*, Stanford University Press: Stanford, CA.

Gough, D., Oliver, S. and Thomas, J. 2012a, 'Introducing systematic reviews', in D. Gough, S. Oliver and J. Thomas (Ed.'s.), *An Introduction to Systematic Reviews*, SAGE Publications Limited: London, pp. 1-6.

Gough, D., Oliver, S. and Thomas, J. 2012b, 'Clarifying differences between review designs and methods', *Systematic Reviews Journal*, vol. 1, no. 1, pp. 28-36.

Gough, D. and Thomas, J. 2012, 'Commonality and diversity in reviews', in D. Gough, S. Oliver and J. Thomas (eds.), *An Introduction to Systematic Reviews*, SAGE Publications Limited: London, pp. 35-65.

Gover, A. 2002, 'The effects of child maltreatment on violent offending among institutionalized youth', *Violence and Victims*, vol. 17, no. 6, pp. 655-68.

Graham, N., Kimonis, E., Wasserman, A., Kline, S. 2012, 'Associations among childhood abuse and psychopathy facets in male sexual offenders', *Personality Disorders: Theory, Research, and Treatment*, vol. 3, no. 1, pp. 66-75.

Green, B., Furrer, C., Worcel, S., Burrus, S., Finigan, M. 2007, 'How effective are Family Treatment Drug Courts? Outcomes from a four-site national study', *Child Maltreatment*, vol. 12, no. 1, pp. 43-59.

Green, D. and McDermott, F. 2010, 'Social work from inside and between complex systems: Perspectives on person-in environment for today's social work', *British Journal of Social Work*, vol. 40, pp. 2414-2430.

Green, D. and Winik, D. 2010, 'Using random judge assignments to estimate the effects of incarceration and probation on recidivism among drug offenders', *Criminology*, vol. 48, no. 2, pp. 357-387.

Green, J. and Caracelli, V. 2003, 'Making pragmatic sense of mixed methods practice', in *Handbook of Mixed Methods in Social and Behavioural Research*, A. Tashakkori and C. Teddlie (ed.s), Sage, California, pp. 91-110.

Green J. and Cohen, J. 2004, 'For the law, neuroscience changes nothing and everything', *Philosophical Transactions of the Royal Society of London Series B – Biological Sciences*, vol. 359, no. 1451, pp. 1775-1785.

Green, S., Higgins, J., Alderson, P., Clarke, M., Mulrow, C. and Oxman, A. 2011, 'Chapter 1: Introduction', in J. Higgins and S. Green (eds.), *Cochrane Handbook for Systematic Reviews of Interventions*, version 5.1.0, The Cochrane Collaboration, available on-line from www.cochrane-handbook.org.

Greene, D. & Zaidel, E. 2011, 'Hemispheric differences in attentional orienting by social cues', *Neuropsychologia*, vol. 49, no. 1, pp. 61-68.

Greene, J. and Cohen, J. 2004, 'For the law, neuroscience changes nothing and everything', *Philosophical Transactions of the Royal Society B: Biological Sciences*, vol. 359, pp. 1775-1785.

Greenough, W., Black, J. and Wallace, C. 1987, 'Experience and brain development', *Child Development*, vol. 58, pp. 539-559.

Greenwald, R. 2002, *Trauma and Juvenile Delinquency: Theory, Research and Intervention*, The Haworth Maltreatment and Trauma Press: Birmingham, New York.

Gregersen, H. and Sailer, L. 1993, 'Chaos theory and its implications for social science research', *Human Relations*, vol. 46, no. 7, pp. 777-804.

Grella, C., Stein, J. and Greenwell, L. 2005, 'Associations among childhood trauma, adolescent problem behaviors, and adverse adult outcomes in substance-abusing women offenders', *Psychology of Addictive Behaviors*, vol. 19, no. 1, pp. 43-53.

Grogan-Kaylor, A., and Otis, M. D. 2003, 'The effect of childhood maltreatment on adult criminality: A tobit regression analysis', *Child Maltreatment*, vol. 8, no. 2, pp. 129–137.

- Groot, W. and van den Brink, H. 2010, 'The effects of education on crime', *Applied Economics*, vol. 42, no. 3, pp. 279-289.
- Gross, J. 2002, 'Emotion regulation: Affective, cognitive, and social consequences', *Psychophysiology*, vol. 39, pp. 281-291.
- Guilfoyle, M. 2013, 'Transforming rehabilitation: the end of the probation service', *Criminal Justice Matters*, vol. 92, no. 1, pp. 38-39.
- Haapasalo, J. and Moilanen, J. 2004, 'Official and self-reported childhood abuse and adult crime of young offenders', *Criminal Justice and Behavior*, vol. 31, no. 2, pp. 127-148.
- Haase, J. and Myers, S. 1988, 'Reconciling paradigm assumptions of qualitative and quantitative research', *Western Journal of Nursing Research*, vol. 10, no. 2, pp. 128-137.
- Haidt, J. 2011, *The Bright Future of Post-Partisan Social Psychology*, talk given at the Annual Meeting of the Society for Personality and Social Psychology, San Antonio, 27 January 2011.
- Haidt, J. 2012, *The Righteous Mind: Why Good People are Divided by Politics and Religion*, Pantheon Books, New York.
- Hämäläinen, T. and Haapasalo, J. 1996, 'Retrospective reports of childhood abuse and neglect among violent and property offenders', *Psychology, Crime & Law*, vol. 3, pp. 1-13.
- Hamilton, C. E., Falshaw, L., and Browne, K. D. 2002, 'The link between recurrent maltreatment and offending behaviour', *International Journal of Offender Therapy and Comparative Criminology*, vol. 46, no. 1, pp. 75-94.
- Hamilton, J. and Gotlib, I. 2008, 'Neural substrates of increased memory sensitivity for negative stimuli in major depression', *Biological Psychiatry*, vol. 63, pp. 1155-1162.
- Haney, C. 2012, 'Prison effects of in the age of mass incarceration', *The Prison Journal*, vol. 20, no. 10, pp. 1-24.

Hannam, H. 7 July 2013, 'Current issues in delivering Indigenous justice: Challenges for the courts', presentation at the AIJA Indigenous Justice Conference, available online: www.ajja.org.au.

Hanson, J., Adluru, N., Chung, M., Alexander, A., Davidson, R. and Pollak, S. 2013, 'Early neglect is associated with alterations in white matter integrity and cognitive functioning', *Child Development*, vol. 84, no. 5, pp. 1566-1578.

Hargreaves, J. 2009. 'Beyond rehab: Where does the prison fit?', *Current Issues in Criminal Justice*, vol. 21, pp. 148–153

Harkin, K., Fletcher, B. and O'Brien, B. 2007, *Adult CARDS: Final Evaluation Report*, Office of Crime Statistics and Research: Adelaide.

Harmon-Jones, E. 2003, 'Clarifying the emotive functions of asymmetrical frontal cortical activity', *Psychophysiology*, vol. 40, no. 6, pp. 838–848.

Harmon-Jones, E. 2007, 'Trait anger predicts relative left frontal cortical activation to anger-inducing stimuli', *International Journal of Psychophysiology*, vol. 66, no. 2, pp. 154–160.

Harmon-Jones, E. and Allen, J. 1998, 'Anger and frontal brain activity: EEG asymmetry consistent with approach motivation despite negative affective valence', *Journal of Personality and Social Psychology*, vol. 74, no. 5, pp. 1310–1316.

Harmon-Jones, E., Sigelman, J. 2001, 'State anger and prefrontal brain activity: evidence that insult-related relative left-prefrontal activation is associated with experienced anger and aggression', *Journal of Personality and Social Psychology*, vol. 80, no. 5, pp. 797–803.

Hart, J., Gunnar, M., and Cicchetti, D. 1995, 'Salivary cortisol in maltreated children: Evidence of relations between neuroendocrine activity and social competence', *Development and Psychopathology*, vol. 7, no. 1, pp. 11-26.

Hart, J., Gunnar, M., and Cicchetti, D. 1996, 'Altered neuroendocrine activity in maltreated children related to symptoms of depression', *Development and Psychopathology*, vol. 8, no. 1, pp. 201-214.

Hartley, C. and Phelps, E. 2010, 'Changing fear: the neurocircuitry of emotion regulation', *Neuropsychendocrinology*, vol. 35, no. 1, pp. 136-146.

Harvey, D. and Reed, M. 1997, 'Social sciences as the study of complex systems', in *Chaos Theory in the Social Sciences: Foundations and Applications*, L. Kiel and E. Elliot (Ed's), University of Michigan Press, Michigan.

Head, B. and Alford, J. 2008, *Wicked Problems: The Implications for Public Management*, Paper presented for the Panel on Public Management in Practice, International Research Society for Public Management, 12th Annual Conference, 26-28 March 2008, Brisbane.

Healey, K. 2009, 'Parole Board Sends Them Packing in Record Numbers', *Herald Sun*, 24 August, p. 14.

Healy, K. *Social Work Theories in Context: Creating Frameworks for Practice*, Palgrave, England.

Heatherton, T. and Wagner, D. 2011, 'Cognitive neuroscience of self-regulation failure', *Trends in Cognitive Science*, vol. 15, no. 3, pp. 132-139.

Hecht, D. 2014, 'Cerebral lateralization of pro- and anti-social tendencies', *Experimental Neurobiology*, vol. 23, no. 1, pp. 1-27.

Heck, C. and Walsh, 2000, 'The effects of maltreatment and family structure on minor and serious delinquency', *International Journal of Offender Therapy and Comparative Criminology*, vol. 44, no. 2, pp. 178-193.

Heide, K. and Solomon, E. 2009, 'Female juvenile murderers: Biological and psychological dynamics leading to homicide', *International Journal of Law and Psychiatry*, vol. 32, no. 4, pp. 244-252.

Heilpern, D. 2006, 'A view from the bench', in *Crime in Rural Australia*, E. Barclay, J. Donnemeyer, J. Scott and R. Hogg (Ed.'s), Federation Press, Annandale, NSW.

Heim, C., Ehlert, U. and Hellhammer, D. 2000, 'The potential role of hypocortisolism in the pathophysiology of stress-related bodily disorders', *Psychoneuroendocrinology*, vol. 25, no. 1, pp. 1-35.

Heim, C. and Nemeroff, C. 2009, 'Neurobiology of posttraumatic stress disorder', *CNS Spectrums*, vol. 14, no. 1, pp. 13-24.

Heim, C., Newport, D., Heit, S., Graham, Y., Wilcox, M., Bonsall, R., Miller, A. and Nemeroff, C. 2000, 'Pituitary-adrenal and autonomic responses to stress in women after sexual and physical abuse in childhood', *Journal of the American Medical Association*, vol. 284, no. 5, pp. 592-597.

Heim, C., Newport, D., Wagner, D., Wilcox, M., Miller, A., Nemeroff, C. 2002, 'The role of early adverse experience and adulthood stress in the prediction of neuroendocrine stress reactivity in women: A multiple regression analysis', *Depression and Anxiety*, vol. 15, no. 3, pp. 117-125.

Heim, C., Newport, D., Bonsall, R., Miller, A. and Nemeroff, C. 2001, 'Altered pituitary-adrenal axis responses to provocative challenge tests in adult survivors of childhood abuse', *American Journal of Psychiatry*, vol. 158, no. 4, pp. 575-581.

Her Majesty's Government. 2013, *Working Together to Safeguard Children: A Guide to Inter-Agency Working to Safeguard and Promote the Welfare of Children*, HM Government: London, available on-line: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/281368/Working_together_to_safeguard_children.pdf

Hernandez, P., Herz, D. and Ryan, J. 2007, 'Developmental trajectories of offending for male adolescents leaving foster care', *Social Work Research*, vol. 31, no. 2, pp. 83-93.

Heseltine, K., Day, A. and Sarre, R. 2011, *Prison-Based Correctional Offender Rehabilitation Programs: The 2009 National Picture in Australia*, AIC Research and Public Policy Series 112, AIC, Canberra.

Hess, W. 1954, *Diencephalon: Autonomic and Extrapyramidal Functions*, Grune & Stratton, New York.

Higgins, J. and Green, S. (editors) *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.

Hilborn, R. 2004, 'Sea gulls, butterflies, and grasshoppers: A brief history of the butterfly effect in nonlinear dynamics', *American Journal of Physics*, vol. 72, pp. 425-427.

Hildyard, K. and Wolfe, D. 2002, 'Child neglect: developmental issues and outcomes', *Child Abuse and Neglect*, vol. 26, pp. 679-695.

Hiraishi, H., Haida, M., Matsumoto, M., Hayakawa, N., Inomata, S. and Matsumoto, H. 2012, 'Differences of prefrontal cortex activity between picture-based personality tests: a near-infrared spectroscopy study', *Journal of Personality Assessment*, vol. 94, no. 4, pp. 366-371.

Hirschi, T. 1969, *Causes of delinquency*. Berkeley and Los Angeles: University of California Press.

Hochstetler, A., Murphy, D. and Simons, R. 2004, 'Damaged goods: exploring predictors of distress in prison inmates', *Crime and Delinquency*, vol. 50, no. 3, pp. 436-457.

Holderhead, S. 2 July 2015, 'Prison capacity crisis forces South Australia Corrections Department 'to break the law' at City Watch House', *The Advertiser*, online: www.adelaidenow.com.au.

Horn, D. 2005, 'Performing criminal anthropology: Science, popular wisdom, and the body', in *Anthropologies of Modernity: Foucault, Governmentality, and Life Politics*, J. Inchausti (Ed.), Blackwell Publishing Ltd.: Oxford.

Hosser, D., Raddatz, S. and Windzio, M. 2007, 'Child maltreatment, revictimisation, and violent behaviour', *Violence and Victims*, vol. 22, no. 3, pp. 318-333.

House of Commons Education Committee. 2012, *Children First: The Child Protection System in England*, Fourth Report of Session 2012-2013, vol. 1, HC137, House of Commons: London.

Huang, Y., Cate, S., Battistuzzi, C., Oquendo, M., Brent, D. and Mann, J. 2004, 'An association between a functional polymorphism in the monoamine oxidase A gene promoter, impulsive traits and early abuse experiences', *Neuropsychopharmacology*, vol. 29, no. 8, pp. 1498-1505.

Hubel, D. and Wiesel, T. 1998, 'Early exploration of the visual cortex', *Neuron*, vol. 20, no. 3, pp. 401-412.

Hubel, D., Wiesel, T. and LeVay, S. 1977, 'Plasticity of ocular dominance columns in monkey striate cortex', *Philosophical Transactions of the Royal Society of London. Series B. Biological Sciences*, vol. 278, no. 961, pp. 377-409.

Hudson, C. 2000, 'At the edge of chaos: A new paradigm for social work?', *Journal of Social Work Education*, vol. 36, no. 2, pp. 215-230.

Human Rights Law Centre. 2015, *Investigation into the Rehabilitation and Reintegration of Prisoners in Victoria: Submission to the Victorian Ombudsman*, HRLC, Melbourne.

Ikonomidou, C., Bittigau, P., Ishimaru, M., Wozniak, D., Koch, C., Genz, K., Price, M., Stefovskaja, V., Hörster, F., Tenkova, T., Dikranian, K. and Olney, J. 2000, 'Ethanol-induced apoptotic neurodegeneration and Fetal Alcohol Syndrome', *Science*, vol. 287, pp. 1056-1060.

International Federation of Social Work, June 2012, www.ifsw.org/policies/definition-of-social-work.

Ireland, T., Smith, C. and Thornberry, T. 2002, 'Developmental issues in the impact of child maltreatment on later delinquency and drug use', *Criminology*, vol. 40, no. 2, pp. 359-399.

Ito, Y., Teicher, M., Glod, C. and Ackerman, E. 1998, 'Preliminary evidence for aberrant cortical development in abused children: A quantitative EEG study', *Journal of Neuropsychiatry and Clinical Neurosciences*, vol. 10, no. 3, pp. 298-307.

Jacobson, S. and Marcus, E. 2011, *Neuroanatomy for the Neuroscientist*, Springer: New York.

Jackowski, A., Perera, T., Abdallah, C., Garrido, G., Tang, C., Martinez, J., Mathew, S., Gorman, J., Rosenblum, L., Smith, E., Dwork, A., Shungu, D., Kaffman, A., Gelernter, J., Coplan, J., and Kaufman, J. 2011, 'Early-life stress, corpus callosum development, hippocampal volumetrics, and anxious behavior in male nonhuman primates', *Psychiatry Research: Neuroimaging*, vol. 192, no. 1, pp. 37-44.

- Jones, C. and Novak, T. 2013, "'We don't want to be ashamed tomorrow': Poverty, inequality and the challenge to social workers, in *Critical and Radical Debates in Social Work*, I. Ferguson, and M. Lavalette (Ed.'s), Bristol Policy Press, Bristol.
- Kaliski, S. 2009, ' "My brain made me do it" – how neuroscience may change the insanity defence', *South African Journal of Psychiatry*, vol. 15, no. 1, pp. 4-6.
- Kandel, E. 1998, 'A new intellectual framework for psychiatry', *American Journal of Psychiatry*, vol. 155, pp. 457-469.
- Kandel, E., Schwartz, J., Jessell, T., Siegelbaum, S., Hudspeth, A. 2000, *Principles of Neuroscience*, 4th edn., McGraw-Hill, New York.
- Karls, J. and Wandrei, K. 1992, 'PIE: A new language for social work', *Social Work*, vol. 37, no. 1, pp. 80-85.
- Kasteiner, W. 2004, 'Testing the limits of trauma: The long-term psychological effects of the Holocaust on individuals and collectives', *History of the Human Sciences*, vol. 17, no. 2-3, pp. 97-123.
- Kauffman, S. 1995, *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity*, Oxford University Press, Oxford.
- Kaufman, J., Birmaher, B., Perel, J., Dahl, R., Moreci, P., Nelson, B., Wells, W. and Ryan, N. 1997, 'The corticotropin-releasing hormone challenge in depressed abused, depressed non-abused, and normal control children', *Biological Psychiatry*, vol. 42, no. 8, pp. 669-679.
- Kaufman, J., Plotsky, P., Nemeroff, C. and Charney, D. 2000, 'Effects of early adverse experiences on brain structure and function: Clinical implications', *Biological Psychiatry*, vol. 48, pp. 778-790.
- Kemali, D., Maj, M., Galderisi, S., Salvati, A., Starace, F., Valente, A., Pirozzi, R. 1987, 'Clinical, biological, and neuropsychological features associated with lateral ventricular enlargement in DSM-III schiziphrenic disorder', *Psychiatry Research*, vol. 21, no. 2, pp. 137-49.

Kemp, M. 9 October 2014, 'Crowding crisis worsens as criminals flood South Australian prisons', *The Advertiser*, online: www.adelaidenow.com.au.

Kempe, H., Silverman, F., Steele, B., Droegemueller, W. and Silver, H. 1962, 'The battered-child syndrome', *Journal of the American Medical Association*, vol. 181, no. 1, pp. 17-24.

Kendler, K., Bulik, C., Silberg, J., Hettema, J., Myers, J. and Prescott, C. 2000, 'Childhood sexual abuse and adult psychiatric and substance use disorders in women: an epidemiological and twin control analysis', *Archives of General Psychiatry*, vol. 57, no. 10, pp. 953-959.

Kenny, D.T., Lennings, C.J., Nelson, P.K. 2007, 'The mental health of young offenders serving orders in the community: Implications for rehabilitation', *Journal of Offender Rehabilitation*, vol. 45, no. 1-2, pp. 123-148.

Kern, S., Oakes, T., Stone, C., McAuliff, E., Kirschbaum, C. and Davidson, R. 2008, 'Glucose metabolic changes in the prefrontal cortex are associated with HPA axis response to a psychosocial stressor', *Psychoendoneuroendocrinology*, vol. 33, no. 4, pp. 517-529.

Keune, P., van der Heiden, L., Várkuti, B., Konicar, L., Veit, R. and Birbaumer, N. 2012, 'Prefrontal brain asymmetry and aggression in imprisoned violent offenders', *Neuroscience Letters*, vol. 515, no. 2, pp. 191-195.

Kiehl, K., Hare, R., McDonald, J., Brink, J. 1999, 'Semantic and affective processing in psychopaths: an event-related potential (ERP) study', *Psychophysiology*, vol. 36, no. 6, pp. 765-774.

Kimonis, E.R., Skeem, J.L., Edens, J.F., Douglas, K.S., Lilienfeld, S.O., Poythress, N.G. 2010, 'Suicidal and criminal behavior among female offenders: The role of abuse and psychopathology', *Journal of Personality Disorders*, vol. 24, no. 5, pp. 581-609.

Kingree, J., Phan, D. and Thompson, M. 2003, 'Child maltreatment and recidivism among adolescent detainees', *Criminal Justice and Behavior*, vol. 30, no. 6, pp. 623-643.

- Kirchbaum, C. and Hellhammer, D. 1994, 'Salivary cortisol in psychoneuroendocrine research: Recent developments and applications', *Psychoneuroendocrinology*, vol. 19, no. 4, pp. 313-333.
- Kliemann, D., Young, L., Scholz, J. and Saxe, R. 2008, 'The influence of prior record on moral judgment', *Neuropsychologia*, vol. 46, pp. 2949–2957.
- Klika, J., Herrenkohl, T. and Lee, J. 2013, 'School factors as moderators of the relationship between physical child abuse and pathways of antisocial behavior', *Journal of Interpersonal Violence*, vol. 28, no. 4, pp. 852-867.
- Koenen, K., Moffitt, T., Caspi, A., Taylor, A. and Purcell, S. 2003, 'Domestic violence is associated with environmental suppression of IQ in young children', *Development and Psychopathology*, vol. 15, no. 2, pp. 297-311.
- Kolb, B. and Fantie, B. 2009, 'Development of the child's brain and behavior', in *Handbook of Clinical Child Neuropsychology*, C. Reynolds and E. Fletcher-Janzen (Ed.'s), 3rd Edn., Springer: New York.
- Koob, G. and Le Moal, M. 2001, 'Drug addiction, dysregulation of reward, and allostasis', *Neuropsychopharmacology*, vol. 24, no. 2, pp. 97-129.
- Koomar, J. and Bundy, A. 2002, 'Creating direct intervention from theory', in *Sensory Integration Theory and Practice*, A. Bundy, S. Lane and E. Murray (Ed's), F.A. Davis: Philadelphia, pp. 261-308.
- Koster-Hale, J., Saxe, R., Dungan, J. and Young, L. 2013, 'Decoding moral judgments from neural representations of intentions', *Proceedings of the National Academy of Sciences of the United States*, vol. 110, no. 14, pp. 5648–5653.
- Koutsantonis, T. 2014, *2014-15 Budget Measures Statement*, Budget Paper 6, Department of Treasury and Finance, Adelaide.
- Kramer, R., Rajah, V. and Sung, H. 2013, 'Neoliberal prisons and cognitive treatment: Calibrating the subjectivity of incarcerated young men to economic inequalities', *Theoretical Criminology*, vol. 17, no. 4, pp. 535-556.

Krasnostein, S. and Freiberg, A. 2013, 'Pursuing consistency in an individualistic sentencing framework: if you know where you're going, how do you know when you've got there?', *Law and Contemporary Problems*, vol. 76, no. 1, pp.265-288.

Kubo, K., Okanoya, K. and Kawai, N. 2012, 'Apology isn't good enough: an apology suppresses an approach motivation but not the physiological and psychological anger', *PLoS One*, vol. 7, no. 3, p.e33006.

Kumari, V., Gudjonsson, G., Raghuvanshi, S., Barkataki, I., Taylor, P., Sumich, A., Das, K., Kuipers, E., Ffytche, D. and Das, M. 2013, 'Reduced thalamic volume in men with antisocial personality disorder or schizophrenia and a history of serious violence and childhood abuse', *European Psychiatry*, vol. 28, no. 4, pp. 225-234.

Kurmelovs, R. 28 April 2015, 'Crime and punishment: Women in Australian prisons', *Aljazeera*, online: www.aljazeera.com.

Kwiatkowski, M., Roos, A., Stein, D., Thomas, K. and Donald, K. 2014, 'Effects of prenatal methamphetamine exposure: A review of cognitive and neuroimaging studies', *Metabolic Brain Disease*, vol. 49, no. 2, pp. 245-254.

Lacombe, D. 1996, 'Reforming Foucault: a critique of the social control thesis', *British Journal of Sociology*, vol. 47, no. 2, pp. 332-352.

Ladd, C., Huot, R., Thrivikraman, K., Nemeroff, C., Meaney, M. and Plotsky, P. 2000, 'Long-term behavioral and neuroendocrine adaptations to adverse early experience', *Progress in Brain Research*, vol. 122, pp. 81-103.

Lake, E. 1993, 'An exploration of the violent victim experiences of female offenders', *Violence and Victims*, vol. 8, no. 1, pp. 41-51.

Lan, M. and Parsey, R. 2013, 'Chapter 28: Brain imaging', in *Clinical Handbook of the Management of Mood Disorders*, J. Mann (Ed.), Cambridge University Press, Cambridge, pp. 358-367.

Landecker, H. and Panofsky, A. 2013, 'From social structure to gene regulation, and back: A critical introduction to environmental epigenetics for sociology', *Annual Review of Sociology*, vol. 39, pp. 333-357.

Lappi-Seppälä, 2012, 'Criminology, crime and criminal justice in Finland', *European Journal of Criminology*, vol. 9, pp. 206-222.

Larsen, J. 2014, 'Restorative justice in the Australian criminal justice system', *AIC Reports: Research and Public Policy Series*, no. 127, Canberra: AIC.

Latimer, J., Morton-Bourgon, K. and Chrétien, J. 2006, *A Meta-Analytic Examination of Drug Treatment Courts: Do They Reduce Recidivism?*, Department of Justice: Research and Statistics Division: Canada.

Lauder, J. 1988, 'Neurotransmitters as morphogens', *Progress in Brain Research*, vol. 73, pp. 365-388.

Law Institute of Victoria. 2011, *Mandatory Minimum Sentencing*, Submission by the Law Institute of Victoria to Attorney-General Robert Clark, Law Institute of Victoria: Melbourne.

Lawson, A., Ahima, R., Krozowski, Z. and Harlan, R. 1992, 'Postnatal development of corticosteroid receptor immunoreactivity in the rat cerebellum and brain stem', *Neuroendocrinology*, vol. 55, pp. 695-707.

Lee, C. and White, H. 2012, 'Effects of childhood maltreatment on violent injuries and premature death during young adulthood among urban high-risk men', *Archives of Pediatrics and Adolescent Medicine*, vol. 166, no. 9, p. 814.

Leeb, R., Paulozzi, L., Melanson, C., Simon, T. and Arias, I. 2008, *Child Maltreatment Surveillance: Uniform Definitions for Public Health and Recommended Data Elements*, version 1.0, Centers for Disease Control and Prevention, National Centre for Injury Prevention and Control: Atlanta.

Lefmann, T. and Combs-Orme, T. 2013, 'Early brain development for social work practice: Integrating neuroscience with Piaget's theory of cognitive development', *Journal of Human Behavior in the Social Environment*, vol. 23, no. 5, pp. 640-647.

Legal and Constitutional Affairs Reference Committee (LCARC). 2013, *Value of a Justice Reinvestment Approach to Criminal Justice in Australia*, The Senate, Commonwealth of Australia: Canberra.

- Legal Institute of Victoria. 2010, *Mandatory Minimum Sentencing*, LIV, Melbourne.
- Lemmon, J. 1999, 'How child maltreatment affects dimensions of juvenile delinquency in a cohort of low-income urban youths', *Justice Quarterly*, vol. 16, no.2, pp. 357–376.
- Lemmon, J. 2006, 'The effects of maltreatment recurrence and child welfare services on dimensions of delinquency', *Criminal Justice Review*, vol. 31, no. 1, pp. 5-32.
- Lende, D. and Downey, G. 2012, 'Neuroanthropology and its applications: An introduction', *Annals of Anthropological Practice*, vol. 36, no. 1, pp. 1-25.
- Leoni, E. and McGaha, J. 1995, 'Family violence, abuse, and related family issues of incarcerated delinquents with alcoholic parents compared to those with non-alcoholic parents', *Adolescence*, vol. 30, no. 118, pp. 473-482.
- Levesque, R. 2009, *Child Maltreatment and the Law: Returning to First Principles*, Springer Science & Business Media, New York.
- Levine, D. 2004-05, 'Angels, devils, and censors in the brain', *Complexus*, vol. 2, pp. 1-25, doi:10.1159/0000XXXXXX.
- Levine, G. 2011, *A Study of Family Drug Treatment Courts in the United States and the United Kingdom: Giving Parents and Children the Best Chance of Reunification*, The Winston Churchill Memorial Trust of Australia: Melbourne.
- Levitt, P. 2003, 'Structural and functional maturation of the developing primate brain', *Journal of Pediatrics*, vol. 143, supplement 4, pp. S35-S45.
- Liepelt, R., Von Cramon, D. and Brass, M. 2008, 'How do we infer others' goals from non-stereotypic actions? The outcome of context-sensitive inferential processing in right inferior parietal and posterior temporal cortex', *NeuroImage*, vol. 43, pp. 784–792.
- Lim, L. and Day, A. 2013, 'Mental health diversion courts: Some directions for further development', *Psychiatry, Psychology and Law*, vol. 20, no. 1, pp.36-45.

Liu, D., Diorio, J., Tannenbaum, B., Caldji, C., Francis, D., Freedman, A., Sharma, S., Pearson, D., Plotsky, P. and Meaney, M. 1997, 'Maternal care, hippocampal glucocorticoid receptors, and hypothalamic-pituitary-adrenal responses to stress', *Science*, vol. 277, no. 5332, pp. 1659-1662.

Liu, J., Chaplin, T., Wang, F., Sinha, R., Mayes, L. and Blumberg, H. 2012, 'Stress reactivity and corticolimbic response to emotional faces in adolescents', *Journal of the American Academy of Child and Adolescent Psychiatry*, vol. 51, no. 3, pp. 304-312.

Lochner, L. and Moretti, E. 2004, 'The effect of education on crime: Evidence from prison inmates, arrests and self-reports', *American Economic Review*, vol. 94, no. 1, pp. 155-189.

Lombroso, C. 1876, 'L'uomo delinquente in rapporto all'antropologia, alla giurisprudenza et alle discipline carcerare' [The delinquent in anthropological, jurisprudential and medical views], Hoepli: Milano.

Long, R., Mathews, M. and White, M. 1999, 'Why study the complexity sciences in the social sciences', *Human Relations*, vol. 52, no. 4, pp. 439-441.

Longshore, D., Turner, S., Wenzel, S., Morral, A., Harrell, A., McBride, D., Deschenes, E. and Iguchi, M. 2001, 'Drug courts: A conceptual framework', *Journal of Drug Issues*, vol. 31, no.1, pp. 7-26.

Lorenz, E.N. 1972, *Predictability: Does the Flap of a Butterfly's Wings in Brazil Set Off a Tornado in Texas?*, talk presented at the 139th Annual Meeting of the American Association for the Advancement of Science (29 December 1972).

Lowe, A. 2011, 'Ill Hinch Courts Home Detention', *The Age*, 22 June, p. 7.

Lowe, A. 2012, '“Trial by social media” worry in Meagher case', *The Age*, 28 September 2012, online.

Loxley, W., Toumbourou, J., Stockwell, T., Haines, B., Scott, K., Godfrey, C., Waters, E., Patton, G., Fordham, R., Gray, D., Marshall, J., Ryder, D., Siggers, S., Sanci, L. and Williams, J. 2004, *The Prevention of Substance Use, Risk and Harm in Australia: A Review of the Evidence*, National Drug Research Institute and Centre for Adolescent Health: Canberra.

Luethi, M., Meier, B. and Sandi, C. 2009, 'Stress effects on working memory, explicit memory, and implicit memory for neutral and emotional stimuli in healthy men', *Frontiers in Behavioral Neuroscience*, vol. 15, pp. 1-9.

Lupien, S., Gillin, C. and Hauger, R. 1999, 'Working memory is more sensitive than declarative memory to the acute effects of corticosteroids: A dose-response study in humans', *Behavioral Neuroscience*, vol. 113, no. 3, pp. 420-430.

Lupien, S., McEwen, B., Gunnar, M. and Heim, C. 2009, 'Effects of stress throughout the lifespan on the brain, behaviour and cognition', *Nature Reviews*, vol. 10, no. 6, pp. 434-445.

Macmillan, R. 2001, 'Violence and the life course: The consequences of victimization for personal and social development', *Annual Review of Sociology*, vol. 27, pp. 1-22.

Magistrates' Court of Victoria. 2012, *Drug Court*, available online: <https://www.magistratescourt.vic.gov.au/jurisdictions/specialist-jurisdictions/drug-court>, accessed 31 May 2014.

Magistrates' Court of Victoria. 2013, *Annual Report 2012/13*, Magistrates' Court of Victoria: Melbourne.

Maguire, M. 2012, 'Response 1: Big Society, the voluntary sector and the marketization of criminal justice', *Criminology and Criminal Justice*, vol. 12, no. 5, pp. 483-494.

Maheu, F., Dozier, M., Guyer, A., Mandell, D., Peloso, E., Poeth, K., Jenness, J., Lau, J., Ackerman, J., Pine, D. and Ernst, M. 2010, 'A preliminary study of medial temporal lobe function in youths with a history of caregiver deprivation and emotional neglect', *Cognitive, Affective and Behavioral Neuroscience*, vol. 10, no. 1, pp. 34-49.

Majer, M., Nater, U., Lin, J., Capuron, L. and Reeves, W. 2010, 'Association of childhood trauma with cognitive function in healthy adults: a pilot study', *BMC Neurology*, vol. 10, no.1, p. 61.

Makkai, T. and Veraar, K. 2003, *Final Report on the South East Queensland Drug Court*, Technical and Background Paper Series No. 6, AIC, Canberra.

Maltz, M. 1984, *Recidivism*, Academic Press Incorporated: Orlando, Florida.

Mangold, D., Wand, G., Javors, M. and Mintz, J. 'Acculturation, childhood trauma and the cortisol awakening response in Mexican-American adults', *Hormones and Behavior*, vol. 58, no. 4, pp. 637-646.

Marcia, J. 2001, 'Identity in childhood and adolescence', *International Encyclopedia of the Social and Behavioral Sciences*, pp. 7159-7163.

Marinelli, M. and Piazza, P. 2002, 'Interaction between glucocorticoid hormones, stress and psychostimulant drugs', *European Journal of Neuroscience*, vol. 16, no. 3, pp. 387-394.

Marks, R. 2015, *Crime and Punishment: Offenders and Victims in a Broken Justice System*, Blank Inc., Collingwood.

Martin, E. 2010, 'Self-making and the brain', *Subjectivity*, vol. 3, no. 4, pp. 366-381.

Martinson, R. 1974, 'What works? – Questions and answers about prison reform', *The Public Interest*, vol. 35, pp. 22-54.

Maruna, S. and Copes, H. 2005, 'What have we learned in five decades of neutralization research?' *Crime and Justice: A Review of Research*, vol. 32, no. 221-320.

Maruna, S. and Mann, R. 2006, 'A fundamental attribution error? Rethinking cognitive distortions', *Legal and Criminological Psychology*, vol. 11, pp. 155-177.

Mason, P. 2006, 'Lies, distortion and what doesn't work: monitoring prison stories in the British Media', *Crime Media Culture*, vol. 2, no. 3, pp. 251-267.

Mason, R. 2011, 'Confronting uncertainty: Lessons from rural social work', *Australian Social Work*, vol. 64, no. 3, pp. 377-394.

Mathiesen, T. 1995, *Driving forces Behind Prison Growth; the Mass Media*, Paper presented at the International Conference on Prison Growth, Oslo, Norway, April, 1995.

Matsuo, K., Nicoletti, M., Nemoto, K., Hatch, J., Peluso, M., Nery, F. and Soares, J. 2009, 'A voxel-based morphometry study of frontal grey matter correlates of impulsivity', *Human Brain Mapping*, vol. 30, pp. 1188-1195.

Matthews, K. and Robbins, T. 2003, 'Early experience as a determinant of adult behavioural responses to rewards: the effects of repeated maternal separation in the rat', *Neuroscience and Biobehavioral Reviews*, vol. 27, pp. 45-55.

Matthiesen, T. 1995, *Driving Forces Behind Prison Growth: The Mass Media*, paper presented to the *International Conference on Prison Growth*, Oslo, Norway.

Matto, H. and Strolin-Goltzman, J. 2010, 'Integrating social neuroscience and social work: Innovations for advancing practice-based research', *Social Work*, vol. 55, no. 2, pp.147-156.

Mazerolle, P. and Legosz, M. 2007, *Breaking the Cycle: A Study of Victimisation and Violence in the Lives of Non-Custodial Offenders*, Crime and Misconduct Commission, Brisbane.

McCabe, D. and Castel, A. 2008, 'Seeing is believing: the effect of brain images on judgements of scientific reasoning', *Cognition*, vol. 107, pp. 343.

McCrorry, E., DeBrito, S., Sebastian, C., Mechelli, A., Bird, G., Kelly, P. and Viding, E. 2011, 'Heightened neural reactivity to threat in child victims of family violence', *Current Biology*, vol. 21, no. 23, pp. R947-R948.

McBurnett, K., Lahey, B., Frick, P., Risch, C., Loeber, R., Hart, E., Christ, M. and Hanson, K. 1991, 'Anxiety, inhibition, and conduct disorder in children: II. Relation to salivary cortisol', *Journal of the American Academy of Child and Adolescent Psychiatry*, vol. 30, no.2, pp. 192-196.

McBurnett, K., Lahey, B., Rathouz, P. and Loeber, R. 2000, 'Low salivary cortisol and persistent aggression in boys referred for disruptive behavior', *Archives of General Psychiatry*, vol. 57, no. 1, pp. 38-43.

McDonnell, M. 24 November 2014, 'Reoffending on the rise, as Victoria lags on diversion', *Smart Justice*, on-line: available:

<https://smartjustice.wordpress.com/2014/11/24/reoffending-on-the-rise-as-victoria-lags-on-diversion/>.

McDonnell, M. and Farrell, J. 2012, 'Tough, tougher, toughest? A new government's approach to sentencing laws in Victoria', *Alternative Law Journal*, vol. 37, no. 4, pp. 238-243.

McEwen, B. 2000, 'Allostasis and allostatic load: Implications for neuropsychopharmacology', *Neuropsychopharmacology*, vol. 22, no. 2, pp. 108-124.

McNeill, F. 2012, 'Four forms of 'offender' rehabilitation: towards an interdisciplinary perspective', *Legal and Criminological Psychology*, vol. 17, no. 1, 18-36.

Mears, D. and Bales, W. 2009, 'Supermax incarceration and recidivism', *Criminology*, vol. 47, no. 4, pp. 1131-1166.

Medrano, M., Hatch, J., Zule, W. and Desmond, D. 2003, 'Childhood trauma and adult prostitution behavior in a multiethnic heterosexual drug-using population', *The American Journal of Drug and Alcohol Abuse*, vol. 29, no. 2, pp. 463-486.

Mehta, M., Golembo, N., Nosarti, C., Colvert, E., Mota, A., Williams, S., Rutter, M. and Sonuga-Barke, E. 2009, 'Amygdala, hippocampal and corpus callosum size following severe early institutional deprivation: The English and Romanian Adoptees Study Pilot', *Journal of Child Psychology and Psychiatry*, vol. 50, no. 8, pp. 943-951.

Meloni, M. 2014, 'Biology without biologism: Social theory in a postgenomic age', *Sociology*, vol. 48, no. 4, pp. 731-746.

Mennen, F., Kim, K., Sang, J. and Trickett, P. 2010, 'Child neglect: Definition and identification of youth's experiences in official reports of maltreatment', *Child Abuse and Neglect*, vol. 34, no. 9, pp. 647-658.

Mersky, J., Topitzes, J. and Reynolds, A. 2012, 'Unsafe at any age: Linking childhood and adolescent maltreatment to delinquency and crime', *Journal of Research in Crime and Delinquency*, vol. 49, no. 2, pp. 295-318.

Mersky, J. and Topitzes, J. 2010, 'Comparing early adult outcomes of maltreated and non-maltreated children: A prospective longitudinal investigation', *Children and Youth Services Review*, vol. 32, no. 8, pp. 1086-1096.

Mersky, J.P., Topitzes, J. and Reynolds, A.J. 2012, 'Unsafe at any age: Linking childhood and adolescent maltreatment to delinquency and crime', *Journal of Research in Crime and Delinquency*, vol. 49, no. 2, pp. 295-318.

Meynen, G. 2013, 'A neurolaw perspective on psychiatric assessments of criminal responsibility: Decision-making, mental disorder, and the brain', *International Journal of Law and Psychiatry*, vol. 36, pp. 93-99.

Mickelborough, P. 2010, 'Leafy Suburbs Home of Crime', *Herald Sun*, 15 February, online, available: <http://www.heraldsun.com.au/news/victoria/leafy-suburbs-home-of-crime/story-e6frf7kx-1225827617909>

Milad, M. and Quirk, G. 2002, 'Neurons in medial prefrontal cortex signal memory for fear extinction', *Nature*, vol. 420, pp. 70-74.

Miller, G. and Chen, E. 2007, 'Unfavorable socioeconomic conditions in early life presage expression of proinflammatory phenotype in adolescence', *Psychosomatic Medicine*, vol. 69, no. 5, pp. 402-409.

Miller, G., Chen, E. and Parker, K. 2011, 'Psychological stress in childhood and susceptibility to the chronic diseases of aging' *Psychological Bulletin*, vol. 137, no. 6, pp. 959-997.

Miller, J., Kinnally, E., Ogden, R., Oquendo, M., Mann, J. and Parsey, R. 2009, 'Reported childhood abuse is associated with low serotonin transporter binding in vivo in major depressive disorder', *Synapse*, vol. 63, no. 7, pp. 565-573.

Miller, L. and Summers, C. 2001, 'Clinical applications in sensory modulation dysfunction: assessment and intervention considerations', in *Understanding the Nature of Sensory Integration in Diverse Populations*, S. Roley, E. Blanche and R. Schaafs (Ed.'s), Charles C. Thomas: Springfield.

Miller, S., Miller, C., Bloom, J., Hynd, G. and Craggs, J. 2006, 'Right hemisphere brain morphology, attention-deficit hyperactivity disorder (ADHD) subtype, and social comprehension', *Journal of Child Neurology*, vol. 21, no. 2, pp. 139-144.

Mills, A., Meek, R. and Gojkovic, D. 2012, 'Partners, guests or competitors: Relationships between criminal justice and third sector staff in prisons', *Probation Journal*, vol. 59, no. 4, pp. 391-405.

Milner, B. 1966, 'Amnesia following operation on the temporal lobes', in *Amnesia*, C. Whitty and O. Zangwill (eds.), Butterworths: London, pp. 109-133.

Ministry of Justice. 2010, *Breaking the Cycle: Effective Punishment, Rehabilitation and Sentencing of Offenders*, London: Ministry of Justice.

Ministry of Justice. January 2013, *Transforming Rehabilitation: A Revolution in the Way We Manage Offenders*, Consultation paper CP1/2013, Ministry of Justice: London.

Mitchell, D., Wilson, D., Eggers, A. and MacKenzie, D. 2012, 'Assessing the effectiveness of drug courts on recidivism: A meta-analytic review of traditional and non-traditional drug courts', *Journal of Criminal Justice*, vol. 40, pp. 60-71.

Moffett, M., Vicentic, A., Kozal, M., Plotsky, P., Francis, D. and Kuhar, M. 2007, 'Maternal separation alters drug intake patterns in adulthood in rats', *Biochemical Pharmacology*, vol. 73, no. 3, pp. 321-330.

Moffitt, T. 1993, 'Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy', *Psychological Review*, vol. 100, no. 4, pp. 674-701.

Moghaddam, B., Bolinao, M., Stein-Behrens, B. and Sapolsky, R. 1994, 'Glucocorticoids mediate the stress-induced extracellular accumulation of glutamate', *Brain Research*, vol. 655, no. 1-2, pp. 251-254.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. 2009, 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement', *Public Library of Science Medicine*, vol. 6, no. 7, e1000097.

Monterosso, S. 2009, 'Punitive criminal justice in contemporary society', *Law and Justice Journal*, vol. 9, no. 1, pp.13-25.

Montgomery, A. 2013, 'Toward the integration of neuroscience and clinical social work', *Journal of Social Work Practice: Psychotherapeutic Approaches in Health, Welfare and the Community*, vol. 27, no. 3, pp. 333-339.

Moore, M. 1 December 2001, 'The role of Specialist Courts – an Australian perspective', (FCA) [2001], *Federal Judicial Scholarship*, vol. 11.

Morris, M., Compas, B. and Garber, J. 2012, 'Relations among posttraumatic stress disorder, comorbid major depression, and HPA function: A systematic review and meta-analysis', *Clinical Psychology Review*, vol. 32, no. 4, pp. 301-315.

Morris-Marr, L. 25 July 2015, 'Dame Phyllis Frost Centre is a melting pot of rage, reflection, recompense and rehabilitation', *Sunday Herald Sun*, online: www.heraldsun.com.au.

Morrison, A., Frame, L. and Larkin, W. 2003, 'Relationships between trauma and psychosis: A review and integration', *British Journal of Clinical Psychology*, vol. 42, pp. 331-353.

Moss, H. Vanyukov, M. and Martin, C. 1995, 'Salivary cortisol responses and the risk for substance abuse in prepubertal boys', *Biological Psychiatry*, vol. 38, no. 8, pp. 547-555.

Murphy, P. 2009, 'Assaults Head Surge in Mayhem', *Herald Sun*, 10 August, p. 4.

Nagin, D., Cullen, F. and Jonson, C. 2009, 'Imprisonment and reoffending', *Crime and Justice*, vol. 38, pp. 115-200.

Nagin, D. and Snodgrass, G. 2010, *The Effect of Incarceration on Recidivism*, paper presented at the annual meeting of the American Society of Criminology, San Francisco.

Napthine, D. and O'Brien, M. 6 May 2014, *Coalition Government 2014-2015: Victorian State Budget is Building a Better Victoria*, Victorian Government: Melbourne, available: www.premier.vic.gov.au.

National Association of Community Legal Centres (NACLC). 2013, *Inquiry into the Value of a Justice Reinvestment Approach to Criminal Justice in Australia*, Submission to the Senate Standing Committee on Legal and Constitutional Affairs: Sydney.

Nature Editorial Group. 2012, 'Life stress', *Nature*, vol. 490, p.143.

Naylor, B. 2014, 'Australia's growing prison crisis', *The 2014 Castan Centre Human Rights Report*, Monash University, Melbourne.

Neighbourhood Justice Centre. 2010, *Evaluating the Neighbourhood Justice Centre in Yarra: 2007-2009*, Victorian Government Department of Justice: Melbourne.

Nelson, C., Furtado, E., Fox, N. and Zeanah, C. 2009, 'The deprived human brain: developmental deficits among institutionalized Romanian children – and later improvements – strengthen the case for individualized care', *American Scientist*, vol. 97, no. 3, pp. 222-229.

Neuman, L. 2011, *Social Research Methods: Qualitative and Quantitative Approaches*, Allyn & Bacon, Boston.

New South Wales Law Reform Commission. 2013, *Sentencing – Patterns and Statistics*, Report 139-A, NSWLRC: Sydney.

Nieuwebeerta, P., Nagin, D. and Blokland, A. 2009, 'The relationship between first imprisonment and criminal career development: A matched samples comparison', *Journal of Quantitative Criminology*, vol. 25, pp. 227-257.

Nofziger, S. and Kurtz, D. 2005, 'Violent lives: A lifestyle model linking exposure to violence to juvenile violent offending', *Crime and Delinquency*, vol. 42, no. 1, pp. 3-26.

Northern Territory Office for Crime Prevention. 2003, *Mandatory Sentencing for Adult Property Offenders: The Northern Territory Experience*, Based on a Presentation to the Australian and New Zealand Society of Criminology Conference 2003, available on-line:
http://www.nt.gov.au/justice/policycoord/documents/statistics/mandatory_sentencing_nt_experience_20031201.pdf.

Novak, I. 2011, *Science: A Many-Splendid Thing*, World Scientific Publishing Company, Singapore.

Nutt, D., Lingford-Hughes, A. and Nester, L. 2012, 'Brain imaging in addiction', in *Addiction Neuroethics*, A. Carter, W. Hall and J. Illes (Ed.'s), Elsevier, Sydney, pp. 3-25.

Nyamathi, A., Marlow, E., Zhang, S., Hall, E., Farabee, D., Marfisee, M., Khalilifard, F., Faucette, M., Leake, B. 2012, 'Correlates of serious violent crime for recently released parolees with a history of homelessness', *Violence and Victims*, vol. 27, no. 5, pp. 793-810.

Oakley, A. 2004, 'The researcher's agenda for evidence', *Evaluation and Research in Education*, vol. 18, no. 1-2, pp.12-27.

Oaks, D. 18 December 2012, 'Websites blamed for attack fears', *The Age*.

Ochsner, K., Silvers, J., Buhle, J. 2012, 'Functional imaging studies of emotion regulation: A synthetic review and evolving model of the cognitive control of emotion', *Annals of the New York Academy of Science*, vol. 125: e1-e24.

O'Connor, T., Rutter, M., Beckett, C., Keaveney, L., Kreppner, J. and the English and Romanian Adoptees Study Team. 2000, 'The effects of global severe privation on cognitive competence: extension and longitudinal follow-up', *Child Development*, vol. 71, no. 2, pp. 376-390.

O'Donnell, M., Scott, D. and Stanley, F. 2007, 'Child abuse and neglect – is it time for a public health approach?', *Australian and New Zealand Journal of Public Health*, v. 32, no. 4, pp. 325-330.

Oei, J., Abdel-Letif, M., Clark, R., Craig, F. and Lui, K. 2010, 'Short-term outcomes of mothers and infants exposed to antenatal amphetamines', *Archives of Disease in Childhood. Fetal and Neonatal Edition*, vol. 95, no. 1, pp. 36-41.

Ogloff, J. 2002, 'Offender rehabilitation: From "nothing works" to "what next"?', *Australian Psychologist*, vol. 37, no. 3, pp. 245–252.

Ogloff, J. and Davis, M. 2004, 'Advances in offender assessment and rehabilitation: contributions of the risk-needs-responsivity approach', *Psychology, Crime and Law*, vol. 10, no. 3, pp. 229-242.

Olney, J., Wozniak, D., Jevtovic-Todorovic, V., Faber, N., Bittigau, P. and Ikonomidou, C. 2002, 'Drug-induced apoptotic neurodegeneration in the developing brain', *Brain Pathology*, vol. 12, no. 4, pp. 488-98.

Olson, D., Lurigio, A. and Albertson, S. 2001, 'Implementing the key components of specialized drug treatment courts: Practice and policy considerations', *Law & Policy*, vol. 23, no. 2, pp. 171-196.

Ono, M., Fujita, M. and Yamada, S. 2012, 'Physiological and psychological responses induced by expressing empathy with others', *Japan Journal of Nursing Science*, vol. 9, no. 1, pp. 56-62.

Oriol-Granado, X., Sala-Roca, J. and Gulu, G.F. 2014, 'Juvenile delinquency in youths from residential care', *European Journal of Social Work*, DOI: 10.1080/13691457.2014.892475.

Ornoy, A. and Ergaz, Z. 2010, 'Alcohol abuse in pregnant women: Effects on the fetus and newborn, mode of action and maternal treatment', *International Journal of Environmental Research and Public Health*, vol. 7, no. 2, pp.364-379.

Ortigue, S., King, D., Gazzaniga, M., Miller, M. and Grafton, S. 2009, 'Right hemisphere dominance for understanding the intentions of others: evidence from a split-brain patient', *BMJ Case Report 2009*, vol. 2009.

Ortigue, S., King, D., Gazzaniga, M., Miller, M. and Grafton, S. 2010, 'Understanding actions of others: the electrodynamics of the left and right hemispheres. A high-density EEG neuroimaging study', *PLoS One*, vol. 5, no. 8, pp. e12160.

Owen, A., Sahakian, B., Demple, J., Polkey, C. and Robbins, T. 1995, 'Visual-spatial short-term recognition memory and learning after temporal lobe excisions or amygdalo-hippocampectomy in man', *Neuropsychologia*, vol. 33, no. 1, pp. 1-24.

- Owens, M. and Nemeroff, C. 1991, 'Physiology and pharmacology of corticotropin-releasing factor', *Pharmacological Review*, vol. 43, no. 4, pp. 425-473.
- Painter, K. and Scannapieco, M. 2013, 'Child maltreatment: The neurobiological aspects of posttraumatic stress disorder', *Journal of Evidence-Based Social Work*, vol. 10, no. 4, pp. 276-284.
- Pape, H., Rajeevan, T., Smid, J., Stork, O., Seidenbecher, T., Burgess, N and O'Keefe, J. 2005, 'Theta activity in neurons and networks of the amygdala related to long-term fear memory', *Hippocampus*, vol. 15, no. 7, pp. 874-880.
- Parton, N. 1994, ' "Problematics of government", (post) modernity and social work', *British Journal of Social Work*, vol. 24, no. 1, pp. 9-32.
- Parton, N. 2008, 'Changes in the form of knowledge in social work: From the "social" to the "informational" ' *British Journal of Social Work*, vol. 38, no. 2, pp. 253-269.
- Paus, T., Collins, D., Evans, A., Leonard, G., Pike, B. and Zijdenbos, A. 2001, 'Maturation of white matter in the human brain: A review of magnetic resonance studies', *Brain Research Bulletin*, vol. 54, no. 3, pp. 255-266.
- Pavlidis, C., Watanabe, Y. and McEwen B. 1993, 'Effects of glucocorticoids on hippocampal long-term potentiation', *Hippocampus*, vol. 3, no. 2, pp. 183-192.
- Pawson, R., Greenhalgh, T., Harvey, G. and Walshe, K. 2005, 'Realist review – a new method of systematic review designed for complex policy interventions', *Journal of Health Services Research and Policy*, vol. 10, suppl. 1, pp. 21-34.
- Payne, J. 2005, *Final Report on the North Queensland Drug Court*, Technical and Background Paper Series No. 17, AIC: Canberra.
- Payne, J. 2006, 'Specialty courts: current issues and future prospects', *Trends and Issues in Crime and Criminal Justice*, no. 317, AIC: Canberra.
- Payne, J. 2007, *Recidivism in Australia: Findings and Future Research*, Research and Public Policy Series, No. 80, Australian Institute of Criminology: Canberra.

Payne, J. 2008, *The Queensland Drug Court: A Recidivism Study of the First 100 Graduates*, Research and Public Policy Series No. 83, AIC: Canberra.

Pechtel, P., Lyons-Ruth, K., Anderson, C. and Teicher, M. 2014, 'Sensitive periods of amygdala development: The role of maltreatment in preadolescence', *NeuroImage*, vol. 97, pp. 236-244.

Peng, H., Ning, Y., Zhang, Y., Yang, H., Zhang, L., He, Z., Li, Z., Wang, L., Lu, S., Zhou, J., Zhang, Z. and Li, L. 2013, 'White-matter density abnormalities in depressive patients with and without childhood neglect: A voxel-based morphometry (VBM) analysis', *Neuroscience Letters*, vol. 550, pp. 23-28.

Perry, B. 1997, 'Incubated in terror: Neurodevelopmental factors in the 'cycle of violence'', in *Children, Youth and Violence: A Search for Solutions*, J. Osofsky (Ed.), Guilford Press: New York, pp. 124-148.

Perry, B. 2002, 'Childhood experience and the expression of genetic potential: what childhood neglect tells us about nature and nurture', *Brain and Mind*, vol. 3, no.1, pp. 79-100.

Perry, B. 2005, *Maltreatment and the Developing Child: How Early Childhood Experience Shapes Child and Culture*, The Margaret McCain Lecture Series, Centre for Children and Families in the Justice System: Ontario, Canada.

Perry, B. 2006, 'Applying principles of neurodevelopment to clinical work with maltreated and traumatized children: The Neurosequential model of therapeutics', in *Social Work Practice with Children and Families*, N.B. Webb (Ed.), Guilford Press: New York, pp.27-52.

Perry, B. 2008, 'Child maltreatment: A neurodevelopmental perspective on the role of trauma and neglect in psychopathology', in *Child and Adolescent Psychopathology*, T. Beauchaine and S. Hinshaw (Ed.s), John Wiley and Sons: New Jersey.

Perry, B. 2009, 'Examining child maltreatment through a neurodevelopmental lens: Clinical applications of the Neurosequential Model of Therapeutics', *Journal of Loss and Trauma: International Perspectives on Stress and Coping*, vol. 14, no. 4, pp. 240-255.

Perry, B. and Pollard, R. 1997, *Altered Brain Development Following Global Neglect in Early Childhood*, Society for Neuroscience: Proceedings from Annual Meeting, New Orleans.

Perry, B. and Pollard, R. 1998, 'Homeostasis, stress, trauma, and adaptation: A neurodevelopmental view of childhood trauma', *Child and Adolescent Psychiatric Clinics of North America*, vol. 7, no. 1, pp. 33-51.

Perry, B., Pollard, R., Blakley, T., Baker, W. and Vigilante, D. 1995, 'Childhood trauma, the neurobiology of adaption and "use-dependent" development of the brain: How "states" become "traits"', *Infant Mental Health Journal*, vol. 16, no. 4, pp. 271-291.

Peterson, C., Gravens, L. and Harmon-Jones, E. 2011, 'Asymmetric frontal cortical activity and negative affective responses to ostracism', *Social Cognitive and Affective Neuroscience*, vol. 6, no. 3, pp. 277-285.

Petticrew, M. and Roberts, H. 2006, *Systematic Reviews in the Social Sciences*, Oxford Blackwell Publishing, United Kingdom.

Petrosino, A., Turpin-Petrosino, C. and Guckenburg, S. 2010, *Formal System Processing of Juveniles: Effects on Delinquency*, Campbell Systematic Reviews 2010:1.

Piaget, J. 1973, *Main Trends in Psychology*, George Allen and Unwin: London.

Pickersgill, M. 2013, 'The social life of the brain: Neuroscience in society', *Current Sociology*, vol. 61, no. 3, pp. 322-340.

Pinchon, S., De Gelder, B. and Grèzes, J. 2012, 'Threat prompts defensive brain responses independently of attentional control', *Cerebral Cortex*, vol. 22, no. 2, pp. 274-285.

Pine, D. 2003, 'Developmental psychobiology and response to threats: relevance to trauma in children and adolescents', *Biological Psychiatry*, vol. 53, no. 9, pp. 796-808.

Plessow, F., Füscher, R., Kirschbaum, C. and Goschke, T. 2011, 'Inflexibility focused under stress: Acute psychosocial stress increases shielding of action goals at the expense of reduced cognitive flexibility with increasing time lag to the stressor', *Journal of Cognitive Neuroscience*, vol. 23, no. 11, pp. 3218-3227.

Polaschek, D. 2012, 'An appraisal of the risk-need-responsivity model of offender rehabilitation and its application in correctional treatment', *Legal and Criminological Psychology*, vol. 17, no. 1, pp. 1-17.

Pollak, S.D., Cicchetti, D., Klorman, R., Brumaghim, J.T. 1997, 'Cognitive Brain Event-Related Potentials and Emotion Processing in Maltreated Children', *Child Development*, vol. 68, no. 5, pp. 773-787.

Pollak, S. and Kistler, D. 2002, 'Early experience is associated with the development of categorical representations for facial expressions of emotion', *Proceedings of the National Academy of Sciences of the United States of America*, vol. 99, no. 13, pp. 9072-9076.

Pollak, S., Klorman, R., Thatcher, J. and Cicchetti, D. 2001, 'P3b reflects maltreated children's reactions to facial displays of emotion' *Psychophysiology*, vol. 38, no. 2, pp. 267-274.

Pollak, S., Nelson, C., Schlaak, M., Roeber, B., Wewerka, S., Wiik, K., Frenn, K., Loman, M. and Gunnar, M. 2010, 'Neurodevelopmental effects of early childhood deprivation in post-institutionalized children', *Child Development*, vol. 81, no. 1, pp. 224-236.

Pollak, S. and Sinha, P. 2002, 'Effect of early experience on children's recognition of facial displays of emotion', *Developmental Psychology*, vol. 38, no. 5, pp. 784-791.

Pollak, S. and Tolley-Schell, S. 2003, 'Selective attention to facial emotion in physically abused children', *Journal of Abnormal Psychology*, vol. 112, no. 3, pp. 323-338.

Pollak, S., Vardi, S., Bechner, A. and Curtin, J. 2005, 'Physically abused children's regulation of attention in response to hostility', *Child Development*, vol. 76, no. 5, pp. 968-977.

Pollock, J.M, Mullings, J.L. and Crouch, B.M. 2006, 'Violent women: Findings from the Texas women inmates study', *Journal of Interpersonal Violence*, vol. 21, no. 4, pp. 485-502.

Pomeroy, E. 2009, 'The end of a decade: Challenges for a changing world', *Social Work*, vol. 54, no. 4, pp. 293-295.

- Porges, S.W. 2011. *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, and Self-regulation*, WW Norton, New York.
- Powell, F. 1998, 'The professional challenges of reflexive modernization: Social work in Ireland', *British Journal of Social Work*, vol. 28, no. 3, pp. 311-328.
- Preston, B. and Donnelly, H. 2008, *Achieving consistency and transparency in sentencing for environmental offences*, Judicial Commission of New South Wales, Sydney.
- Pritchard, E., Mugavin, J. and Swan, A. 2007, *Compulsory Treatment in Australia: A Discussion Paper on the Compulsory Treatment on Individuals Dependent on Alcohol and/or Other Drugs*, Australian National Council on Drugs: Canberra.
- Przybylski, R. 2008, *What Works: Effective Recidivism Reduction and Risk-Focused Prevention Programs: A Compendium of Evidence-Based Options for Preventing New and Persistent Criminal Behavior*, Colorado Department of Public Safety, Colorado.
- Qin, S., Hermans, E., van Marie, H., Luo, J. and Fernández, G. 2009, 'Acute psychological stress reduces working memory-related activity in the dorsolateral prefrontal cortex', *Biological Psychiatry*, vol. 66, no. 1, pp. 25-32.
- Quirk, G., Likhtik, E., Pelletier, J., Pare, D. 2003, 'Stimulation of medial prefrontal cortex decreases the responsiveness of central amygdala output neurons', *Journal of Neuroscience*, vol. 23, pp. 8800-8807.
- Rafter, N. 2008, 'Criminology's darkest hour: biocriminology in Nazi Germany', *The Australian and New Zealand Journal of Criminology*, vol. 41, no. 2, pp. 287-306.
- Rafter, N. 2010, 'Silence and memory in criminology – the American Society of Criminology 2009 Sutherland Address', *Criminology*, vol. 48, no. 2, pp. 339-355.
- Raine, A. 2008, 'From genes to brain to antisocial behavior', *Current Directions in Psychological Science*, vol. 17, pp. 323-328.
- Raine, A., Park, S., Lencz, T., Bihrlé, S., Lacasse, L., Spatz, C., Al-dayeh, L. and Singh, M. 2001, 'Reduced right hemisphere activation in severely abused violent offenders during a working memory task: An fMRI study', *Aggressive Behavior*, vol. 27, no. 2, pp. 111-129.

Rainecki, C., Moriceau, S. and Sullivan, R. 2010, 'Developing a neurobehavioral animal model of infant attachment to an abusive caregiver', *Biological Psychiatry*, vol. 67, no., 12, pp. 1137-1145.

Raio, C., Orederu, T., Palazzolo, L., Shurick, A. and Phelps, E. 2013, 'Cognitive emotion regulation fails the stress test', *Proceedings of the National Academy of Sciences of the United States of America*, vol. 110, no. 37, pp. 15139-15144.

Ralston, N. 3 February 2015, 'NSW prison population hits record high forcing police to 'babysit' inmates', *Sydney Morning Herald*, online: www.smh.com.au.

Ramsay, R. 2003, 'Transforming the working definition of social work into the 21st century', *Research on Social Work Practice*, vol. 13, no. 3, pp. 324-338.

Ranson, S. 1934, 'The hypothalamus: its significance for visceral innervation and emotional expression', The Weir Mitchell Oration, *Transactions of the College of Physicians of Philadelphia*, Series IV, no. 2, pp. 222-242.

Rao, H., Betancourt, L., Giannetta, J., Brodsky, N., Korczykowski, M., Avants, B., Gee, J., Wang, J., Hurt, H., Detre, J. and Farah, M. 2010, 'Early parental care is important for hippocampal maturation: Evidence from brain morphology in humans', *NeuroImage*, vol. 49, issue 1, pp. 1144-1150.

Rao, U., Chen, L., Bidesi, A., Shad, M., Thomas, M. and Hammen, C. 2010, 'Hippocampal changes associated with early-life adversity and vulnerability to depression', *Biological Psychiatry*, vol. 67, no. 4, pp. 357-364.

Rao, U., Hammen, C., Ortiz, L., Chen, L., Poland, R. 2008, 'Effects of early and recent adverse experiences on adrenal response to psychosocial stress in depressed adolescents', *Biological Psychiatry*, vol. 64, no. 6, pp. 521-526.

Reckdenwald, A., Mancini, C. and Beauregard, E. 2013, 'The cycle of violence: Examining the impact of maltreatment early in life on adult offending', *Violence and Victims*, vol. 28, no. 3, pp. 466-482.

Reid, W. 2002, 'Knowledge for direct social work practice: An analysis of trends', *Social Service Review*, vol. 76, no. 1, pp. 6-33.

Reisch, M. and Jani, J. 2012, 'The new politics of social work practice: Understanding context to promote change', *British Journal of Social Work*, vol. 42, no. 6, pp. 1132-1150.

Ringland, C. 2012, 'Intensive correction orders vs other penalties: offender profiles', *Crime and Justice Bulletin*, no. 163, NSW Bureau of Crime Statistics and Research: Sydney.

Ringland, C. and Weatherburn, D. 2013, 'The impact of intensive correction orders on reoffending', *Contemporary Issues in Crime and Justice*, No. 176, NSW Bureau of Crime Statistics and Research: Sydney.

Ritchie, D. 2011, *Sentencing Matters: Does Imprisonment Deter? A Review of the Evidence*, Sentencing Advisory Council: Melbourne.

Roberts, L. and Indermaur, D. 2009, *What Australians Think About Crime and Justice: Results from the 2007 Survey of Public Attitudes*, Australian Institute of Criminology: Canberra.

Robinson, D. 1995, *The Impact of Cognitive Skills Training on Post-Release Recidivism among Canadian Federal Offenders*, Correctional Research and Development, Ottawa.

Rodriguez de Fonseca, F. and Navarro, M. 1998, 'Role of the limbic system in dependence on drugs', *Annals of Medicine*, vol. 30, no. 4, pp. 397-405.

Roe-Sepowitz, D.E. 2009, 'Comparing male and female juveniles charged with homicide: Child maltreatment, substance abuse, and crime details', *Journal of Interpersonal Violence*, vol. 24, no. 4, pp. 601-617.

Root, C., MacKay, S., Henderson, J., Bove, G. and Warling, D. 2008, 'The link between maltreatment and juvenile firesetting: Correlates and underlying mechanisms', *Child Abuse and Neglect*, vol. 32, pp. 161-176.

Roozendaal, B., McReynolds, J. and McGaugh, J. 2004, 'The basolateral amygdala interacts with the medial prefrontal cortex in regulating glucocorticoid effects on working memory impairment', *Journal of Neuroscience*, vol. 24, no. 6, pp.1385-1392.

Rose, N. 2000, 'The biology of culpability: Pathological identity and crime control in a biological culture', *Theoretical Criminology*, vol. 4, no. 1, pp. 5-34.

Rose, N. 2013, 'The human sciences in a biological age', *Theory, Culture and Society*, vol. 30, no. 1, pp. 3-34.

Ross, R. and Fabiano, E. 1985, *Time to Think: A Cognitive Model of Delinquency Prevention and Offender Rehabilitation*, Air Training and Publications: Ottawa, Canada.

Rossi, I. 2014, 'Reflexive modernization', in *Ulrich Beck: Pioneer in Cosmopolitan Sociology and Risk Society*, U Beck (Ed.), Springer Briefs on Pioneers in Science and Practice, vol. 18, Springer International Publishing: Cham.

Rotman, E. 1990, *Beyond Punishment. A New View of the Rehabilitation of Criminal Offenders*, Greenwood Press, New York.

Rutter, M. and English and Romanian Adoptees study team. 1998, 'Developmental catch-up, and deficit, following adoption after severe global early privation', *Journal of Child Psychology and Psychiatry*, vol. 39, no. 4, pp. 465-476.

Ryan, J. 2006, 'Dependent youth in juvenile justice: Do positive peer culture programs work for victims of child maltreatment?', *Research on Social Work Practice*, vol. 16, pp. 511-519.

Ryan, J. and Testa, M. 2005, 'Child maltreatment and juvenile delinquency: Investigating the role of placement and placement instability', *Children and Youth Services Review*, vol. 27, pp. 227-249.

Samplin, E., Ikuta, T., Malhotra, A., Szeszko, P. and Derosse, P. 2013, 'Sex differences in resilience to childhood maltreatment: Effects of trauma history on hippocampal volume, general cognition and subclinical psychosis in healthy adults', *Journal of Psychiatric Research*, vol. 47, no. 9, pp. 1174-1179.

Sampson, R. and Laub, J. 1993, *Crime in the Making: Pathways and Turning Points Through Life*, Harvard University Press: Cambridge.

Sandelowski, M., Voils, C., Leeman, J. and Crandell, J. 2012, 'Mapping the mixed methods-mixed research synthesis terrain', *Journal of Mixed Methods Research*, vol. 6, no. 4, pp. 317-331.

Sandelowski, M. 2008, 'Reading, writing and systematic review', *Journal of Advanced Nursing*, vol. 64, no. 1, pp.104-110.

Sapolsky, R. 2000, 'The possibility of neurotoxicity in the hippocampus in major depression: A primer on neuron death', *Biological Psychiatry*, vol. 48, no. 8, pp. 755-765.

Sarantakos, S. 1998, *Social Research*, Macmillan, Basingstoke, Hampshire.

Sarre, R. 2001, 'Beyond 'What works?' A 25-year jubilee retrospective of Robert Martinson's famous article', *The Australian and New Zealand Journal of Criminology*, vol. 34, no. 1, pp. 38-46.

Satchell, M., Lai, Y., Kochanek, P., Wisniewski, S., Fink, E., Siedberg, N., Berger, R., DeKosky, S., Adelson, P. and Clark, R. 2005, 'Cytochrome *c*, a biomarker of apoptosis, is increased in cerebrospinal fluid from infants with inflicted brain injury from child abuse', *Journal of Cerebral Blood Flow and Metabolism*, vol. 25, pp. 919-927.

Schiller, D. and Delgado, M. 2010, 'Overlapping neural systems mediating extinction, reversal and regulation of fear', *Trends in Cognitive Science*, vol. 14, no. 6, pp. 268-276.

Schilling, C., Kühn, S., Romanowski, A., Banaschewski, T., Barbot, A., Barker, G., Brühl, R., Büchel, C., Charlet, K., Conrod, P., Czech, K., Dalley, J., Flor, H., Häke, I., Itterman, B., Ivanov, N., Mann, K., Lüdemann, K., Martinot, J., Palafox, C., Paus, T., Poline, J., Reuter, J., Rietschel, M., Robbins, T., Smolka, M., Ströhle, A., Walaszek, B., Kathmann, N., Schumann, G., Heinz, A., Garavan, H. and Gallinat, J. 2013, 'Common structural correlates of trait impulsiveness and perceptual reasoning in adolescence', *Human Brain Mapping*, vol. 34, no.2, pp. 374-383.

Schilling, C., Kühn, S., Romanowski, A., Schubert, F., Kathmann, N. and Gallinat, J. 2012, 'Cortical thickness correlates with impulsiveness in healthy adults', *NeuroImage*, vol. 59, no. 1, pp. 824-830.

Schoofs, D., Wolf, O. and Smeets, T. 2009, 'Cold pressor stress impairs performance on working memory tasks requiring executive functions in healthy young men', *Behavioral Neuroscience*, vol. 123, no. 5, pp. 1066-1075.

Schore, A. 1996, 'The experience-dependent maturation of a regulatory system in the orbital prefrontal cortex and the origin of developmental psychopathology', *Development and Psychopathology*, vol. 8, no. 1, pp. 59-87.

Scotland, J. 2012, 'Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methods of the scientific, interpretive, and critical research paradigms', *English Language Teaching*, vol. 5, no. 9, pp. 9-16.

Scott, D. 1995, 'The social construction of child sexual abuse: Debates about definition and the politics of prevalence', *Psychiatry, Psychology and the Law*, vol. 2, no. 2, pp. 117-126.

Scudder, R., Blount, W. and Heide, K. 1993, 'Important links between child abuse, neglect, and delinquency', *International Journal of Offender Therapy and Comparative Criminology*, vol. 37, no. 4, pp. 315-323.

Sharma, S. and Majsak, M. 2003, 'Brain anatomy', *Encyclopedia of the Neurological Sciences*, M. Aminoff and R. Daroff (Ed.'s), Academic Press: New York, pp. 420-423.

Sheahan, W.F. 14 March 1957, *Parliamentary Debates (Hansard)*, NSW Legislative Assembly, Second Reading Speech at 4070.

Shenk, C., Noll, J., Putnam, F., Trickett, P. 2010, 'A prospective examination of the role of childhood sexual abuse and physiological asymmetry in the development of psychopathology', *Child Abuse and Neglect*, vol. 34, no. 10, pp. 752-761.

Sheppes, G., Suri, G. and Gross, J. 2015, 'Emotion regulation and psychopathology', *Annual Review of Clinical Psychology*, vol. 11, pp. 379-405.

Shin, L., McNally, R., Kosslyn, S., Thompson, W., Rauch, S., Alpert, N., Metzger, L., Lasko, N., Orr, S. and Pitman, R. 1999, 'Regional cerebral blood flow during script-driven imagery in childhood sexual abuse-related PTSD: A PET investigation', *American Journal of Psychiatry*, vol. 156, no. 4, pp. 575-584.

Shirtcliff, E., Vitacco, M., Graf, A., Gostisha, A., Merz, J. and Zahn-Waxler, C. 2009, 'Neurobiology of empathy and callousness: implications for the development of antisocial behavior', *Behavioral Sciences and the Law*, vol. 27, no. 2, pp. 137- 171.

Shoal, G., Giancola, P. and Kirillova, G. 2003, 'Salivary cortisol, personality, and aggressive behavior in adolescent boys: a 5-year longitudinal study', *Journal of the American Academy of Child and Adolescent Psychiatry*, vol. 42, no. 9, pp. 1101- 1107.

Silva, T.C., Graña, J.L. and González-Cieza, L. 2014, 'Self-reported physical and emotional abuse among youth offenders and their association with internalizing and externalizing psychopathology: A preliminary study', *International Journal of Offender Therapy and Comparative Criminology*, vol. 58, no. 5, pp. 590-606.

Silva, T., Larm, P., Vitaro, F., Tremblay, R., Hodgins, S. 2012, 'The association between maltreatment in childhood and criminal convictions to age 24: A prospective study of a community sample of males from disadvantaged neighbourhoods', *European Child and Adolescent Psychiatry*, vol. 21, no. 7, pp. 403-413.

Simons, R. and Klopach, E. 2015, 'Invited address: "The times they are a-changin"' Gene expression, neuroplasticity, and developmental research', *Journal of Youth and Adolescence*, vol. 44, no. 3, pp. 573-580.

Simpson, T., Westerberg, V., Little, L. and Trujillo, M. 1994, 'Screening for childhood physical and sexual abuse among outpatient substance abusers', *Journal of Substance Abuse Treatment*, vol. 11, no. 4, pp. 347-358.

Sinha, R. 2001, 'How does stress increase risk of drug abuse and relapse?', *Psychopharmacology*, vol. 158, no. 4, pp. 343-359.

Sinha, R. 2008, 'Chronic stress, drug use and vulnerability to addiction,' *Annals of the New York Academy of Sciences*, vol. 1141, pp. 105-130.

Skrzypiec, G. 2006, *The South Australian Drug Court: An Analysis of Participant Retention Rates*, Office of Crime Statistics and Research, Adelaide.

Skrzypiec, G., Wundersitz, J., and McRostie, H. 2004, *Magistrates Court Diversion Program: An Analysis of Post-Program Offending*, Information Bulletin No. 20, Office of Crime Statistics: South Australia.

Slobogin, C. 1995, 'Therapeutic jurisprudence: Five dilemmas to ponder', *Psychology, Public Policy, and Law*, vol. 1, no. 1, pp. 193-219.

Smart Justice. 18 November 2014, *Massive Growth in Prison Spending Shows Victorian Government Values a Flawed Solution to Crime Over Vital Community Services*, Media Release, Smart Justice, available online: <https://smartjustice.wordpress.com/2014/11/18/massive-growth-in-prison-spending-shows-victorian-government-values-a-flawed-solution-to-crime-over-vital-community-services/>

Smith, B. and Testa, M. 2002, 'The risk of subsequent maltreatment allegations in families with substance-exposed infants', *Child Abuse and Neglect*, vol. 26, no.1, pp. 97-114.

Smith, C. and Thornberry, T. 1995, 'The relationship between childhood maltreatment and adolescent involvement in delinquency', *Criminology*, vol. 33, no. 4, pp. 451-481.

Smith, P. and Gendreau, P. 2010, *A Longitudinal Examination of Innate Behavior and Program Activities on Institutional Adjustment and Recidivism*, unpublished paper, University of Cincinnati.

Smith, P., Goggin, C. and Gendreau, P. 2002, *The Effects of Prison Sentences and Intermediate Sanctions on Recidivism: General Effects and Individual Differences*, Public Works and Government Services, Canada.

Smith, S. and Vale, W. 2006, 'The role of the hypothalamic-pituitary-adrenal axis in neuroendocrine responses to stress', *Dialogues in Clinical Neuroscience*, vol. 8, no. 4, pp. 383-395.

Sowell, E., Leow, A., Bookheimer, S., Smith, L., O'Connor, M., Kan, E., Rosso, C., Houston, S., Dinov, I. and Thompson, P. 2010, 'Differentiating prenatal exposure to methamphetamine and alcohol versus alcohol and not methamphetamine using tensor based brain morphometry and discriminant analysis', *Journal of Neuroscience*, vol. 30, no. 11, pp. 3876-3885.

- Sowell, E., Mattson, S., Kan, E., Thompson, P., Riley, E. and Toga, A. 2008, 'Abnormal cortical thickness and brain-behavior correlation patterns in individuals with heavy prenatal alcohol exposure', *Cerebral Cortex*, vol. 8, no. 1, pp. 136-144.
- Spaccarelli, S., Coatsworth, D. and Bowden, B. 1995, 'Exposure to serious family violence among incarcerated boys: Its association with violent offending and potential mediating variables', *Violence and Victims*, vol. 10, no. 3, pp. 163-182.
- Spidel, A., Lecomte, T., Greaves, C., Sahlstrom, K., Yuille, J.C. 2010, 'Early psychosis and aggression: Predictors and prevalence of violent behaviour amongst individuals with early onset psychosis', *International Journal of Law and Psychiatry*, vol. 33, no. 3, pp. 171-176.
- Spigelman, J. 2008, 'Consistency and sentencing', *Australian Law Journal*, vol. 82, no. 7, pp. 450-460.
- Spiranovic, C. Roberts, L. and Indermaur, D. 2012, 'What predicts punitiveness? An examination of predictors of punitive attitudes towards offenders in Australia', *Psychiatry, Psychology and the Law*, vol. 19, no. 2, pp. 249-261.
- Spohn, C. 2007, 'The deterrent effect of imprisonment and offenders' stakes in conformity', *Criminal Justice Policy Review*, vol. 18, no. 1, pp. 31-50.
- Spohn, C. and Holleran, D. 2002, 'The effect of imprisonment on recidivism rates of felony offenders: A focus on drug offenders', *Criminology*, vol. 40, no. 2, pp. 329-357.
- Standing Committee on Law and Justice. 2006, *Community Based Sentencing Options for Rural and Remote Areas and Disadvantaged Populations*, NSW Legislative Council, SCLJ, Sydney.
- Steering Committee for the Review of Government Service Provision (SCRGSP). 2014, *Report on Government Services 2014*, Volume C: Justice, SCRGS: Melbourne.
- Stein, M. B., Koverola, C., Hanna, C., Torchia, M. G., and McClarty, B. 1997, 'Hippocampal volume in women victimized by childhood sexual abuse', *Psychological Medicine*, vol. 27, pp. 951-959.

Stewart, A., Dennison, S. and Hurren, E. 2005, *Juvenile Offending Trajectories: Pathways from Child Maltreatment to Juvenile Offending, and Police Cautioning in Queensland*, Griffith University, Queensland.

Stewart, A., Livingston, M and Dennison, S. 2008, 'Transitions and turning points: Examining the links between child maltreatment and juvenile offending', *Child Abuse & Neglect*, vol. 32, no. 1, pp. 51-66.

Stiles, J. and Jernigan, T. 2010, 'The basics of brain development', *Neuropsychology Review*, vol. 20, pp. 327-348.

Stouthamer-Loeber, M., Loeber, R., Homish, L. and Wei, E. 2001, 'Maltreatment of boys and the development of disruptive and delinquent behavior', *Development and Psychopathology*, vol. 13, no. 4, pp. 941-955.

Strauss, M. 1979, 'Measuring intrafamily conflict and violence: the Conflict Tactical Scale', *Journal of Marriage and Family*, vol. 41, pp. 75-88.

Strominger, N. and Demarest, R. 2012, 'Gross anatomy of the brain', *Noback's Human Nervous System*, N. Strominger, R. Demarest and L. Laemie (Ed.'s), Humana Press: Totowa, NJ, pp. 1-10.

Strominger, N. and Demarest, R. 2012, 'The reticular formation and the limbic system', *Noback's Human Nervous System*, N. Strominger, R. Demarest and L. Laemie (Ed.'s), Humana Press: Totowa, NJ, pp. 379-395.

Stoodley, B. 2010, 'To measure or not to measure? The "recidivism dilemma"', *Corrections Today*, vol. 72, no. 4, pp.86-87.

Strelzyk, F., Hermes, M., Naumann, E., Oitzl, M., Walter, C., Busch, H., Richter, S. and Shächinger, H. 2012, 'Tune it down to live it up? Rapid nongenomic effects of cortisol on the human brain', *The Journal of Neuroscience*, vol. 32, no. 2, pp. 616-625.

Suri, H. 2013, 'Epistemological pluralism in research synthesis methods', *International Journal of Qualitative Studies in Education*, vol. 26, no. 7, pp. 889-911.

Susman, E. 2006, 'Psychobiology of persistent behavior: Stress, early vulnerabilities and the attenuation hypothesis', *Neuroscience and Biobehavioral Reviews*, vol. 30, no. 3, pp. 376-389.

Susman, E., Dorn, L., Inoff-Germain, G., Nottelmann, E. and Chrousos, G. 1997, 'Cortisol reactivity, distress behaviour, and behavioural and psychological problems in young adolescents: A longitudinal perspective', *Journal of Research on Adolescence*, vol. 7, no. 1, pp. 81-105.

Sutton, A., Duval, S., Tweedie, R., Abrams, K. and Jones, D. 2000, 'Empirical assessment of effect of publication bias on meta-analyses', *British Medical Journal*, vol. 320, no. 7249, pp. 1574-1577.

Swain, M. 1999, *The Illicit Drug Problem: Drug Courts and Other Alternative Approaches*, Briefing Paper no. 4/99, NSW Parliamentary Library Research Service, Sydney.

Sykes, G. and Matza, D. 1957, 'Techniques of neutralization', *American Sociological Review*, vol. 22, no. 6, pp. 664-670.

Taplin, S. 2002, *New South Wales Drug Court Evaluation: A Process Evaluation*, NSW Bureau of Crime and Statistics, Sydney.

Taub, E., Uswatte, G., King, D., Morris, D., Cragi, J. and Chatterjee, A. 2006, 'A placebo-controlled trial of constraint-induced movement therapy for upper extremity after stroke', *Stroke*, vol. 37, no. 4, pp. 1045-1049.

Taylor, S., Eisenberger, N., Saxbe, D., Lehman, B. and Lieberman, M. 2006, 'Neural responses to emotional stimuli are associated with childhood family stress', *Biological Psychiatry*, vol. 60, no. 3, pp. 296-391.

Teicher, M., Andersen, S., Polcari, A., Anderson, C., Navalta, C. and Kim, D. 2003, 'The neurobiological consequences of early stress and childhood maltreatment', *Neuroscience & Biobehavioral Reviews*, vol. 27, issue 1-2, pp. 33-44.

Teicher, M., Anderson, C., Ohashi, K. and Polcari, A. 2014, 'Childhood Maltreatment: Altered Network Centrality of Cingulate, Precuneus, Temporal Pole and Insula', *Biological Psychiatry*, vol. 76, no. 4, pp. 297-305.

Teicher, M., Anderson, C. and Polcari, A. 2012, 'Childhood maltreatment is associated with reduced volume in the hippocampal subfields CA3, dentate gyrus, and subiculum', *Proceedings of the National Academy of Sciences of the United States of America*, vol. 109, no. 9, pp. E563-E572.

Teicher, M., Dumont, N., Ito, Y., Vaituzis, C., Giedd, J. and Andersen, S. 2004, 'Childhood neglect is associated with reduced corpus callosum area', *Biological Psychiatry*, vol. 56, no. 2, pp. 80-85.

Tennes, K. and Kreye, M. 1985, 'Children's adrenocortical responses to classroom activities and tests in elementary school', *Psychosomatic Medicine*, vol. 47, no. 5, pp. 451-460.

Thomas, E. and Elliott, R. 2009, 'Brain imaging correlates of cognitive impairment in depression', *Frontiers in Human Neuroscience*, vol. 3, no. 30, pp. 1-9.

Thomas, L. and De Bellis, M. 2004, 'Pituitary volumes in pediatric maltreatment-related posttraumatic stress disorder', *Biological Psychiatry*, vol. 55, no. 7, pp. 752-758.

Thomas, S. and Shihadeh, E. 2013, 'Institutional isolation and crime: The mediating effect of disengaged youth on levels of crime', *Social Science Research*, vol. 42, no. 5, pp. 1167-1179.

Thompson, K., Wonderlich, S., Crosby, R., Ammerman, F., Mitchell, J. and Brownfield, D. 2001, 'An assessment of the recidivism rates of substantiated and unsubstantiated maltreatment cases', *Child Abuse and Neglect*, vol. 25, no. 9, pp. 1207-1218.

Tikkanen, R., Holi, M., Lindberg, N., Tiihonen, J., Virkkunen, M. 2009, 'Recidivistic offending and mortality in alcoholic violent offenders: A prospective follow-up study', *Psychiatry Research*, vol. 168, no. 1, pp. 18-25.

Tomkinson, E. 2012, *An Australian Snapshot: Social Impact Bonds*, Perspectives from the Social Science Forum 2012, The Centre for Social Impact: Sydney.

Tomoda, A., Navalta, C., Polcari, A., Sedato, N. and Teicher, M. 2009, 'Childhood sexual abuse is associated with reduced grey matter volume in visual cortex of young women', *Biological Psychiatry*, vol. 66, no. 7, pp. 642-648.

Tomoda, A., Sheu, Y., Rabi, K., Suzuki, H., Navalta, C., Polcari, A. and Teicher, M. 2011, 'Exposure to parental verbal abuse is associated with increased grey matter volume in superior temporal gyrus', *NeuroImage*, vol. 54, supplement 2, pp. S280-S286.

Tomoda, A., Suzuki, H., Rabi, K., Sheu, Y., Polcari, A. and Teicher, M. 2009, 'Reduced prefrontal cortical grey matter volume in young adults exposed to harsh corporal punishment', *NeuroImage*, vol. 47, supplement 2, pp. T66-T71.

Topitzes, J., Mersky, J. and Reynolds, A. 2012, 'From child maltreatment to violent offending: An examination of mixed-gender and gender-specific models', *Journal of Interpersonal Violence*, vol. 27, no. 12, pp. 2322-2347.

Toth, S., Stronach, E., Rogosch, F., Caplan, R. and Cicchetti, D. 2011, 'Illogical thinking and thought disorder in maltreated children', *Journal of the American Academy of Child and Adolescent Psychiatry*, vol. 50, no. 7, pp. 659-558.

Tottenham, N., Hare, T., Quinn, B., McCarry, T., Nurse, M., Gilhooly, T., Millner, A., Galvan, A., Davidson, M., Eigsti, I., Thomas, K., Freed, P., Booma, E., Gunnar, M., Altemus, M., Aronson, J. and Casey, B. 2010, 'Prolonged institutional rearing is associated with atypically large amygdala volume and difficulties in emotion regulation', *Developmental Science*, vol. 13, no. 1, pp. 46-61.

Trevithick, P. 2008, 'Revisiting the knowledge base of social work: A framework for practice', *British Journal of Social Work*, vol. 38, pp. 1212-1237.

Tripodi, S., Kim, J. and Bender, K. 2010, 'Is employment associated with reduced recidivism? The complex relationship between employment and crime', *International Journal of Offender Therapy and Comparative Criminology*, vol. 54, no. 5, pp. 706-720.

Trotter, A. and Hobbs, H. 2014, 'The great leap backwards: Criminal law reform with the Hon Jarrod Blieje', *Sydney Law Review*, vol. 36, no. 1.

Tuominen, T., Korhonen, T., Hämäläinen, H., Temonen, S., Salo, H., Katajisto, J. and Lauerma, H. 2014a, 'Neurocognitive disorders in sentenced male offenders: Implications for rehabilitation', *Criminal Behaviour and Mental Health*, vol. 24, no. 1, pp. 36-48.

Tuominen, T., Korhonen, T., Hämäläinen, H., Temonen, S., Salo, H., Katajisto, J. and Lauerma, H. 2014b, 'Functional illiteracy and neurocognitive deficits among male prisoners: Implications for rehabilitation', *The Journal of Forensic Practice*, vol. 16, no. 4, pp. 268-280.

Turner, B.S. 2009, *The New Blackwell Companion to Social Theory*, Wiley, Chichester, United Kingdom.

Tyrka, A., Wier, L., Price, L., Ross, N., Anderson, G., Wilkinson, C. and Carpenter, L. 2008, 'Childhood parental loss and adult hypothalamic-pituitary-adrenal function', *Biological Psychiatry*, vol. 63, no. 12, pp. 1147-1154.

United Nations Office on Drugs and Crime. 2007, *Handbook of Basic Principles and Promising Practices on Alternatives to Imprisonment*, United Nations: New York.

van der Kolk, B. and Fisler, R. 1994, 'Childhood abuse and neglect and loss of self-regulation', *Bulletin of the Minninger Clinic*, vol. 58, no. 2, pp. 145-168.

van der Kolk, B., Stone, L., West, J., Rhodes, A., Emerson, D., Suvak, M and Spinazzola, J. 2014, 'Yoga as an adjunctive treatment for posttraumatic stress disorder: a randomized controlled trial', *Journal of Clinical Psychiatry*, vol. 75, no. 6, pp. e559-e565.

van Goozen S., Fairchild, G., Snoek, H. and Harold, G. 2007, 'The evidence for a neurobiological model of childhood antisocial behavior', *Psychological Bulletin*, vol. 133, no. 1, pp. 149- 182.

van Goozen, S., Matthys, W., Cohen-Kettenis, P., Gispens-de Wied, C., Wiegant, V. and van Engeland, H. 1998, 'Salivary cortisol and cardiovascular activity during stress in oppositional-defiant disorder boys and normal controls', *Biological Psychiatry*, vol. 43, no. 7, pp. 531-539.

van Harmelen, A., van Tol, M., van der Wee, N., Veltman, D., Aleman, A., Spinhoven, P., van Buchem, M., Zitman, F., Penninx, B. and Elzinga, B. 2010, 'Reduced medial prefrontal cortex volume in adults reporting childhood emotional maltreatment', *Biological Psychiatry*, vol. 68, no. 9, pp. 832-838.

- van Kesteren, J. 2009, 'Public attitudes and sentencing policies across the world', *European Journal of Criminal Policy Research*, vol. 15, pp. 25-46.
- van Wingen, G., Geuze, E., Vermetten, E. and Fernández, G. 2011, 'Perceived threat predicts the neural sequelae of combat stress', *Molecular Psychiatry*, vol. 16, pp. 664-671.
- Vanyukov, M., Moss, H., Plail, J., Blackson, T., Mezzich, A. and Tarter, R. 1993, 'Antisocial symptoms in preadolescent boys and in their parents: Associations with cortisol', *Psychiatry Research*, vol. 46, no. 1, pp. 9-17.
- Verrecchia, P., Fetzer, M., Lemmon, J. and Austin, T. 2010, 'An examination of direct and indirect effects of maltreatment dimensions and other ecological risks on persistent youth offending', *Criminal Justice Review*, vol. 35, no. 2, pp. 220-243.
- Verona, E., Sadeh, N. and Curtin, J. 2009, 'Stress-induced asymmetric frontal brain activity and aggression risk', *Journal of Abnormal Psychology*, vol. 118, no. 1, pp. 131-145.
- Victoria Police. 27 August 2014, *Crime Statistics 2013/2014*, Victoria Police, Melbourne.
- Vieth, V. 2005, 'When the victim is very young: Assessing allegations of sexual abuse in pre-school children', *National Child Protection Training Centre: Reasonable Efforts*, vol. 2, no. 4, Virginia: American Prosecutors Research Institute.
- Vincent, N. 2010, 'On the relevance of neuroscience to criminal responsibility', *Criminal Law and Philosophy*, vol. 4, pp.77-98.
- Vyas, A., Pillai, A. and Chatterji, S. 2004, 'Recovery after chronic stress fails to reverse amygdaloid neuronal hypertrophy and enhanced anxiety-like behavior', *Neuroscience*, vol. 128, no. 4, pp. 667-673.
- Vythilingam, M., Heim, C., Newport, J., Miller, A., Anderson, E., Bronen, R., Brummer, M., Staib, L., Vermetten, E., Charney, D., Nemeroff, C. and Bremner, J. 2002, 'Childhood trauma associated with smaller hippocampal volume in women with major depression', *American Journal of Psychiatry*, vol. 159, no. 12, pp. 2072-2080.

- Wang, Z., Neylan, T., Mueller, S., Lenoci, M., Truran, D., Marmar, C., Weiner, M. and Schuff, N. 2010, 'Magnetic resonance imaging of hippocampal subfields in posttraumatic stress disorder', *Archives of General Psychiatry*, vol. 67, no. 3, pp. 296-303.
- Ward, T. 2002, 'The management of risk and the design of good lives', *Australian Psychologist*, vol. 37, no. 3, pp. 172-179.
- Ward, T., Day, A. and Casey, S. 2006, 'Offender rehabilitation down under', *Journal of Offender Rehabilitation*, vol. 43, no. 3, pp. 73-83.
- Ward, T. and Maruna, S. 2007, *Rehabilitation*, Routledge: London.
- Ward, T. and Stewart, C. 2003, 'Criminogenic needs and human needs: a theoretical mode', *Psychology, Crime & Law*, vol. 9, pp. 125-143.
- Warner, E., Spinazzola, J., Westcott, A., Gunn, C. and Hodgdon, H. 2014, 'The body can change the score: Empirical support for somatic regulation in the treatment of traumatized adolescents', *Journal of Child and Adolescent Trauma*, vol. 7, no. 4, pp.237-246.
- Watson, C. 2010a, 'Higher level functions consciousness, learning, memory, and emotions', in *The Brain: An Introduction to Functional Neuroanatomy*, C. Watson, M. Kirkcaldie and G. Paxinos (Ed.'s), San Diego: Academic Press, pp. 109-124.
- Watson, C. 2010b, 'The human cerebral cortex', in *The Brain: An Introduction to Functional Neuroanatomy*, C. Watson, M. Kirkcaldie and G. Paxinos (Ed.'s), San Diego: Academic Press, pp. 97-108.
- Watson, C. 2010c, 'Chapter 10: The development of the brain and spinal cord', in *The Brain: An Introduction to Functional Neuroanatomy*, C. Watson, M. Kirkcaldie and G. Paxinos (Ed.'s), San Diego: Academic Press, pp. 141-152.
- Watson, R., Latinus, M., Charest, I., Crabbe, F. and Belin P. 2014, 'People-selectivity, audiovisual integration and heteromodality in the superior temporal sulcus', *Cortex*, vol. 50, pp. 125-136.

Watts, S.J. and McNulty, T.L. 2013, 'Childhood abuse and criminal behaviour: Testing a General Strain Theory Model', *Journal of Interpersonal Violence*, vol. 28, no. 15, pp. 3023-3040.

Weatherburn, D. 2008, 'The economic and social factors underpinning Indigenous contact with the justice system: Results from the 2002 NATSISS survey', *Crime and Justice Bulletin*, no. 104.

Weatherburn, D. 2010, 'The effect of prison on Adult re-offending', *Crime and Justice Bulletin*, no. 143, NSW Bureau of Crime Statistics and Research: Sydney.

Weatherburn, D. and Indermaur, D. 2004, 'Public perceptions of crime trends in NSW and WA', *Crime and Justice Bulletin*, no. 80, NSW Bureau of Crime Statistics and Research, Sydney.

Weatherburn, D., Jones, C., Snowball, L. and Hua, J. 2008, *The New South Wales Drug Court: A Re-evaluation of its Effectiveness*, NSW Bureau of Crime and Statistics, Sydney.

Weatherburn, D. and Lind, B. 2006, 'What mediates the macro-level effects of economic and social stress on crime?', *Australian and New Zealand Journal of Criminology*, vol. 39, no. 3, pp. 384-397.

Weatherburn, D., Snowball, L. and Hunter, B. 2006, *The economic and social factors underpinning Indigenous contact with the justice system: results from the 2002 NATSISS survey*, NSW Bureau of Crime Statistics and Research, Sydney.

Weber, D. and Reynolds, C. 2004, 'Clinical perspectives on neurobiological effects of psychological trauma', *Neuropsychology Review*, vol. 14, no. 2, pp. 115-129.

Wehr, K. and Aseltine, E. 2013, *Beyond the Prison Industrial Complex: Crime and Incarceration in the 21st Century*, Routledge, London.

Weiber, D., Keil, F., Goodstein, J., Rawson, E. and Gray, J. 2008, 'The seductive allure of neuroscience explanations', *Journal of Cognitive Neuroscience*, vol. 20, pp. 470-477.

Wexler, D. 1997, 'Therapeutic jurisprudence in a comparative law context', *Behavioral Sciences and the Law*, vol. 15, pp. 223-46.

Whalen, P., Shin, L., Mcinerney, S., Fischer, H., Wright, C. and Rauch, S. 2001 'A functional MRI study of human amygdala responses to facial expressions of fear versus anger', *Emotion*, vol. 1, no. 1, pp. 70-83.

Whittle, S., Dennison, M., Vijayakumar, N., Simmons, J., Yücel, M., Lubman, D. Pantelis, C. and Allen, N. 2013, 'Childhood maltreatment and psychopathology affect brain development during adolescence', *Journal of the American Academy of Child & Adolescent Psychiatry*, vol. 59, no. 9, pp. 940-952.

Widom, C. 1994, 'Childhood victimisation and adolescent problem behaviors', in R. Ketterlinus and M. Lamb (eds.), *Adolescent Problem Behaviors: Issues and Research*, New Jersey: Lawrence Erlbaum Associates.

Widom, C. and Ames, M. 1994, 'Criminal consequences of childhood sexual victimization', *Child Abuse and Neglect*, vol. 18, no. 4, pp. 303-318.

Widom, C., Schuck, A. and White, H. 2006, 'An examination of pathways from childhood victimization to violence: the role of early aggression and problematic alcohol use', *Violence and Victims*, vol. 21, no. 6, pp. 675-690.

Widom, C. and White, H. 1997, 'Problem behaviours in abused and neglected children grown up: prevalence and co-occurrence of substance abuse, crime and violence', *Criminal Behaviour and Mental Health*, vol. 7, no. 4, pp. 287-310.

Wiech, K., Lin, C., Brodersen, K., Bingel, U., Ploner, M. and Tracey, I. 2010, 'Anterior insula integrates information about salience into perceptual decisions about pain', *Journal of Neuroscience*, vol. 30, pp. 16324-16331.

Wilsnack, S., Vogeltanz, N., Klassen, A. and Harris, T. 1997, 'Childhood sexual abuse and women's substance abuse: national survey findings', *Journal of Studies on Alcohol*, vol. 58, no. 3, pp. 264-271.

Winick, B. 2003, 'Therapeutic jurisprudence and problem solving courts', *Fordham Urban Law Journal*, vol. 30, no. 3, pp. 1055-1103.

Wolfe, J. and Kimerling, R. 1997, 'Gender issues in the assessment of posttraumatic stress disorder', in *Assessing Psychological Trauma and PTSD*, J. Wilson and T. Keane (Ed.'s), Guilford, New York, pp. 192-238.

Wolff, N., Shi, J. and Siegel, J. 2009, 'Patterns of victimization among male and female inmates: evidence of an enduring legacy', *Violence and Victims*, vol. 24, no. 4, pp. 469-484.

Won, L., Bubula, N., McCoy, H., Heller, A. 2001, 'Methamphetamine concentrations in fetal and maternal brain following prenatal exposure', *Neurotoxicology and Teratology*, vol. 23, pp. 349-354.

Wood, W. 2014, 'Justice reinvestment in Australia', *Victims and Offenders: An International Journal of Evidence-based Research, Policy and Practice*, vol. 9, no. 1, pp. 100-119.

Woon, F. and Hedges, D. 2008, 'Hippocampal and amygdala volumes in children and adults with childhood maltreatment-related posttraumatic stress disorder: A meta-analysis', *Hippocampus*, vol. 18, no. 8, pp. 729-736.

Wright, J., Beaver, K., Delisi, M., Vaughn, M., Boisvert, D. and Vaske, J. 2008, 'Lombroso's legacy: the miseducation of criminologists', *Journal of Criminal Justice Education*, vol. 19, no. 3, pp. 325-338.

Wright, J. and Cullen, F. 2012, 'The future of biosocial criminology: beyond scholars' professional justice', *Journal of Contemporary Criminal Justice*, vol. 28, no., 3, pp. 237-253.

Wright, L. and Perrot, T. 2013, *Stress and the developing brain. Colloquium series on the developing brain*, Morgan and Claypool Life Sciences: Maryland.

Wright, R. and Miller, J. 1998, 'Taboo until today? The coverage of biological arguments in criminology textbooks, 1961 to 1970 and 1987 to 1996', *Journal of Criminal Justice*, vol. 26, no.1, pp. 1-19.

Yampolskaya, S., Armstrong, M.I., McNeish, R. 2011, 'Children placed in out-of-home care: Risk factors for involvement with the juvenile justice system', *Violence and Victims*, vol. 26, no. 2, pp. 231-245.

Yampolskaya, S. and Banks, S. 2006, 'An assessment of the extent of child maltreatment using administrative databases', *Assessment*, vol. 13, no. 13, pp. 342-355.

Yampolskaya, S. and Chuang, E. 2012, 'Effects of mental health disorders on the risk of juvenile justice system involvement and recidivism among children placed in out-of-home care', *American Journal of Orthopsychiatry*, vol. 82, no. 4, pp. 585-593.

Yechiam, E., Kanz, J., Bechara, A., Stout, J., Busemeyer, J., Altmaier, E. and Paulsen, J. 2008, 'Neurocognitive deficits related to poor decision making in people behind bars', *Psychonomic Bulletin and Review*, vol. 15, no. 1, pp. 44-51.

Young, J. 2011, *Criminological Imagination*, Polity Press, Cambridge.

Young, L. and Saxe, R. 2009, 'Innocent intentions: a correlation between forgiveness for accidental harm and neural activity', *Neuropsychologia*, vol. 47, pp. 2065-2072.

Yovel, G. Tambini, A. and Brandman, T. 2008, 'The asymmetry of the fusiform face area is a stable individual characteristic that underlies the left-visual-field superiority for faces', *Neuropsychologia*, vol. 46, no. 13, pp. 3061-3068.

Ziersch, E. and Marshall, J. 2012, *The South Australian Drug Court: A Recidivism Study*, SA Office of Crime Statistics and Research: Adelaide.

Zelikowsky, M., Bissiere, S., Hast, T., Bennett, R., Abdipranoto, A., Vissel, B. and Fanselow, M. 2013, 'Prefrontal microcircuit underlies contextual learning after hippocampal loss', *Proceedings of the National Academy of Sciences of the United States of America*, vol. 110, no. 24, pp. 9938-9943.

Legislation

The Commonwealth of Australia Constitution Act 1901 (Cwth) (Austl.)

Crimes (Sentencing Procedure) Act 1999 (NSW) s 3A[d] (Austl.)

Criminal Code (WA) (Austl.)

Criminal Code Amendment Act (Number 2) 1996 (WA) (Austl.)

Criminal Law Amendment Act 1883 (NSW) (Austl.)

Criminal Law Amendment Act 2012 (Qld) (Austl.)

Criminal Law (Criminal Organisation Disruption) Amendment Act 2013 (Qld) (Austl.)

Criminal Law and Other Legislation Amendment Act 2013 (Qld) (Austl.)

Criminal Law (Sentencing) Act 1988 (SA) (Austl.)

Criminal Law (Two Strike Child Sex Offences) Amendment Act 2012 (Qld) (Austl.)

Habitual Criminals Act 1905 (NSW) (Austl.)

Habitual Criminals Act 1957 (NSW) (Austl.)

Juvenile Justice Act 1993 (NT) (Austl.)

Sentencing Act 1991 (Vic) (Austl.)

Sentencing Act 1995 (NT) (Austl.)

Serious Sex Offenders Monitoring Act 2005 (Vic) (Austl.)

Serious Sex Offenders (Detention and Supervision) Act 2009 (Vic) (Austl.)

Tattoo Parlours Act 2013 (Qld) (Austl.)

Vicious Lawless Association Disestablishment Act 2013 (Qld) (Austl.)

Case law

Lowe v The Queen (1984) 154 CLR 606, 612

Makarjian v The Queen (2005) 228 CLR 357, 371

Pearce v The Queen (1998) 194 CLR 610, 624

R v Whyte (2002) NSWCCA 343, para. 147

Strong v R (2005) 216 ALR 219

Dictionaries

“phrenology” n.d. Oxford English Dictionary Online. Oxford University Press. Accessed 5 August 2015 <http://www.oed.com>.

“physiognomy” n.d. Oxford English Dictionary Online. Oxford University Press. Accessed 5 August 2015 <http://www.oed.com>.

“recidivism” n.d. Oxford English Dictionary Online. Oxford University Press. Accessed 25 January 2013 <http://www.oed.com>.