The factors smokers use to distinguish between nicotine withdrawal and cravings for nicotine: results from a mixed-methods survey of students at an Australian university

By

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ABSTRACT

Background: Smoking is a global public health issue responsible for more than eight million deaths annually, with at least 20,000 of these occurring in Australia. Nationally, almost one third of smokers unsuccessfully attempt to quit each year. Nicotine withdrawal symptoms and nicotine craving are often cited as reasons cessation attempts fail. Therefore, smokers having a greater understanding of these processes could assist smokers to quit. There is an absence of research examining smokers' conception of, and distinction between, nicotine withdrawal and nicotine craving.

Methods: Netnography was employed to explore non-traditional sources conveying smokers' understanding of both processes, and a range of disparate views was identified. A primary objective of the research project was to examine if and how smokers distinguish between nicotine withdrawal and cravings for nicotine. The research project was based on critical theory methodology. An online mixed-methods survey of 39 university students who smoke tobacco explored respondents' understanding and experience of both phenomena. Participant responses were analysed to produce three major themes.

Findings: Survey results indicated that most participants considered nicotine withdrawal and nicotine craving to be different processes, a position which contrasts with that of many researchers. A substantial proportion of respondents considered it possible to crave something that was not wanted. The sample also possessed a low level of nicotine pharmacology health literacy, with many participants unaware of how frequently withdrawal is experienced. The low level of nicotine pharmacology health literacy identified, if representative of smokers more broadly, could have significant implications for the ability of many people to quit.

Conclusions: The findings from this research project highlight the need for further research examining smokers' understanding of basic nicotine pharmacology, withdrawal, and craving. Future smoking cessation resources which incorporate such findings may lead to improved rates of quitting and health outcomes.

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.

Jaime Reed

Signature:  Date: November 2023

ACKNOWLEDGEMENT OF COUNTRY

I acknowledge that the research project this thesis was based upon was conducted on Kaurna land. I would also like to acknowledge the Kaurna Elders past, present and emerging. This is, was and always will be Kaurna land.

ACKNOWLEDGEMENTS AND DEDICATION

The researcher of this thesis facilitates a smoking cessation program based on the Allen Carr's Easyway to Stop Smoking method and has observed many participants' lack of awareness of experiencing withdrawal symptoms. This professional experience is consistent with Allen Carr's observations, that many smokers only report experiencing withdrawal when they attempt to quit. Carr's observations were instrumental in informing the research question this thesis is based upon.

On a more personal note, it was Allen Carr's understanding of nicotine withdrawal and craving, along with his many observations related to smoking, that assisted to me to quit. It is difficult to express the gratitude that I have for Allen Carr in developing the Easyway to Stop Smoking method. I believe I would not have been able to stop smoking without it. I read Allen's book in 2000 and was extremely sceptical that I could stop smoking, and even more incredulous that I would find the process easy. I have never been gladder to be wrong. I would also like to sincerely thank Mr John Dicey, CEO of Allen Carr's Easyway International, for supporting my interest to undertake this research project.

A massive thank you is owed to my supervisor, Associate Professor Yvonne Parry, who has been generous with her time, knowledge, support and patience. Associate Professor Parry conveyed a confidence in me that I would complete this thesis, even during times that I did not possess the same belief. Dr Sheila Pais James also provided critical and invaluable input, while steadfastly encouraging and supporting me to complete this thesis for which I am immensely grateful. I would like to express my appreciation for the assistance provided by Alisha Uswatte and the Yungkurrinthi Student Engagement community. Thank you to Kathy Larrigy, a librarian with SA Health, who very patiently assisted me to conduct two literature searches, and helped me to realise I had identified a gap in the literature. I am also grateful to Dr Wilson Compton, text coordinator of the Substance-Related and Addictive Disorders chapter of the DSM-5 (APA, 2013). Dr Compton generously responded to an email that I sent with a question regarding the deletion of craving as a symptom of nicotine withdrawal in the DSM. I would also like to extend my appreciation and gratitude to the research project participants who contributed their time and thoughts to completing the questionnaire. Assistance was provided by David Alston in formatting and editing this thesis.

To my besties Evie and Stevie, thank you for your friendship, the positive distractions from study when possible and still being here after the many times it wasn't. We can go fishing now.

Finally, thank you to my sisters, Christine, Alison and Helen for your love and support while completing this thesis.

This thesis is dedicated to the memory of ngaityai Janet Summers.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Tobacco smoking continues to be a major cause of mortality, and annually is responsible for over eight million deaths globally (World Health Organization [WHO], 2022). The experiences of nicotine withdrawal (Centers for Disease Control and Prevention [CDC], 2022; Department of Health, 2019), and cravings for nicotine (Buczkowski et al., 2014; Liu et al., 2022), or both, (Quit Victoria, 2022; Twyman et al., 2014) have been cited as reasons smokers find quitting difficult. Therefore, increased knowledge of smokers' understanding of nicotine withdrawal and nicotine craving may contribute to the development of improved smoking cessation resources. It is well established that nicotine withdrawal is a physiological process experienced by smokers who develop tolerance (Jackson et al., 2015). The experience of craving, however, is less clearly defined, with numerous theories based on varied conceptions of the phenomenon attempting to elucidate the process (Skinner & Aubin, 2010). Skinner and Aubin (2010) propose that it is unlikely that a single current theory of craving can fully explain the process. Indeed, the findings of the research project which this thesis is based upon indicate that smokers also have disparate understandings of nicotine withdrawal and nicotine craving.[1]

Definitions of nicotine withdrawal and nicotine craving provided by researchers were sought as a reference point prior to conducting the literature review. It was noted, however, that there is a lack of consensus among researchers as to whether craving is a component of withdrawal or a distinct process. During the preceding five decades, researchers who developed the following nicotine withdrawal assessment tools viewed craving to be one of several symptoms that comprise the singular process of nicotine withdrawal: Shiffman-Jarvik Withdrawal Scale (Shiffman & Jarvik, 1976), Mood and Physical Symptom Scale (West et al., 1984), Minnesota Nicotine Withdrawal Scale (Hughes & Hatsukami, 1986), Wisconsin Smoking Withdrawal Scale (Welsch et al., 1999) Cigarette Withdrawal Scale (Etter, 2005) and the Wisconsin Smoking Withdrawal Scale - Revised (Smith et al., 2021). This position is inconsistent with the deletion of craving as a symptom of nicotine withdrawal in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-4; American Psychiatric Association [APA], 1994) and the continued absence of the symptom in the DSM-5 (APA, 2013) and DSM-5 Text Revision (DSM-5TR) (APA, 2022). Additionally, most developers of theories of craving describe craving as a consequence of withdrawal rather than a component of the process, examples of which include: the compensatory response (Siegel, 1983), opponent-process (Solomon

[1] In this thesis, the terms 'withdrawal' and 'craving' will refer to the processes of nicotine withdrawal and nicotine craving respectively unless stated otherwise.

& Corbit, 1974), incentive (Stewart et al., 1984), expectancy (Marlatt, 1985), three-pathways psychobiological (Verheul et al., 1999), temporal difference reinforcement learning (Redish, 2004), unified framework for addiction (Redish et al., 2008), theory of neural opponent motivation (Koob & Le Moal, 2008), incentive sensitization (Robinson & Berridge, 2008), interoceptive dysregulation (Paulus et al., 2009), and neurobiological (Anton, 1999) models. Given the continuing discord among researchers, it perhaps not unexpected that the literature review here did not identify research literature which addressed the research question.

Furthermore, the pathophysiological mechanisms of withdrawal (Wittenberg et al., 2020) and descriptions of craving (Carr & Dicey, 2020; Koob & Le Moal, 2008), set the position of the researcher of this thesis to assert that nicotine withdrawal and cravings for nicotine are two separate processes. The following discussion acknowledges that although pathophysiological processes (Bullmore, 2018), including withdrawal, can influence a person's emotional affect, nicotine withdrawal is ultimately a physiological process. This view of nicotine withdrawal contributed to the development of the research question.

In this chapter smoking-related mortality and smokers requiring numerous attempts to quit will be detailed. The processes of nicotine withdrawal and nicotine craving will be discussed and defined. A distinction between both processes will be proffered, along with a discussion of how this may lead to improved smoking cessation resources. The objectives of the research project will be presented. A framework of each chapter of the thesis will also be included.

1.2 Defining nicotine withdrawal and cravings for nicotine

Nicotine addiction has been researched for more than 90 years (Loud et al., 2022; The Hygienic Exposition in Dresden, 1931), yet disagreement on how to define cravings for nicotine persists. It is an area of contention for a significant proportion of researchers, including those who developed nicotine withdrawal and craving assessment tools (Etter, 2005; Heishman et al., 2003; Heishman et al., 2008; Hughes & Hatsukami, 1986; Shiffman & Jarvik, 1976; Smith et al., 2021; Tiffany & Drobes, 1991; Welsch et al., 1999; West et al., 1984), who consider craving to be a key component of the withdrawal process. Conversely, a number of other researchers do not (Anton, 1999; APA, 1994; APA, 2013; APA, 2022; Koob & Le Moal, 2008; Marlatt, 1985; Paulus et al., 2009; Robinson & Berridge, 2008; Siegel, 1983; Solomon & Corbit, 1974; Stewart et al., 1984; Verheul et al., 1999).

Craving was listed as symptom of nicotine withdrawal in the DSM-3 (APA, 1980). However, in DSM-4, DSM-5 and DSM-5TR (APA, 1994; APA, 2013; APA, 2022) craving was not included as a symptom of nicotine withdrawal but listed as a symptom of tobacco use disorder in the DSM-5 and DSM-5TR (APA, 2013; APA, 2022). Wilson Compton, the text coordinator of the 'Substance-Related and Addictive Disorders' chapter of the DSM-5 (APA, 2013), maintains that while there is a strong association between the symptoms of nicotine use disorder (including craving) and nicotine

withdrawal, both criteria were viewed as conceptually distinct (W. Compton, personal communication, 22 June, 2021). The position that nicotine craving is distinct from nicotine withdrawal warrants craving being examined in more detail, to identify what is being craved.

Although there are aspects other than nicotine that can influence a smoker's perception of withdrawal and craving, these were outside the scope of this research project and thesis. Here the premise is that a person who indicates craving cigarettes is, by default, also signifying craving nicotine. This stance is supported by the recognition that nicotine is the primary pharmacologically active and addictive compound in tobacco (Mahajan et al., 2021). Further, low nicotine or denicotinised cigarettes overwhelmingly decrease tobacco consumption (Gray et al., 2005; Higgins et al., 2019). Additionally, an internal document of British American Tobacco produced in 1959 (as cited in Prochaska & Benowitz, 2019, p. 1) stated that 'To lower nicotine too much might end up destroying the nicotine habit in a large number of consumers'. Various assessment tools have been developed to measure craving specifically, including the Questionnaire on Smoking Urges (QSU) (Tiffany & Drobes, 1991) and the Tobacco Craving Questionnaire (TCQ) (Heishman et al., 2003). The designers of both assessment tools consider craving to be a component of nicotine withdrawal (Heishman et al., 2003; Tiffany & Drobes, 1991). Having established that smokers smoke to obtain nicotine, it remains imperative to examine what advantages, if any, smokers may receive from nicotine and therefore crave.

A discussion on whether smokers crave nicotine because it provides a benefit, relieves withdrawal symptoms, or a combination of the two, is not recent (Tiffany & Drobes, 1991) and continues in current literature (Germovsek et al., 2021; Loganathan & Ho, 2021). Incontrovertibly, it would be advantageous for the tobacco industry to identify such a benefit if it in fact existed. It is possible that research has been conducted attempting to identify a benefit provided to smokers by nicotine. Rasmussen and Proctor (2019) suggest that although the tobacco industry has funded extensive research, when research findings prove unfavourable to the industry, the results often remain unpublished. The identification of an advantage provided by nicotine would demonstrate that smokers are able to crave a benefit unavailable to non-smokers (Carr & Dicey, 2020).

Carr and Dicey (2020) argue that nicotine does not provide a benefit which is unavailable to non-smokers. The researcher of this study concurs with the conclusions of Carr and Dicey (2020). Based on this position, in this thesis nicotine craving is defined as the desire to self-administer nicotine, not to relieve withdrawal symptoms but because the person perceives that nicotine provides a benefit unavailable to a person who does not consume nicotine (Carr & Dicey, 2020). Due to a lack of evidence demonstrating that nicotine consumption is advantageous, the terms 'perceives' or 'perceived' have been included in this thesis when discussing the 'advantages' of smoking and nicotine. Recognition of this absence of research facilitates examination of nicotine craving, secern

from nicotine withdrawal. Undeniably, it is this stance which underpins the originality of the current thesis. A definition of nicotine withdrawal is considered next.

To provide context for the definition of nicotine withdrawal utilised in this thesis, the process of up-regulation or neuroadaptation requires explanation. Acetylcholine (ACh) is an endogenous neurotransmitter which activates nicotinic acetylcholine receptors (nAChRs) located on neurons within the central nervous system and throughout the body. Once ACh has combined with the receptor and the desired outcome has been achieved, the enzyme acetylcholinesterase (AChE) breaks down the ACh to prevent the neurotransmitters' continued effect (Bullock & Manias, 2016). The structure of the nicotine molecule is similar to ACh, allowing it to bind to the nACh receptor; however, nicotine binds for a significantly longer period than ACh. The extended occupancy of the nAChRs by nicotine reduces the opportunity for ACh to bind with the receptors and produce its effect. In order for the body to maintain homeostasis, an increased number of nAChRs are produced in the process called up-regulation or neuroadaptation (Wittenberg et al., 2020). Smokers have an increased density of nAChRs, ranging between 25% and 200%, compared with non-smokers (Mukhin et al., 2008). Withdrawal symptoms are then produced when the absence of nicotine reduces the number of occupied nAChRs. After a period of abstinence, the number of nAChRs in the brain returns to pre-smoking levels, resulting in the cessation of withdrawal symptoms (McLaughlin et al., 2015). The period within which withdrawal symptoms occur is therefore time limited.

Wittenberg et al. define nicotine withdrawal 'as a combination of affective and somatic symptoms that appear soon after nicotine abstinence, reflecting a change in neurochemistry caused by the absence of the drug' (2020, p. 4). This is a narrow definition as the researchers define nicotine withdrawal by the absence of the drug only, rather than an absence of the drug combined with the physiological changes caused by up-regulation. Utilising single photon emission computed tomography (SPECT) scans, Cosgrove et al. (2009) found that up-regulation of β_2- nAChRs persisted up to four weeks after quitting and returned to levels equivalent to a non-smoker following six to twelve weeks of abstinence. Brody et al. (2014) conducted PET (positron emission tomography) scans on 81 smokers prior to a quit attempt. The researchers found those with lower levels of up-regulation were more likely to be successful in quitting (Brody et al., 2014). The process of up-regulation therefore clearly impacts on the quitting process. Based on the previous discussion, the researcher of this study defines nicotine withdrawal as the physiological process of nicotine leaving the body and symptoms caused by up-regulation (due to previous intake of the drug) as the body returns to its former non-neuroadaptive state. It is on this definition of nicotine withdrawal that discussion of the withdrawal process in this thesis will be based. Frequently, craving and withdrawal occur in a person who has developed an addiction to a particular substance, including nicotine. The American Society of Addiction Medicine (ASAM) define addiction as "a treatable, chronic medical

disease involving complex interactions among brain circuits, genetics, the environment, and an individual's life experiences. People with [an] addiction use substances or engage in behaviors that become compulsive and often continue despite harmful consequences" (ASAM, 2023). It is further suggested by this researcher that an individual's understanding, perception, experience and interpretation of their addiction (including withdrawal and craving) will influence the ability of the person to end the addiction.

1.3 Allen Carr's view of nicotine withdrawal and cravings for nicotine

Nicotine has an average half-life of approximately two hours (Ziedonis et al., 2017) which causes the nicotine level in the blood to reduce by 50% two hours after smoking (Hallare & Gerriets, 2022), and as a result the smoker experiences withdrawal symptoms. Carr and Dicey (2020) maintains that most smokers are unaware of how quickly nicotine leaves the body and that many perceive withdrawal as experienced only when a quit attempt is made. Furthermore, it is the professional experience of the researcher of this thesis that most smokers perceive that withdrawal is only experienced during the time taken for nicotine to leave the body. Additionally, only a very small proportion of smokers are aware of the process of neuroadaptation.

Foundational to the Allen Carr (Carr & Dicey, 2020) method is the position that nicotine is not advantageous in any way. Carr and Dicey (2020) argue that due to a majority of smokers being unaware of how often withdrawal is experienced, nicotine withdrawal is frequently recognised by the smoker not as withdrawal but as a feeling of wanting a cigarette, which is interpreted as craving. Juxtaposing these stances, Carr and Dicey (2020) recognise that the one pseudo benefit a smoker receives from nicotine is the temporary relief of withdrawal symptoms, and in the process is able to feel like a non-smoker who does not suffer withdrawal symptoms. A central tenet of the cessation method is the counterintuitive thesis that smokers smoke solely to feel like non-smokers who do not experience withdrawal symptoms (Carr & Dicey, 2020). Although Carr and Dicey (2020) do not discuss neuroadaptation, the authors recognise that withdrawal symptoms occur after nicotine has left the body. A smoker who is aware of how quickly nicotine leaves the body, and that up-regulation causes withdrawal symptoms after the drug has left the body, is undoubtedly in a better position to quit. Possessing this knowledge, the smoker can then question what is being experienced and arrive at one of three conclusions.

Despite understanding the withdrawal process and neuroadaptation, a proportion of smokers may continue to interpret withdrawal symptoms as a craving for nicotine. It is questionable if a person arriving at this conclusion has benefited from an understanding of up-regulation. A second possible interpretation is that withdrawal and craving are being experienced concurrently. This understanding is more advantageous as the entire experience is not viewed as craving, and consequently any perception of deprivation is reduced. If cigarettes are viewed as not providing a benefit, a third

interpretation is possible, namely that the person is not craving a cigarette per se, but rather is experiencing time-limited withdrawal symptoms (Carr & Dicey, 2020). This last interpretation puts smokers in an advantageous position whereby the experience of withdrawal is acknowledged as a physiological process only, and not viewed as a form of deprivation (Carr & Dicey, 2020). A person who interprets the quitting process in this manner is unlikely to crave cigarettes or nicotine, as that person does not feel deprived of a benefit (Carr & Dicey, 2020).

1.4 Tobacco related mortality

Nationally, the Australian Institute of Health and Welfare (AIHW) estimates that smoking-related illness was responsible for almost 20,500 deaths or 13% of total deaths in 2018 (AIHW, 2021). The impact of smoking on health is well established (AIHW, 2021). Furthermore, most smokers understand there are numerous potentially fatal health risks associated with smoking (Brennan et al., 2018). Despite this awareness, approximately 2.9 million people in Australia continue to smoke (AIHW, 2020c).

1.5 Who is most likely to smoke?

Research conducted by the AIHW (2020c) demonstrates that smoking rates are higher among disadvantaged populations. Nationally, in 2019 daily smoking rates among Aboriginal and Torres Strait Islander people were 19% compared with 10% for non-Indigenous Australians. Citizens with an education to Year 11 or lower, had a smoking rate of 26% compared with 5% of those with a bachelor's or higher degree. Consistent with this finding, people in the first or most disadvantaged quintile for socio-economic status (SES) had a smoking rate of 18% compared with 5% of those in the fifth, or most advantaged, quintile. Finally, smoking rates for heterosexual people were 10% compared with 16% for homosexual or bisexual people (AIHW, 2020c). These figures indicate that smoking rates are not evenly spread throughout the population but are concentrated in particular demographic groups with reduced SES. Critical theory recognises that the lived experience and health of a person is strongly influenced by their SES which is determined by factors including class, race, ethnicity, age, gender and sexual orientation (McNaughton & Martimianakis, 2020; Paradis et al., 2020; Parry 2023). Critical theory is therefore the methodology that was employed in the research project was based upon.

1.6 Do smokers want to quit?

Nationally, in 2001, 30% of smokers attempted to stop smoking in the previous twelve months (AIHW, 2002). This statistic has essentially remained unchanged, as almost two decades later 31% of smokers reported they had attempted to quit within the preceding twelve months (AIHW, 2020a). A systematic review conducted by Hughes et al. (2004) confirmed that only between 3% and 5% of unassisted quit attempts were successful. Creamer et al. (2019) examined quit rates in the United

States, and found only 7% of smokers were able to quit for a period of six to twelve months, regardless of the quitting method used. Undoubtedly, a significant proportion of smokers want to stop smoking and make multiple attempts to quit.

Chaiton et al. (2016) question the accuracy of research which suggests that smokers require between 8 and 14 attempts to successfully quit. These authors reason that should these figures be accurate, and given the number of quit attempts made by smokers, the number of older smokers ought to be significantly lower (Chaiton et al., 2016). Utilising data from the Ontario Tobacco Survey in Canada, Chaiton et al. (2016) reviewed the quit attempts of 1,277 Canadian smokers every six months for a three-year period. These researchers observed that depending on the assessment method used, an average of 6, 19, 29 or 142 attempts were required to successfully quit. Chaiton et al. (2016) suggest that the higher number of quit attempts was more representative of smokers' experiences. The researchers posit that earlier studies cited a lower number of attempts due to the use of cross-sectional studies rather than longitudinal studies, and an inability of smokers to accurately recall quit attempts (Chaiton et al., 2016). The findings of Chaiton et al. (2016) are more closely aligned with those of Borland et al. (2012). These researchers reported on a seven-year longitudinal study involving 21,613 smokers from Australia, Canada, the United Kingdom and the United States. The researchers found that by the age of 40 the 'average' smoker had attempted to quit smoking more than 20 times (Borland et al., 2012). The statistics cited above demonstrate that a significant percentage of smokers attempt to quit but experience difficulty succeeding.

1.7 Why do smokers find it difficult to quit?

Numerous factors have been put forward by both smokers and researchers to explain why many smokers are unable to remain abstinent. The addictive properties of nicotine are frequently cited as a reason why quitting is difficult (Pfeffer et al., 2018). Researchers argue that the addictive nature of nicotine causes smokers to experience withdrawal symptoms, including craving, which frequently result in relapse (Buczkowski et al., 2014). Carr and Dicey (2020) maintain, however, that most quit attempts fail due to the smoker feeling deprived of a perceived benefit. Researchers and smokers maintain that cigarettes provide perceived benefits which include smoking being enjoyable, assisting with relaxation, concentration, stress relief, weight control, and enhancing social situations (Carter et al., 2001; Department of Health, 2019). Some smokers also characterise cigarettes as their friend and that quitting is as difficult as 'finding the strength to kill your best friend' (Carter et al., 2001, p. 40). Two decades after the publication of Carter et al.'s (2001) work, these perceptions remain. A health department website includes a former smoker of 50 years describing cigarettes as a friend because cigarettes were always there (South Australia Health, n.d.).

1.8 How many people in Australia have stopped smoking?

The National Drug Strategy (NDS) program was initiated in 1985 with the aim of addressing harm caused by licit and illicit drug use (AIHW, 2020b). A central component of the NDS is the National Drug Strategy Household Survey (NDSHS) (AIHW, 2020b). The NDSHS assesses drug use and has been conducted every two to three years since inception (AIHW, 2020b). The periodical survey has allowed for an accurate assessment of drug use over time (AIHW, 2000; AIHW, 2002; AIHW, 2005; AIHW, 2008; AIHW, 2011; AIHW, 2014; AIHW, 2017; AIHW, 2020a).

Smoking rates have fallen significantly over the past two decades; however, the number of smokers has not decreased in the same proportions. Results from the 2001 NDSHS demonstrated that approximately 23% of people aged 14 and over smoked (AIHW, 2002); this rate had decreased to 11% by 2019 (AIHW, 2020c), yet the number of smokers only decreased by approximately 20% (AIHW, 2002; AIHW, 2020c). There were an estimated 3.6 million smokers in 2001 and an estimated 3 million smokers in 2016 (AIHW, 2002; AIHW, 2017). The reduction in smoking rates occurred largely due to fewer people commencing smoking rather than as a result of smokers quitting (AIHW, 2017). Further, between 2016 and 2019 the number of smokers only decreased by 100,000 (AIHW, 2020c). The above statistics represent a reduction in the number of people smoking of less than 40,000 per year. Nationally, in 2018 approximately 13% (20,482) of deaths resulted from smoking (AIHW, 2019). Banks et al. (2015) confirmed that in Australia two thirds of smoking-related deaths occur in current smokers. Taking this into account, the number of people who actively stopped smoking is significantly lower than the total reduced number of smokers.

Pharmacotherapies are a central component of the health measures implemented to reduce smoking, yet the majority of pharmacotherapy-based quit attempts are unsuccessful. In 2001 and 2016, 30% and 28% of smokers, respectively, unsuccessfully attempted to quit smoking (AIHW, 2002; AIHW, 2017). A significant proportion of these quit attempts would have included pharmacotherapy (Pharmaceutical Benefits Scheme Drug Utilisation Sub-Committee [PBSDUSC], 2016). A Cochrane systematic review of smoking cessation pharmacotherapies included 27 trials involving 12,625 participants (Cahill et al., 2016). The researchers (Cahill et al., 2016) confirmed that the number needed to treat (NNT) to assist one person to stop smoking with pharmacotherapies were: varenicline (11), bupropion (22), and nicotine replacement therapy (NRT) (23). The findings of Cahill et al. (2016) are consistent with pharmacotherapy use and smoking cessation outcomes in Australia (AIHW, 2017; PBSDUSC, 2016), which will now be discussed in more detail.

Nationally, between 2000 and 2015 more than 1.7 million people were prescribed a Pharmaceutical Benefits Scheme (PBS) funded smoking cessation pharmacotherapy for the first time (PBSDUSC, 2016). During the same period more than five million PBS funded prescriptions were dispensed (PBSDUSC, 2016). The use of pharmacotherapies does not occur in isolation. Smokers who are

prescribed PBS funded pharmacotherapies are also required to undertake smoking cessation-based counselling (PBS, n.d.). Although the reporting period of 2000 to 2015 cited does not coincide exactly with the NDSHS's of 2001 and 2016, the approximation of the dates allows inferences on the effectiveness of pharmacotherapies to be made (AIHW, 2002; AIHW, 2017; PBSDUSC, 2016). The magnitude of pharmacotherapy use and accompanying counselling, coupled with the slow decrease in the number of smokers described above, thus substantiates the need for improved smoking cessation programs.

In 2019, approximately 31% of smokers unsuccessfully attempted to quit (AIHW, 2020a). It was noted above that the experience of nicotine withdrawal (CDC, 2022; Department of Health, 2019) and nicotine craving (Buczkowski et al., 2014; Liu et al., 2022) or both (Quit Victoria, 2022; Twyman et al., 2014) were cited as reasons smokers find quitting difficult. Smokers have also indicated that withdrawal and craving can make quitting unmanageable (Chean et al., 2019). Clear advice on how to navigate both processes is necessary to assist smokers to quit, however it disputable that smokers receive this, as disagreement continues between researchers on whether withdrawal and craving are separate or distinct phenomena. Undoubtedly, the likelihood of quitting is increased when the provider of advice has the same understanding of withdrawal and craving as the receiver of advice attempting to navigate both processes. Indeed, as indicated in a post on the iCanQuit website forum run by the Cancer Institute NSW (Cancer Institute NSW, 2022), a smoker contemplating quitting wanted to be able distinguish between the two processes. Poster 1[2] (2015) asked 'could [anyone] tell me what the difference is between a withdrawal symptom and a craving'? In order for a smoker to answer this question, it is essential that the smoker has basic nicotine pharmacology health literacy to be cognisant about how frequently nicotine withdrawal is experienced. Determining respondents' understanding of how frequently withdrawal occurs was one of the six objectives of the research project, which will be presented next.

1.9 Aims and objectives of the study

The primary aim of the research project was to explore smokers' understanding of nicotine withdrawal and cravings for nicotine, and how smokers differentiated between these phenomena. The research project sought to examine if smokers had limited understanding of these processes, and if identified, investigated in future research and utilised to improve smoking cessation resources.

[2] Although the posts are located on a publicly accessible website, in this thesis the usernames of forum participants will be substituted with the name 'Poster' and a number to indicate the order in which the forum member's post appears in this thesis.

Objective 1: Explore smokers' understanding and experience of nicotine withdrawal

Survey respondents were asked the question: 'How many times or how often have you experienced nicotine withdrawal?' Respondents were also asked if they considered craving to be a component of withdrawal.

Objective 2: Explore smokers' understanding and experience of cravings for nicotine

Survey respondents were asked the question: 'How many times or how often have you experienced cravings for a cigarette or nicotine?' Objective 2 aimed to determine whether the reports of nicotine craving experienced by respondents are consistent with those reported in the literature. Results from the research will add to the literature on the topic of how often smokers report experiencing cravings for nicotine.

Objective 3: Determine if smokers' understanding of when nicotine withdrawal is experienced is consistent with nicotine pharmacology

Survey respondents were asked the number of cigarettes smoked per day, the number of quit attempts made and how frequently withdrawal symptoms have been experienced to determine if the respondents' reports of withdrawal are congruent with nicotine pharmacology.

Objective 4: Identify the information sources smokers' understandings of nicotine withdrawal are based upon

Survey respondents were asked the question, 'Where did you gain your understanding of nicotine withdrawal from?' Answers to this question aimed to provide information on whether smokers' understanding of withdrawal is based on scientific knowledge or other sources.

Objective 5: Identify the information sources smokers' understandings of nicotine craving are based upon

The survey respondents were also asked to indicate the information sources their knowledge of craving were derived from.

Objective 6: Ascertain why smokers do, or do not see themselves, or are uncertain about whether they are able to have control over craving something that they do not want.

Survey respondents were asked the questions: 'Do you think that you can crave something that you don't want? Yes/No/ Not sure'; and 'Please write your thoughts on why you gave the answer "Yes", "No" or "Not sure".'

It was anticipated that answering of the survey questions, including those cited above, would facilitate the research objectives being met as numerous questions were developed based on specific research objectives. The survey was comprised of 28 questions, 24 which were quantitative with the remainder being qualitative. Survey responses were examined to identify commonalties held among participants and with themes identified in the literature review.

1.10 Thesis outline

1. 10.1 Outline of Chapter 2: Literature review

This chapter discusses the processes utilised to conduct the scoping review. Search terms entered into the PubMed and PsychINFO databases, which resulted in nil research articles that addressed the research question being identified, are provided. As a result of nil research articles being obtained from the search, netnography (Kozinets, 2020) was employed to search for other potential online sources. The concept of netnography is introduced and a rationalisation is offered for utilising this methodology to explore smokers' understanding of withdrawal and craving expressed on the Cancer Institute NSW website forum (2022). Posts from the website iCanQuit (Cancer Institute NSW, 2022) online forum's provided significant insights into smokers' understanding of both phenomena and are included in the review. These posts highlight that there is a range of fundamentally different understandings of nicotine withdrawal and craving held by smokers. Eight themes which emerged from the posts will be presented that demonstrate varying views of both processes.

1.10.2 Outline of Chapter 3: Methods

The mixed-methods questionnaire the research project is based upon is introduced and discussed. The research setting and accompanying constraints on survey distribution are outlined. A justification for the use of critical theory methodology (McNaughton & Martimianakis, 2020; Paradis et al., 2020) is provided by outlining specific population groups which experience higher rates of both smoking and social disadvantage. Further, responses to survey questions were examined as to how they befit a critical theory methodology where new knowledge may emerge of smokers' understanding of withdrawal and craving. Netnography is identified as both a tool utilised conducting the literature review, and in comparative analysis when interpreting the findings of the research project. The trustworthiness, rigour, reliability and validity of the research project are addressed. Finally, the ethical considerations relating to the research project are also considered.

1.10.3 Outline of Chapter 4: Results

This chapter presents the three main themes of the research project, with these being:

1. A majority of smokers viewed withdrawal and craving as two separate processes.
2. Most participants were unaware how often withdrawal is experienced.
3. A majority of participants believed that it was possible to crave something that was also not wanted. Further, a significant proportion of respondents indicated that it was possible to crave nicotine but not wish to smoke.

A range of demographic indicators of the survey participants is outlined including gender, Aboriginal and Torres Strait Islander status, age, and level of education. The respondents' experience of smoking and quitting attempts are also provided.

1.10.4 Outline of Chapter 5: Discussion

Chapter 5 will explore the three main findings of the research project and the implications these findings have for the health literacy of smokers. The findings that smokers' reports of craving are more closely aligned with the experience of nicotine withdrawal than reports of withdrawal are detailed. The potential misinterpretation of nicotine withdrawal as cravings for nicotine will be discussed.

1.10.5 Outline of Chapter 6: Conclusion

The final chapter will detail the attainment of five of the six research project objectives. Limitations on the applications of the findings are identified, with specific reference to the relatively small sample obtained and the degree to which the sample is representative of smokers generally. Recommendations for future research on smokers' understanding of nicotine withdrawal and craving will also be proposed.

1.11 Summary

This chapter has introduced the research question of 'How do smokers distinguish between nicotine withdrawal and craving?' It was established that there is a lack of consensus among researchers as to whether nicotine craving is a component of nicotine withdrawal or a distinct process. An argument was presented as to why the researcher of this thesis considers withdrawal and craving as individual phenomena. It was observed that the distinction between these two processes is a potential basis for developing improved smoking cessation resources. Background information on smoking rates in Australia, including within specific population groups, and the slow reduction in the number of people who smoke, was discussed. The extensive use of pharmacotherapy, and the limited influence this has had in assisting people to quit, was outlined. The need for smoking cessation resources where descriptions of withdrawal and craving held by both the providers and receivers of advice on quitting smoking are congruent was highlighted. Finally, it was also noted that a literature review, which will be presented in the following chapter, did not identify any existing research which addresses the research question.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The preceding introductory chapter presented the research question, namely 'How do tobacco smokers distinguish between nicotine withdrawal and cravings for nicotine?' and provided crucial context on why this is an area of enquiry warranting exploration. Accepted definitions of nicotine craving and nicotine withdrawal were sought as a reference point to discuss views held by smokers. It is apparent, however, that there is a lack of consensus among researchers as to whether craving for nicotine is a component of nicotine withdrawal or a separate process (APA, 2022; Smith et al., 2021). A majority of researchers who have developed nicotine withdrawal and craving assessment tools (Cox et al., 2001; Etter, 2005; Heishman et al., 2003; Heishman et al., 2008; Hughes & Hatsukami, 1986; Shiffman & Jarvik, 1976; Smith et al., 2021; Tiffany & Drobes, 1991; Welsch et al., 1999; West et al., 1984) consider craving to be a component of withdrawal. This position is at odds with the APA (2022) and numerous craving theorists, who describe craving as a separate phenomenon (Anton, 1999; Koob & Le Moal, 2008; Marlatt, 1985; Paulus et al., 2009; Robinson & Berridge, 2008; Siegel, 1983; Solomon & Corbit, 1974; Stewart et al., 1984; Verheul et al., 1999). Given the continuing discord among researchers, it is perhaps not unexpected that the literature review did not identify research articles addressing the research question.

This chapter discusses the steps taken in conducting the literature review. The search terms utilised in both the PubMed and PsychINFO databases are provided in section 2.3 of this thesis. Three librarians assisted on four separate occasions in attempting to locate traditional research literature on the research question. The searches conducted in both databases did not identify sources of information on the research question, establishing that a gap in research literature exists. Data drawn from non-traditional research sources can be included in a scoping literature review (Peters et al., 2021). As descriptions of understanding of phenomena is not restricted to traditional research literature, netnography (Kozinets, 2020) was utilised to search online sources to gain smokers' perspectives on the research question. Posts on the iCanQuit (Cancer Institute NSW, 2022) website provided insight on smokers' comprehension of both processes. A range of disparate understandings of withdrawal and craving held by smokers was identified and arranged into eight themes which are discussed in this chapter.

2.2 Background

The research question was generated from the experience of the researcher of this thesis, of both quitting smoking and facilitating smoking cessation seminars utilising the Allen Carr's Easyway to Stop Smoking method. A scoping review was chosen as an appropriate method of literature review to identify references on the subject. Munn et al. state 'that scoping reviews are an ideal tool to

determine the scope or coverage of a body of literature on a given topic' (2018, p. 2). Additional rationales to conduct a scoping review include 'clarifying concepts and characterizations in the literature, identifying key factors/issues related to a concept, analysing and identifying knowledge gaps' (Khalil et al., 2021, p. 156). The statements cited by Munn et al. (2018) and Khalil et al. (2021) are consistent with the reasoning for choosing a scoping review as the method of literature review in this thesis. Finally, Peters et al. (2015) reiterate that a scoping review can expound definitions and concepts in a particular field, which in this case is the central focus of the research question.

2.3 The literature review method

The methods employed in this review were based upon the Joanna Briggs Institute (JBI) Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Peters et al., 2020). Prior to completing the literature review, the researcher of this thesis met with three different librarians on four separate occasions. At each meeting several literature searches were conducted within several databases. The first two literature searches were conducted with the assistance of Flinders University librarians. The third and fourth literature searches were facilitated by a senior librarian in SA Health. Each of the four searches did not locate articles relevant to the research question, establishing that there is a gap in the literature. The two main data bases searched were Medline and PsychINFO. The search terms utilised, and the results obtained are outlined below in sections 2.3.2 and 2.3.3. The search strategies utilised in Medline and PsychINFO are detailed in Appendix A and Appendix B respectively.

An absence of research articles which address the research question necessitated other literature sources being sought. Peters et al. (2020) state that websites and blogs can be included as evidence sources in a scoping review. Posts made by members of the iCanQuit website forum (Cancer Institute NSW, 2022) are thus included in this thesis and reflect forum participants' understanding of nicotine withdrawal and nicotine craving. The methods for incorporating online posts utilising netnography are outlined by Kozinets (2020). Netnography is a methodology adapted from ethnography which can be employed to research online communities and online cultures (Kozinets, 2020). Posts which describe withdrawal and craving in similar ways were organised into eight themes and are discussed from section 2.5. below.

2.3.1 Inclusion/exclusion criteria

It was anticipated that few, if any, research articles would be identified in the literature search. Only two exclusions were applied to the search, the first of which was to exclude research published before 1980. The search of the literature over an extended period occurred due to an expectation of minimal references being detected. The second exclusion criterion in the review was to exclude studies involving people who vape. This decision was made as not all e-cigarettes contain nicotine (Morgan et al., 2019) and, therefore, study participants may not have had the experience to speak

to the topic of nicotine withdrawal and craving. Smokers included in the review were demographically diverse and therefore the contextual setting for smokers was 'open' (Peters et al., 2020, p. 2123). Both qualitative and quantitative studies conducted based on any methodology were included in the search.

2.3.2 Searching in PubMed

The initial search in the PubMed database yielded 1,009 results from the search terms 'smoker OR nicotine OR tobacco AND (withdrawal AND craving)'. Articles were sought from 1980 onwards. A second search utilising the terms 'smoker OR nicotine OR tobacco AND (withdrawal AND craving) AND (understanding OR perception OR knowledge OR experience OR attitudes)' produced 185 articles. The title of all 185 articles and some abstracts were scrutinised, and it was determined that none addressed the research question. The third and final search produced 187 references after inputting the search terms 'smoker OR nicotine OR tobacco OR Smoking/psychology AND (withdrawal AND craving) AND (understanding OR perception OR knowledge OR experience OR attitudes)'. Again, the titles of all 187 articles, and some abstracts, were read, and it was determined that none were relevant to the research question.

2.3.3 Searching in PsychINFO

As the PubMed search did not identify references which addressed the research question, no exclusions were placed on the search conducted in the PsychINFO database. An initial search utilising the search terms 'smoker.sh OR nicotine.sh OR tobacco.sh OR smoker.tw OR nicotine.tw OR tobacco.tw' produced 40,727 sources. A second search based on the search terms 'craving.sh OR craving.tw OR crave.sh OR crave.tw' yielded 8,762 references. The third search, based on the search terms 'withdrawal.sh OR withdrawal.tw OR withdraw$.sh OR withdraw$.tw', provided 42,257 hits. A total of 658 references were generated from the fourth search, which combined the results of the previous three searches. The search terms 'experience.sh OR experience.tw OR knowledge.sh OR knowledge.tw OR perception.sh OR perception.tw OR attitude.sh OR attitude.tw' were entered for the fifth search, returning 917,420 sources. A sixth and final search combining the fourth and fifth searches produced 80 references. The titles of the 80 references identified were read and all articles were assessed as not addressing the research question. The results of this search, combined with the results of the PubMed database search, are summarised in Figure 2.1 below.

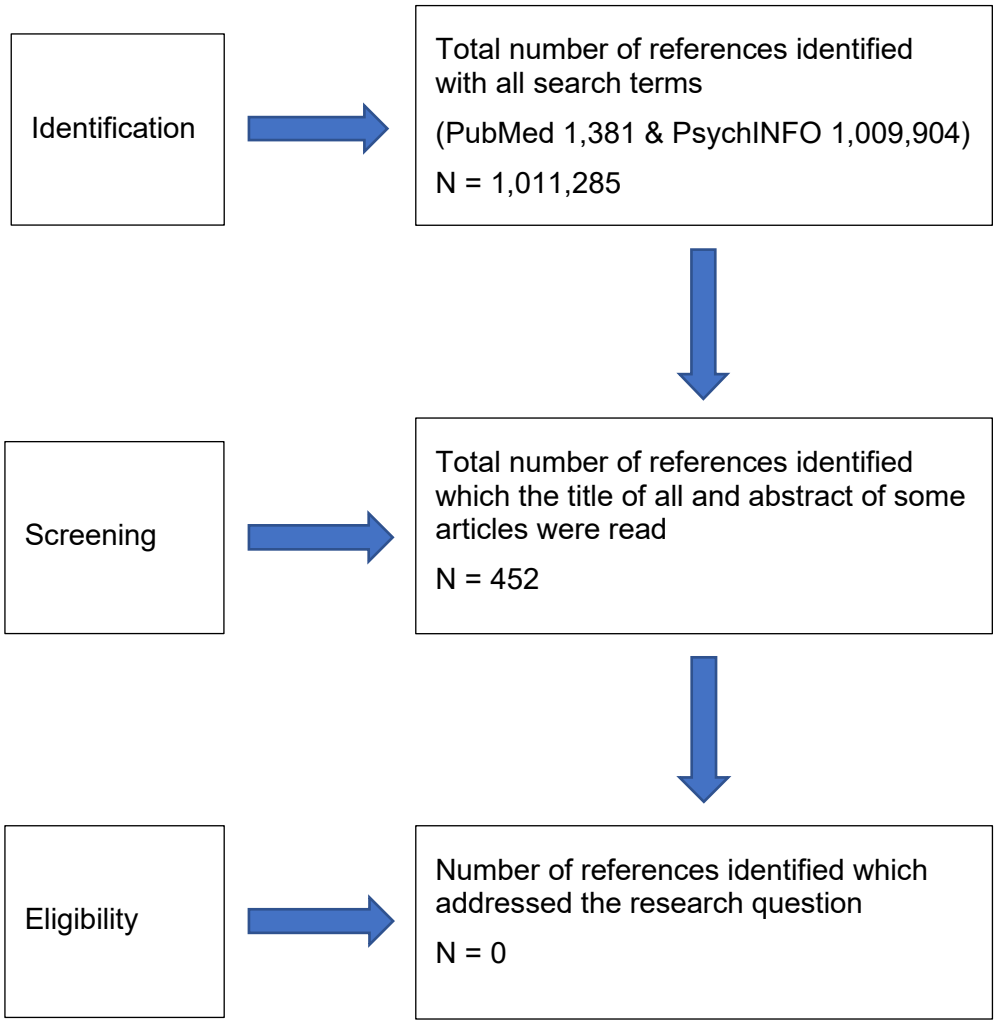

Figure 2.1 A summary of the combined results produced searching Medline and PsychINFO

The diagram in Figure 2.1 was designed by the researcher of this thesis.

2.4 Netnography

Kozinets describes netnography as 'a form of qualitative research that seeks to understand the cultural experiences that encompass and are reflected within the traces, practices, networks and systems of social media' (2020, p. 14). Netnography employs three data-collection operations: investigative, interpretive, and immersive operations (Kozinets, 2020). An investigative procedural operation was utilised in reviewing posts on the iCanQuit (Cancer Institute NSW, 2022) website. Kozinets (2020) notes that data obtained from such an operation are often selected from a large volume of information on social media platforms, and indeed content from the online forum included in this literature review was drawn from more than 10,000 original posts. Kozinets (2020) also observes that netnographic data sources are propagated for the purpose held by the original creator and not in response to a researcher's question, which prevents influence from the researcher on the

data produced. Indeed, the use of passive netnography (Costello et al., 2017) allowed the gathering of data without participating in the forum and potentially influencing the responses provided by forum members. Employing netnography was appropriate (Peters et al., 2020) and undeniably necessary, as searching the databases did not identify a single research article. Further, utilising netnography is congruent with a critical theory based methodology. Critical theory notes that citizens with a reduced position of power are less likely to have their views considered on an issue (McNaughton & Martimianakis, 2020; Paradis et al., 2020; Parry 2023) and this was demonstrated through an absence of sources identified within the research literature.

2.5 Themes identified from posts on the iCanQuit website

The iCanQuit website forum is run by the Cancer Institute NSW (2022) and, as noted above, contains more than 10,000 original posts plus responses from smokers contemplating quitting and those who have quit. All aspects of smoking and quitting are discussed in the forum, including withdrawal and craving. A considerable number of quotes from the website are included in this thesis, primarily in this chapter. The posts contain commentary by and for lay people, and will be cited as they appear. Spelling and grammatical errors will not be indicated with the term '[sic]'. The disparate understandings of withdrawal and craving held by smokers on the forum relating to the research question were arranged into the following eight themes:

1. Viewing nicotine craving as a component of nicotine withdrawal.
2. Viewing nicotine craving as a process separate from nicotine withdrawal.
3. Craving has both physical and psychological components.
4. Withdrawal has both physical and psychological components.
5. Nicotine withdrawal is over once nicotine leaves the body.
6. Smokers have to want to quit to be able to quit.
7. Smokers experience cravings long after withdrawal has ceased.
8. Understanding neuroadaptation can assist in achieving a positive mindset to quit.

2.5.1 Theme: Viewing nicotine craving as a component of nicotine withdrawal

As observed previously, developers of withdrawal and craving assessment tools (Cox et al., 2001; Etter, 2005; Heishman et al., 2003; Heishman et al., 2008; Hughes & Hatsukami, 1986; Shiffman & Jarvik, 1976; Smith et al., 2021; Tiffany & Drobes, 1991; Welsch et al., 1999; West et al., 1984) consider craving to be a component of the withdrawal process. This view appears to be reflected by forum member Poster 2 who quit smoking with the assistance of varenicline. Poster 2 (2019) wrote:

> I haven't had a single craving, nothing to make me feel like I'm withdrawing … and I've even been in triggering situations and not a thing.

Forum member Poster 3 (2020), who also appears to view craving as an element of withdrawal, stated:

> Sure, there will be physical withdrawal, discomfort. Generally 2-3 weeks, but, it is only a craving.

These posts describe craving as an intrinsic feature of the singular process of withdrawal.

2.5.2 Theme: Viewing nicotine craving as separate from withdrawal

There were more frequent posts by forum members indicating that nicotine withdrawal and craving were viewed as distinct processes. Poster 4 (2016) stated:

> I've lost my uncle to cancer … I really need [crave] a smoke anyone have any tips to not smoke? Been 4 weeks since I gave up and I don't want to go through the withdrawals again.

Poster 5 (2016) wrote:

> Last time I quit I struggled a lot with cravings but didn't have many [withdrawal] symptoms.

Finally, Poster 6 (2020) who utilised NRT to stop smoking, responded:

> I knew I needed the patches mainly to take the edge off both cravings and withdrawal.

The three previous posts are consistent with researchers and craving theorists who describe withdrawal and craving as separate phenomena (Anton, 1999; APA, 2022; Koob & Le Moal, 2008; Marlatt, 1985; Paulus et al., 2009; Robinson & Berridge, 2008; Siegel, 1983; Solomon & Corbit, 1974; Stewart et al., 1984; Verheul et al., 1999). Further, the posts reflect the research project's finding that most respondents consider withdrawal and craving to be individual processes.

2.5.3 Theme: Craving has both physical and psychological components

Although the proceeding posts do not indicate whether or not the writer considers craving to be a component of withdrawal, some detail of the person's understanding of craving is provided. A number of forum posts indicated that the member perceived nicotine craving as having both physical and psychological components. Poster 7 (2015) stated:

> I am on day 24 of my final quit journey and I can say that the physical cravings have now passed and I am now experiencing that feeling of normality all the time … I know that any temptation I get in the future to have a cigarette will be purely a mental thing and not a physical thing.

After not smoking for 26 days, Poster 8 (2015) wrote:

> the difference on how I feel is fantastic, when I have a craving I change what im doing and in a few minutes its gone, its all a mind game now, the physical craving has gone.

Finally, Poster 9 (2019) who stopped smoking for 200 days expressed:

> I still have the odd moment or two every now and then when I have a mental craving, but it quickly passes.

The above posts describe craving as having both physical and psychological components and indicate that psychological craving can occur for an extended period. It is possible that these forum members consider craving to a be an element of withdrawal, but it was not possible to determine if this was the case as the contexts which the posts are positioned within were not provided. When conducting the review, traditional research sources such as journal articles that contained smokers' descriptions of craving having physiological and psychological elements were not identified. This theme could be an area of future exploration. The descriptions of craving having physiological and psychological components are congruent with survey questions in the Questionnaire on Smoking Urges (Tiffany & Drobes, 1991) and the Tobacco Craving Questionnaire (Heishman et al., 2008). Interestingly, there is not a survey question included in the Questionnaire on Smoking Urges – Brief (Cox et al., 2001) that measures symptoms which are unequivocally physical in nature.

2.5.4 Theme: Withdrawal has both physical and psychological components

As with the posts included in the previous section, it is not possible to ascertain whether or not the contributors in the current section (2.5.4) view craving as a component of withdrawal. However, aspects of the person's understanding of withdrawal are imparted, and a significant number of posts indicate that nicotine withdrawal was viewed as having both physical and psychological components. Poster 10 (2015), who had quit for 897 days at the time of contributing, wrote:

> I am so pleased I went through the physical and mental withdrawals and I dreamed of being in tis place and thought it never possible.

Other posters commented:

> I like the idea of slowly cutting down, and slowly let champix dull the withdrawal symptoms. From experience, the withdrawal symptoms … both physiological and psychological (as experienced with patches) that really gets me. (Poster 11 (2015))

> Most of life's struggles are won or lost in the mind and smoking is no different, the physical and psychological symptoms of withdrawal is powerful and inevitable but defeat is optional. (Poster 12 (2019))

The above posts clearly describe withdrawal as having physiological and psychological elements. This viewpoint is consistent with the position held by developers of nicotine withdrawal assessment tools (Etter, 2005; Hughes & Hatsukami, 1986; Shiffman & Jarvik, 1976; Smith et al., 2021; Welsch et al., 1999; West et al., 1984), all of which contain survey questions that include both physiological and psychological symptoms.

2.5.5 Theme: Nicotine withdrawal is over once nicotine leaves the body

A theme identified that would contribute to smokers finding it difficult to distinguish between nicotine withdrawal and craving for nicotine is namely that many smokers are unaware that neuroadaptation results in withdrawal symptoms occurring after nicotine has left the body. Poster 13 (2014) stated:

> Quitline WA say the bulk of the nicotine is out of your bloodstream in three hours … and that after that it is your habits and the other poisons in your system that create any discomfort. The nicotine itself does not last long at all.

Poster 14 (2015) offered:

> I think I have found this week harder then the – first week – which seems crazy when all of the nicotine should be out of my system.

Poster 15 (2019) said that:

> Last time I quit (cold turkey) I made it about [11 days] … before the mental aspects became an issue. I called the smokers hotline and they said it made sense because the nicotine was completely gone at that point. Most is gone after 72 hours but traces can hang around for up to two weeks.

The above posts demonstrate a lack of knowledge of the fact that withdrawal symptoms continue for a period after nicotine leaves the body. Potentially, more people would continue to abstain if aware that this is the case. In the absence of knowledge of neuroadaptation, it is more likely that the experience of withdrawal could be misinterpreted as craving and a feeling of deprivation, rather than nicotine withdrawal.

2.5.6 Theme: Smokers have to want to quit to be able to quit

Multiple posts on the forum stated that in order for a smoker to quit, it is necessary that the person wants to quit. This suggestion may appear self-evident, however, the intimation that a smoker has to want to quit could be interpreted as implying that smokers who do not stop do not quit due to wanting to smoke (and therefore craving nicotine). This position assumes that a person who continues to smoke wishes to smoke, rather than allowing for a possible alternate explanation of lacking knowledge on how to succeed (Carr & Dicey, 2020). Poster 16 (2019) wrote:

> The smoker has to eventually come to the … conclusion that they want to not smoke … People can Quit through sheer willpower and determination, until eventually they stumble on to the right mindset of not wanting the smoke anymore.

Poster 17 (2019) conveyed a similar sentiment:

> I believe this as well. If you want to quit you have to persuade yourself that you are not missing out on anything by not smoking.

Poster 18 (2021) suggested:

> I have tried in the past to quit … Truth is you have to want to quit.

The above posts could imply that if a smoker does not quit, by default the person actually wants to smoke, and craves nicotine. Poster 17 also highlights the stance that if a smoker perceives there is something to 'miss out on', and therefore crave, a smoker can want to continue smoking to receive the perceived benefit despite also wishing to cease for other reasons. A thorough exploration of whether a benefit is provided by nicotine and, as a result, can be wanted and craved, is essential to assist smokers to develop a more in-depth understanding of nicotine craving.

2.5.7 Theme: Smokers experience cravings long after withdrawal has ceased

Numerous posts were identified wherein the writer experienced craving following the abatement of withdrawal symptoms. Frequently, forum members reported experiencing cravings months and even years after quitting. Poster 19 (2014) wrote:

> I'm on the eve of 2 years quitting. Can't believe it' I still get cravings and they're annoying, but I won't give in.

Another forum member, Poster 20 (2014), stated:

> well This November will be 4 years. Would you believe sometimes I still would like to have a ciggy but I wont.

Finally, Poster 21 (2016) offered:

> Its been 330 days for me today and I'm still hanging for a cigarette.

Forum members often stated that the frequency and intensity of cravings reduced with continued abstinence; however, the essential nature of cravings was not described as being different once withdrawal had ceased.

2.5.8 Theme: Understanding neuroadaptation can assist in achieving a positive mindset to quit

It is the continuing experience of the researcher of this thesis, while facilitating a smoking cessation program, that people equipped with a more developed understanding of withdrawal can find it easier to quit. This is probably due in part to a person understanding what occurs physiologically during withdrawal, rather than interpreting the experience as a craving and consequently feeling deprived of nicotine. This is reflected in a number of posts on the forum. Poster 22 (2016) suggested:

> Just making a resolution to quit is not nearly enough as smoking is a chemical addiction … As far as quitting goes, knowledge is power and becoming smarter than your addiction is strong, leads to success … The first 72-hours of nicotine withdrawal are the hardest. Withdrawal peaks by day three and two to three weeks after that the brain re-adjusts to function without it

Poster 23 (2016) wrote:

> I still get short pangs for something first thing in the morning because physically, my nicotine receptors are still awake and firing for the next few weeks. However, those pangs aren't really for a smoke.

Another forum member, Poster 24 (2016), stated:

> I am on day 55 now. I'm not getting serious withdrawals anymore and believe I can resist one day at a time but I still crave for a cigarette now and again. I'm hoping these cravings leave me completely after 3 months … I did a search on google and found the text below this paragraph which encouraged me to keep on and to believe that in 3 months its going to be even better than it is now …
>
> Nicotine withdrawal symptoms usually reach their peak 2 to 3 days after you quit, and are gone within 1 to 3 months … It takes at least 3 months for your brain chemistry to return to normal after you quit smoking.

Forum member Poster 25 (2016) responded to Poster 30's contribution, stating:

> I needed to hear that about brain chemistry … no one else seems to mention this stuff that my system needs to learn to function without [nicotine].

The above posts demonstrate that there is range of understandings of withdrawal and cravings held by smokers, many of which are either congruent or incongruent with researchers, depending on the specific assessment tool or theory of craving the post is being compared with. Of note are several posts which indicated that an understanding that withdrawal symptoms continue after nicotine leaves

the body assisted those posters in remaining abstinent. Indeed, recognition of this occurrence was one of the factors that informed the research question.

2.6 The gap in the literature

Researchers report that nicotine withdrawal symptoms (CDC, 2022; Department of Health, 2019) and cravings for nicotine (Buczkowski, et al., 2014; Liu et al., 2022), or both (Quit Victoria, 2022; Twyman et al.; 2014) frequently cause quit attempts to fail. Numerous posts on the iCanQuit (Cancer Institute NSW, 2022) website forum concur with these assertions. The literature review outlined above demonstrates there is a dearth of research which examines the research question. The forum posts analysed in this review indicate that there is a range of fundamentally different understandings of nicotine withdrawal and nicotine craving held by smokers. This has significant implications for the development of smoking cessation resources, which often include advice on how to navigate both processes. Therefore, interpretation of advice on how to approach nicotine withdrawal and craving could, depending on a smoker's understanding of both phenomena, vary significantly from what is intended by researchers, potentially reducing the likelihood of quitting. It is the perspective of this researcher that development of smoking cessation programs where participants objectively question what benefit, if any they receive from nicotine, together with an understanding of neuroadaptation and the withdrawal process, smokers would have an increased likelihood of quitting.

2.7 Summary

This chapter outlined the steps undertaken in conducting the scoping literature review. The dearth of research articles exploring if and how smokers distinguish between nicotine withdrawal and cravings for nicotine demonstrates a clear gap in the research literature. Netnography was employed to identify and review other sources to explore the research question. Eight themes emerged from posts on the iCanQuit website forum run by the Cancer Institute NSW (2022), which reflected that smokers hold a range of disparate understandings of nicotine withdrawal and craving. The conducting of research to answer the research question of how smokers distinguish between both processes has the potential to improve smoking cessation resources and increase the number of people who successfully quit.

The next chapter will discuss the methods utilised to conduct the mixed-methods survey (Polit & Beck, 2019) on how university students who smoke tobacco differentiate between nicotine withdrawal and cravings for nicotine. The challenges encountered with survey distribution, ethical considerations, and data collection and storage for the research project will be outlined. An explanation for the use of a critical methodology underpinning the research project will be presented. The issues of trustworthiness, rigour, reliability and validity will also be addressed.

CHAPTER 3: METHODS

3.1 Introduction

The preceding chapter established that a gap in the literature exists where the research question has not been examined. The current chapter discusses the research methods utilised to explore the research question. A justification of critical theory (McNaughton & Martimianakis, 2020; Paradis et al., 2020), the methodology the research project was based upon, is provided. Ethical considerations, including the data collection and storage processes relevant to the project, are discussed. The trustworthiness, rigour, validity and reliability of the study will also be discussed.

3.2 Methodology

As observed above, the current research project is based upon critical methodology. Critical methodology is an appropriate paradigm to employ as health status, including smoking status, is fundamentally impacted by a person's position in society and the degree of power held by the person associated with that position (McNaughton & Martimianakis, 2020; Paradis et al., 2020). Tobacco companies direct marketing programs towards population groups with reduced power in society such as young people, people with limited income, and people of colour (Oregon Health Authority Public Health Division [OHAPHD], 2018). The targeting of a specific population group with reduced power in society is reflected in a quote by Eric Le Gresley of the World Health Organization. Le Gresley stated in 1999:

> The world's most widespread, serious infection is purposely spread by its vector: the tobacco industry … Rather than a tiny insect, this vector has economic resources rivalling those of many of the world's largest governments … Its spread is mapped out in mahogany-lined boardrooms; it breeds its resistance to countermeasures in political backrooms; and it seizes its victims in adolescent bedrooms (as cited in Proctor, 2012, p. 256).

Perks et al. (2018) confirm that the three most heavily advertised cigarette brands in the United States are Marlboro, Newport and Camel. The researchers also found that the three most popular tobacco brands among high school students in the United States were Marlboro (48%), Newport (16%) and Camel (13%) (Perks et al., 2018). Students who denied exposure to tobacco advertising, however, were less likely to report having a favourite brand (Perks et al., 2018), indicating the effectiveness of tobacco advertising in impacting young people.

In the United States, television and billboard tobacco advertising were banned in 1971 and 1998 respectively, which led tobacco companies to concentrate their marketing in retail outlets (OHAPHD, 2018). A survey of almost 2000 retail outlets in Oregon found that tobacco marketing was aimed at

the young, the poor, and people of colour (OHAPHD, 2018). The marketing strategies included flavoured tobacco to appeal to younger consumers, selling at discounted prices, and selling a small number of cigarettes per transaction to attract those with limited income (OHAPHD, 2018). Marketing depicting images of liberation were also located in areas with a high percentage of African American residents (OHAPHD, 2018). The targeting of people with reduced power in society was overtly conveyed in a statement reportedly made by an R.J. Reynolds Tobacco Company executive. When asked why the company executives did not smoke, the response given was: 'Are you kidding? We reserve that right for the poor, the young, the black and the stupid' (Herbert, 1993). Additionally, the SES of a person is potentially further reduced due to the health and financial impacts of smoking.

Critical theory argues that in a capitalist economy, working-class people and other minority groups are suppressed by an influential ruling class (McNaughton & Martimianakis, 2020; Paradis et al., 2020). The relative power possessed by each group in society directly impacts the life events experienced and choices available to an individual, including those relating to health (Muldoon & Jackson, 2018). The stance held by critical theorists contrasts starkly with positivistic or empirical theorists, such as Auguste Comte and Emile Durkheim (Paradis et al., 2020). Positivistic or empirical theorists search for 'universal rules for human behavior' to explain the experience of the individual (Paradis et al., 2020, p. 842). Critical theory, however, recognises that the lived experience of a person is strongly influenced by factors including class, race, ethnicity, age, gender and sexual orientation (Paradis et al., 2020; Parry 2023). Critical theory is therefore an appropriate methodology on which to base the research project, as smoking rates are unevenly distributed throughout the population and concentrated in demographic groups with lower SES (AIHW, 2020b). The use of critical theory and methodology in the current research project is represented through survey questions which directly measure multiple aspects of the participants' SES (Parry 2023). As the survey involved university students it is acknowledged that the SES of the participant group regarding education is not representative of smokers more generally (AIHW, 2020c). Critical theory can also be utilised to analyse citizens understanding of concepts and processes (Dahms, 2017; Parry 2023). The examination of smokers' comprehension of withdrawal and craving drawn from responses to qualitative questions situates the research project within a critical theory framework.

3.3 Methods

3.3.1 A mixed-methods survey

An exploratory, mixed-methods (Shields & Smyth, 2016) survey was selected as the research tool to examine the research question. The survey is contained in Appendix C. A mixed-methods research approach affords the benefits of both qualitative and quantitative approaches (Polit & Beck, 2019). It is acknowledged that utilising a mixed-methods paradigm could limit the amount of information gained from each individual component of the project (Anderson, 2016). It was envisaged, though, that a mixed-methods design would generate a greater sum of evidence.

According to Rutberg and Bouikidis (2018) the use of mixed-methods allows the researcher to gather two data sets from which analyses can be developed and deductions made. Utilising a mixed-methods approach, concatenation can take place at the level of paradigm, methodology and method (Anderson, 2016). The findings of both the quantitative and qualitative portions of the research can corroborate the other (Anderson, 2016). Further, the process of triangulation that occurs with mixed-methods research can facilitate the gathering of a more complete set of data (Whitehead & Day, 2016). Additionally, the potential for bias to occur is reduced by the use of more than one method (Whitehead & Day, 2016). It was considered, then, that the use of a mixed-methods approach could generate a more robust set of results.

The inclusion of the words ‘How do’ in the research question ‘How do tobacco smokers differentiate between when they are experiencing nicotine withdrawal and cravings for nicotine?’ lends the research question to being explored with a qualitative approach. An advantage of asking a qualitative question is that participants are able to provide unrestricted responses (Whitehead & Day, 2016). This question and other qualitative questions in the survey facilitated data being captured that was less likely to be provided in responses to quantitative questions. Responses provided to qualitative questions are also more likely to contain rich detail of the participants’ understanding of the phenomena being researched (Whitehead & Day, 2016), which in this case was fundamental to the research question of distinguishing between nicotine withdrawal and craving.

The quantitative component of a mixed-methods approach enables gathering of information to test a hypothesis and make deductions from the data obtained (Anderson, 2016). Although the research question is a qualitative one, it would not have been possible to fully examine the question without also asking quantitative questions such as how often participants experienced withdrawal and craving. It was noted in the preceding chapter that it appears the research question has not been investigated. This necessitated the employment of netnography to explore smokers’ conception of withdrawal and craving presented on the iCanQuit website forum run by the Cancer Institute NSW (2022). Descriptions of withdrawal and craving identified on the website forum contributed the development of a number of questionnaire items resulting in a mixed-methods approach.

Several of the most recent surveys on smoking among Australian university students were conducted by Smith and Leggat (2007), Sun et al. (2011) and Walsh et al. (2012). The survey return rates on the studies were 84% (Smith & Leggat, 2007), 18% (Sun et al., 2011) and 81% (Walsh et al., 2012). The return rates cited was a deciding factor in selecting a questionnaire as a research tool. The qualitative questions of the survey were in part, formed on based on smokers perceptions of withdrawal and craving identified through the netnographic exploration of the iCanQuit website forum. The experience of the researcher conducting smoking cessation seminars also contributed to the development of the questionnaire. A number of the quantitative survey items were included to assess participants understanding of the withdrawal process. A pilot study was not conducted prior

to the dissemination of the questionnaire, resulting in the research project itself being viewed as a pilot study (Lowe, 2019).

3.3.2 The research setting

An online 28 question mixed-methods survey of university students who smoke tobacco was available on the Qualtrics platform for a 20-week period. The method of sampling utilised was convenience sampling (Whitehead & Whitehead, 2016) as the research project participants were drawn from the already formed university student body. The survey was compiled by the researcher and contained 24 quantitative questions and four qualitative questions. The questionnaire was provided to university students with the lived experience of tobacco smoking. Although 89 respondents commenced the questionnaire, a total of just 39 participants completed all or a sufficient number of survey questions to be included in the results, and as a corollary.

3.3.3 Inclusion criteria

The survey was open to all students at the university students aged 17 years or older who were current tobacco smokers at the time of completing the questionnaire. The National Health and Medical Research Council (NH&MRC) (2007) considers young people with sufficient maturity are able to provide consent to participate in research. Current smokers only were included in the research project to reduce the possible influence of recall bias (Althubaiti, 2016) had former smokers participated. Finally, e-cigarette users were excluded from the research project as not all e-cigarettes contain nicotine (Department of Health, 2021) and therefore some e-cigarette users may not have had the requisite experience to answer questions about nicotine withdrawal and craving.

3.3.4 Survey distribution

Prior to 2021 it was possible for a post-graduate student's research project to be the sole topic of an email sent to the university student body, inviting participation. This was a major factor informing the decision to conduct a survey for the research project. The researcher of this thesis was not aware, however, that this means of survey dissemination would be unavailable from 2021. Subsequently, students were informed about research projects via a weekly university email newsletter. The weekly email covered a range of topics, including a generalised invitation to take part in research projects which stated, 'PARTICIPATE IN RESEARCH Would you like to participate in ... University research studies? Participating is a great way to help ... students and researchers. You can browse the studies open for participation' (Flinders University, n.d.).

The survey information was also disseminated via the University Health, Counselling and Disability Service Facebook page, in the service's newsletter, and a survey flyer was placed on the noticeboard in an area visible to students. Flyers were also placed in the Indigenous student lounge, in bathroom areas and on notice boards on two campuses. This process provided 39 participants whose data is included in the analysis. The survey flyer is contained in Appendix D.

3.4 Ethical considerations

According to the World Health Organization it:

> is important to adhere to ethical principles in order to protect the dignity, rights and welfare of research participants. As such all research involving human beings should be reviewed by an ethics committee to ensure that the appropriate ethical standards are being upheld (2023, para. 1).

Further, in order for research to be conducted ethically, informed consent is required from all participants (NH&MRC, 2007). The proposed research project was submitted to the Flinders University Human Research Ethics Committee (Application Number: 2721) and was granted approval. The research project ethics approval notification is contained in Appendix E.

A power differential exists between researchers and research participants, with participants possessing the lesser (NH&MRC, 2007). There is an even greater power imbalance between researchers and specific population groups, who due to their position in society are potentially more vulnerable, as is the case with young people (NH&MRC, 2007). A decision was therefore made not to include students younger than 17 years of age. The second survey question was ‘Are you aged 17 years or older?’ If a respondent indicated being younger than 17 years of age the survey automatically closed, an event which occurred with just one person who commenced the survey.

Frequently, ethical research necessitates that anonymity and confidentiality is provided for participants. Rationales for providing anonymity and confidentiality include providing personal physical safety, preventing professional repercussions, and avoiding personal embarrassment or shame (Neuman & Neuman, 2013). It is well established that a power differential can exist between a researcher and those who are researched (Råheim et al., 2016) due to the nature of the relative positions of those involved in the research process. Providing confidentiality and anonymity to survey respondents reduces the chances of a possible misuse of power (Tourangeau, 2018). Potential survey participants were informed that a decision not to participate or withdraw from the research project would not affect the student’s relationship with Flinders University or its staff. This may have been a greater concern for potential participants had the survey been conducted without confidentiality and anonymity.

3.5 Data collection and storage

The information collected was securely stored throughout the study on a password protected computer and a Flinders University server. During the research process, data which identified participants was not collected, allowing anonymity to be provided. At the completion of the research project all data will be securely stored at Flinders University for at least five years after publication of

the results. Following the required data storage period, the data will be securely destroyed according to Flinders University protocols.

3.6 Trustworthiness, rigour, reliability and validity

Trustworthiness or credibility is a measure of the degree to which results reflect reality (Stahl &King, 2020). Credibility of the qualitative findings in the research project was able to be established through the triangulation (Stahl &King, 2020) of themes which emerged from responses to open-ended questions when compared to those identified with the netnographic sources. A pilot study being conducted prior to the research project would have assisted in further elevating both the trustworthiness of the results obtained from qualitative survey questions, and the rigour of the quantitative questions (Richardson-Tench et al., 2018). This would have allowed comparisons to be made of the results obtained in each research process. Additionally, improvements could have been made to both survey distribution and the questions in the subsequent survey. Trustworthiness and rigour were able to be achieved, however, through the use of a mixed-methods research design (Anderson, 2016; Whitehead & Day, 2016) which was augmented utilising netnography (Kozinets, 2020). Due to the relatively small number of participants, combined with the brevity of responses provided to the qualitative questions in the survey, the degree to which reliability could be demonstrated if the research project were to be repeated is unclear (Richardson-Tench et al., 2018)

Reliability is the extent to which similar results are obtained using the same research tool on different occasions in comparable conditions (Ahmed & Ishtiaq, 2021). As the questionnaire employed in this research project has not been utilised previously or subsequently, it is difficult to establish its reliability. Validity is the degree to which a research tool actually assesses or measures what is intended to be measured (Ahmed & Ishtiaq, 2021). Ahmed and Ishtiaq (2021) contend that the validity of a research tool can be determined by comparing the findings of a different measure of the same concept. As this research project appears to be the first examination of the research question, determining the validity of the questionnaire would be challenging. The degree to which both the internal and external validity of the research findings were achieved was reduced due to several factors. The internal validity of the research project was challenged due to two historical occurrences (Richardson-Tench et al., 2018) taking place during the research project, resulting in a relatively small sample being obtained. As noted above (section 3.3.4), procedural changes prevented potential participants being notified of the project via an email specifically addressing the research project being sent to the student body. Potential research participants were predominantly made aware of the project via flyers placed on campus. Due to the COVID-19 pandemic the number of students attending the university in person was severely reduced, which decreased the number of potential participants being made aware of the project. External validity, or the degree to which the research findings can be applied to other populations, is also limited. The participants surveyed

belonged to a very specific demographic group, resulting in the findings not being fully applicable to smokers more broadly (Richardson-Tench et al., 2018).

3.7 Summary

This chapter has outlined the methods and methodology selected to conduct the online mixed-methods survey. The elucidation of SES factors which affect health status confirmed that critical theory was an appropriate choice of methodology. A newly introduced restriction prevented a dedicated email being sent to the student body inviting participation in the research project, likely significantly reduced the number of survey completions. Additional survey dissemination options were implemented, including the placement of flyers on campus.

The next chapter presents the results obtained in the research project. A number of SES indicators of the survey participants, such as country of birth, first language spoken and level of education attained, will be detailed. Results from quantitative questions about the participants' experience of smoking, including how often nicotine withdrawal is experienced, which highlight a lack of knowledge on nicotine pharmacology, will be presented. The implications this paucity of nicotine pharmacology health literacy has on the ability to quit smoking is contended. Finally, responses to qualitative questions on understandings of withdrawal and craving will also be presented.

CHAPTER 4: RESULTS

4.1 Introduction

The preceding chapter discussed the methods employed in conducting the research project. As noted above, from 2021 it was no longer possible to email the student body inviting participation in a specific research project. This change reduced survey distribution options and in all probability contributed to the low number of completed surveys. The survey was commenced by 89 respondents, and 39 participants completed either all questions or a sufficient number of questions to be included in the results. Despite the relatively small sample, several important findings emerged which could inform future research projects.

The current chapter will outline participant demographic details. Participants' sources of knowledge on withdrawal and craving will be presented. A significant finding of the research project to be discussed is that 80% of respondents considered nicotine withdrawal and craving to be separate processes. Also to be examined is the fact that most participants were unaware of how frequently nicotine withdrawal is experienced. Further, a significant proportion of respondents believed it was possible to crave nicotine but not want to smoke.

4.2 Survey respondent demographics

Demographic details of survey participants were collected from questions in the section of the survey entitled 'About you'. Statistics regarding the respondent's age, gender, Aboriginal and Torres Strait Islander status, country of birth, first language spoken, level of education and whether the participant was enrolled in a health-related course were collected. Unfortunately, due to the relatively small number of surveys returned, it was not possible to draw major conclusions from the demographic details collected. A summary of the participants' demographic details will now be presented

4.2.1 Age

A total of 39 respondents answered the question of the participant's age. The youngest participant was aged 17 and the oldest was 49. The mean participant age was 23.69 years. The standard deviation (SD) was 6.03 while the variance was 36.42.

4.2.2 Gender

Predominantly, female students completed the questionnaire: 94% (n=36) were female, 5% (n=2) were male, while 1% (n=1) identified as 'other'. It is probable that the large proportion of female participants resulted from the researcher of this thesis only being able to place the survey flyers in the female and unisex toilet areas.

4.2.3 Aboriginal and Torres Strait Islander status

The question regarding Aboriginal and Torres Strait Islander status was answered by 39 respondents. Approximately 10% (n=4) of survey participants were Aboriginal. Nil participants identified as Torres Strait Islander or Aboriginal and Torres Strait Islander. It is likely that a comparatively large proportion of respondents were Aboriginal as survey flyers were placed in the Yungkurrinthi Student Engagement Centre.

4.2.4 Country of birth

Australia was the country of birth for 28 (72%) participants, while four respondents (10%) were born in England. Chile, Indonesia, Hong Kong, Kuwait, Malaysia, Nepal and Pakistan were each listed as the country of birth by one respondent.

4.2.5 First language

English was the first language of 33 participants (84%). One respondent each listed the following languages as their first language; Cantonese, Indonesian, Nepali, Polish, Spanish and Urdu.

4.2.6 Highest level of study

A total of 34 respondents answered the survey question asking participants to indicate the highest level of education they had enrolled in, including their current enrolment. This survey question was completed by 27 undergraduate students, four master's students, two PhD students and one graduate certificate student.

4.2.7 Students enrolled in a health-related course

A significant proportion of respondents, 18 (≈46%), were currently enrolled in a health-related course while 21 (≈54%) were not. Had a larger sample been obtained, it may have been possible to observe differences in nicotine pharmacology knowledge between participants enrolled in a health or non-health related course.

4.3 Participants' experience of smoking and quitting

The section of the survey entitled 'You and Smoking' contained questions about the respondents' experience of smoking and quitting. Respondents were asked questions concerning the number of cigarettes smoked per day, the number of quit attempts made, the duration of the longest quit attempt, and reasons for relapse. An outline of the responses will be provided below.

4.3.1 Age started smoking

The youngest age a respondent began smoking was 13 years of age while the oldest was 27 years of age. The mean age at which respondents began smoking was 16.94 years.

4.3.2 Number of cigarettes smoked per day

A total of 38 participants answered the question 'On average how many cigarettes do you smoke a day?' The lowest number indicated was zero and the highest number was 40. It is assumed the respondent who answered zero cigarettes was a casual or intermittent smoker. The mean number of cigarettes smoked per day was 9.9 cigarettes.

4.3.3 Did the participants want to stop smoking?

Answers to the survey question 'Do you want to stop smoking?' indicated that 19 participants (49%) wanted to stop, 13 (33%) were uncertain about wanting to quit, while 7 (18%) respondents wished to continue smoking.

4.3.4 Respondents' attempts to quit smoking

Approximately 69% (n=27) of respondents had previously attempted to quit, compared with 31% (n=12) who had not.

4.3.5 The number of quit attempts made by participants

A total of 26 participants answered the question on how many quit attempts had been made. Twenty-three participants provided a numerical answer and three provided a non-numerical response. Three was the most frequently cited number of quit attempts. The number of quit attempts made by participants is summarised in Figure 4.1, below.

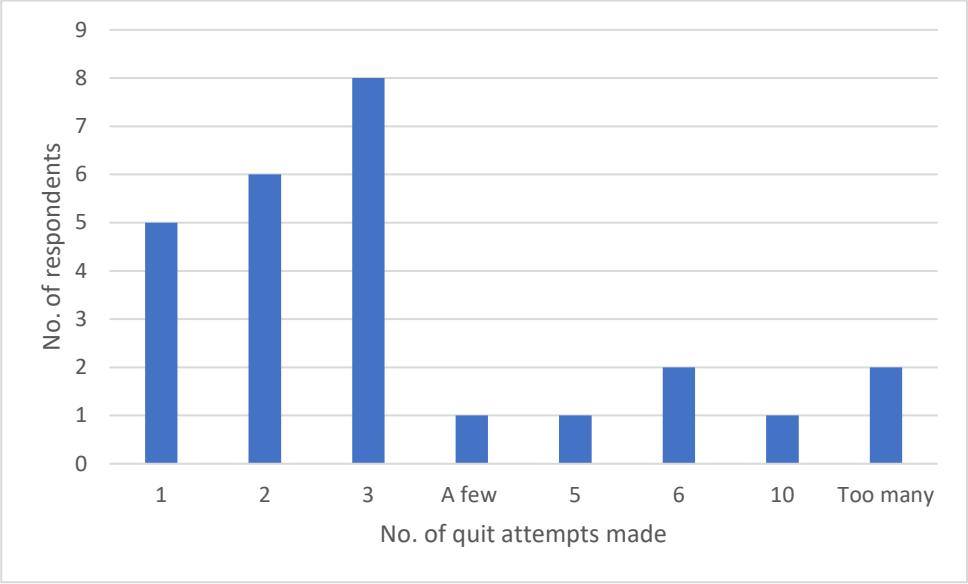

Figure 4.1 Number of quit attempts made by survey participants

Borland et al. (2012) found that by the age of 40, the 'average' smoker would have attempted to quit around 20 times. As the mean age of respondents in the current study was 23.69 years and most participants had attempted to quit three times or less, this would allow more quit attempts to

potentially be made over time, and a ‘future result’ to be more consistent with the findings of Borland et al. (2012).

4.3.6 Reasons for relapse

Respondents who had attempted to quit were asked why relapse had occurred. More than one reason was provided by some of the 28 participants who answered. The most frequently cited reason (n=12) was that smoking was viewed as assisting in stressful situations. The second most frequently reason (n=5) for relapse was that the person wanted to smoke or saw it as enjoyable. Smoking being habitual was a cause of relapse given by four respondents as was smoking being sociable. Two participants cited craving as a reason for relapse. Each of the following factors were cited by one respondent as a cause of relapse: ‘it’s been a part of my life for a long time’, depression, pressure to smoke, bereavement, constantly thinking about smoking, having dreams about smoking, being influenced to smoke, and ‘BPD’. It was assumed that the participant who indicated ‘BPD’, denoted this as an acronym for borderline personality disorder. The causes of relapse indicated by respondents are summarised below in Figure 4.2.

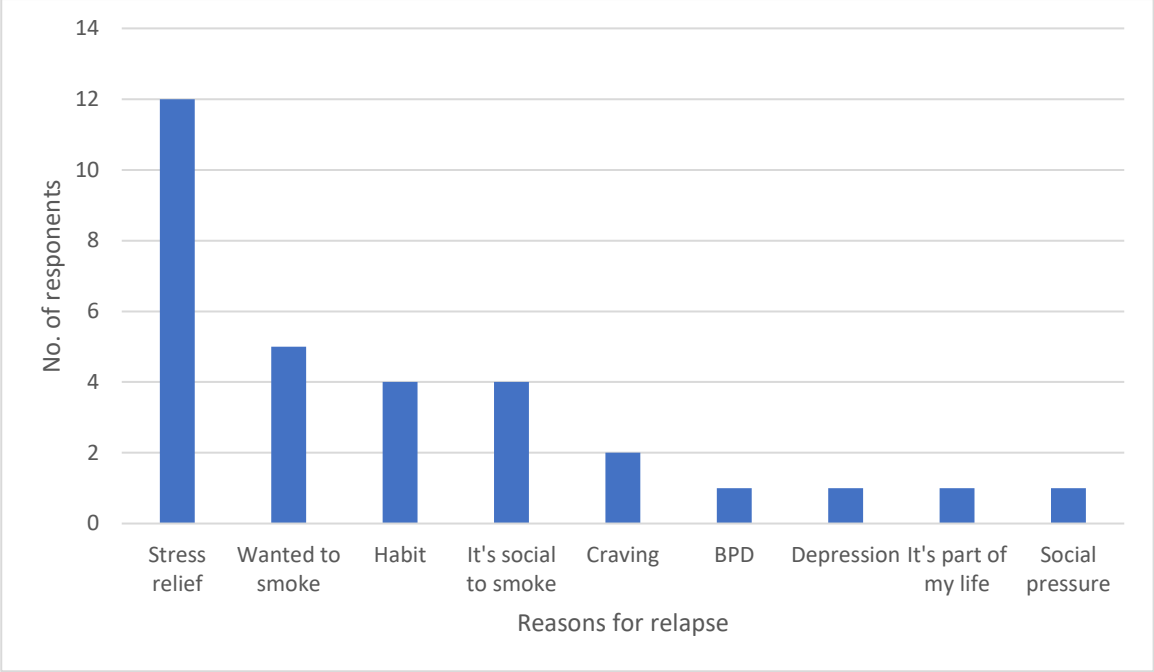

Figure 4.2 Participants’ reasons for relapse on previous quit attempts

A majority of participants (n=12) indicated that a desire to smoke for stress relief was a reason for relapse. The conducting of research which examines if smokers experience less stress than non-smokers in a given situation may assist smokers to quit, if it could be demonstrated that this is not the case. Such a finding would substantiate that stress relief is not a benefit provided by nicotine that can be craved.

4.3.7 Longest quit attempt

Twenty-six participants answered the question 'What is the longest amount of time that you stopped smoking?' A total of four participants quit for a year or longer. The longest periods of abstinence achieved by the survey participants are summarised below in Figure 4.3.

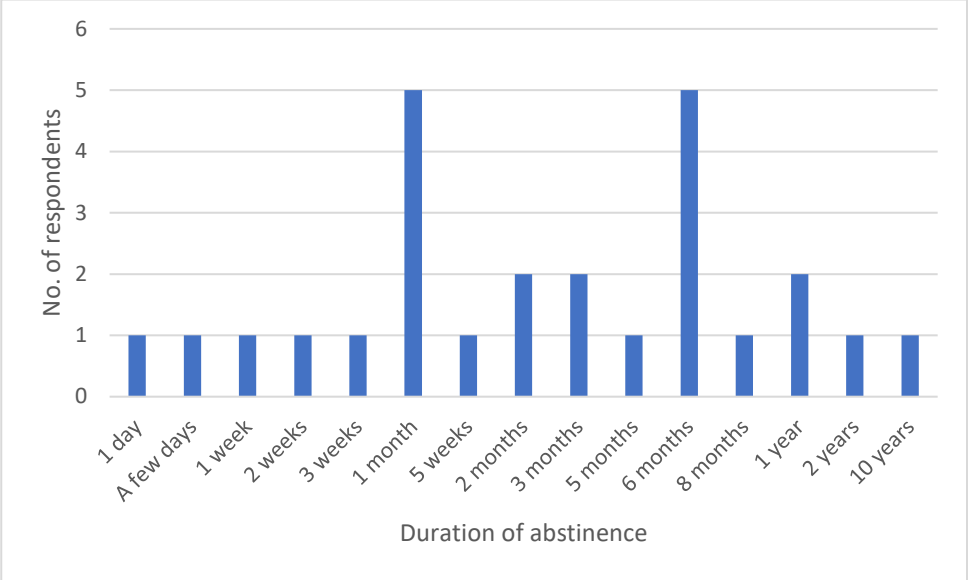

Figure 4.3 Participants' longest quit attempts

The graph above (Figure 4.3) demonstrates that approximately half the respondents relapsed before their nAChRs (nicotinic acetylcholine receptors) returned to pre-smoking levels, and potentially experienced withdrawal symptoms that were interpreted as cravings.

4.4 Participants' sources of information on nicotine withdrawal and nicotine craving

4.4.1 Participants' sources of information on nicotine withdrawal

Twenty-six participants indicated a single source of information on nicotine withdrawal, while three participants listed two knowledge sources. The smoker's own experience and observations was the most frequently cited information source (n=10), followed by the internet (n=5). Figure 4.4, below, summarises the sources of information on nicotine withdrawal listed by the respondents.

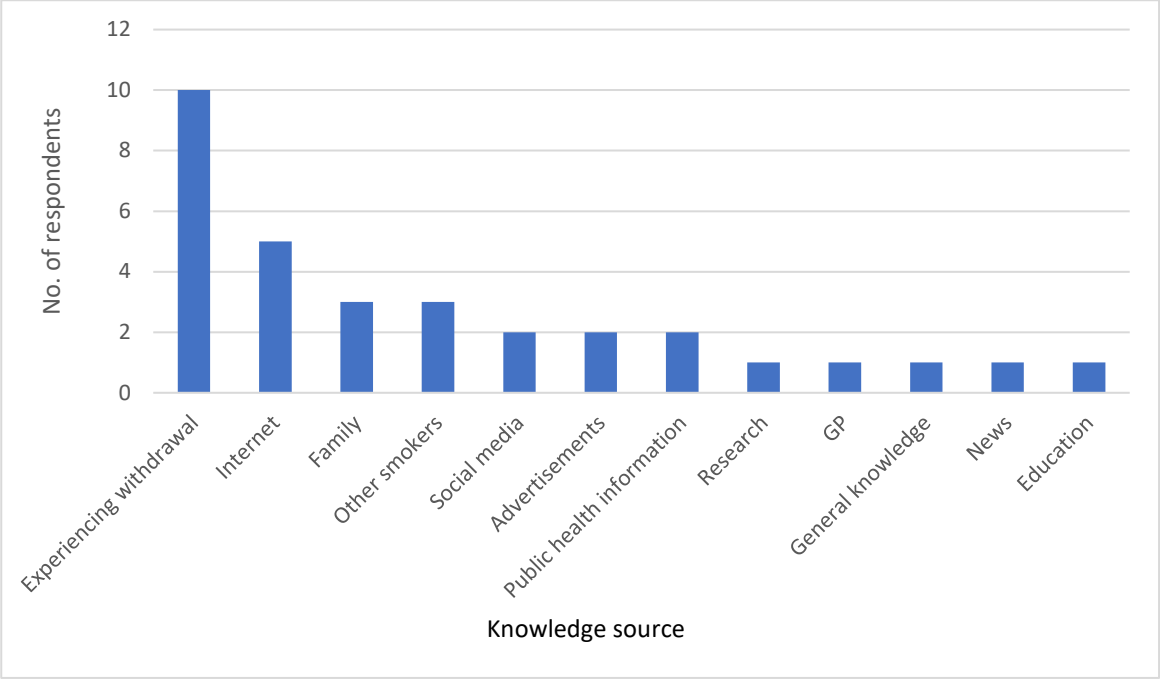

Figure 4.4 Participants' sources of knowledge on nicotine withdrawal

It is interesting to note that many participants (n=10) listed their own experience of withdrawal as a source of information on the process despite most respondents being unaware of how often withdrawal is experienced. With the exception of the knowledge sources of public health information, GPs, research, education or news, it is difficult to ascertain the quality of information provided by the other sources listed.

4.4.2 Participants' sources of information on nicotine craving

A total of 32 respondents indicated one or more sources of information on nicotine craving, sources which were similar to those identified for nicotine withdrawal. A large proportion of participants (n=14) listed personal experience as an information source on craving. Figure 4.5, below, depicts the sources of information on craving identified by respondents.

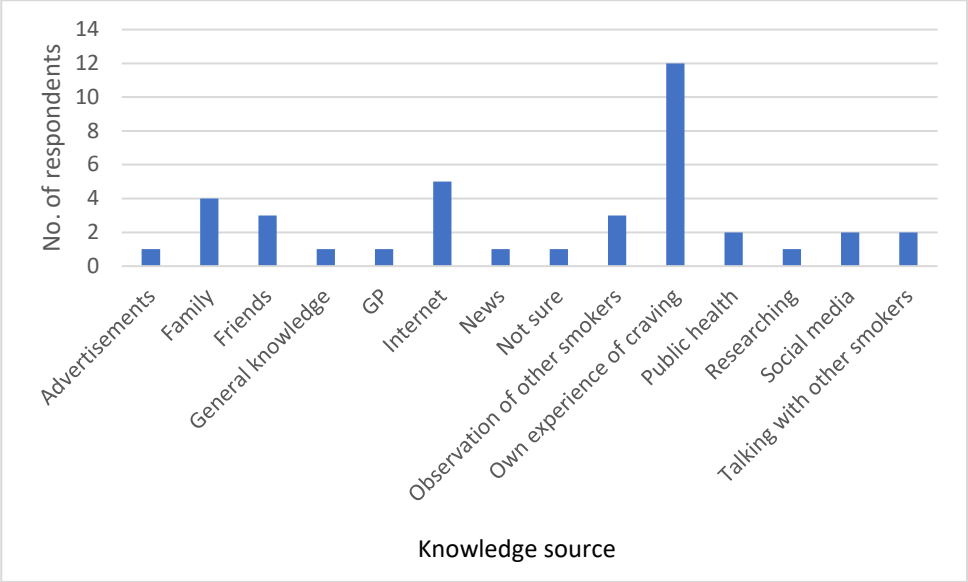

Figure 4.5 Participants' sources of knowledge on nicotine craving

The participants' own experience of craving was the most frequently cited source of information on the process. It is noteworthy that, based on pharmacology, respondents' reports of craving were more closely aligned with nicotine withdrawal than respondents' reports of withdrawal. This is perhaps not unexpected given the low level of nicotine pharmacology health literacy in the sample, the topic which will be discussed next.

4.5 Respondents' knowledge of nicotine pharmacology

It was noted previously that the half-life of nicotine is approximately two hours (Ziedonis et al., 2017), although in some individuals it can be as short as one hour (Murphy, 2021). A drug is largely considered to be eliminated from the body after four to five half-lives (Hallare & Gerriets, 2022). Nicotine withdrawal symptoms can, however, begin to manifest within four hours of smoking a cigarette (McLaughlin et al., 2015).

A total of 33 respondents answered the question 'How long do think it takes for the nicotine in a cigarette to leave your body after you have finished smoking a cigarette?' As nicotine levels can decrease to a point where withdrawal symptoms are experienced within four hours of smoking a cigarette, and approximately 97% of the nicotine is eliminated from the body after ten hours (or five half-lives), participants who indicated that nicotine left the body within four to ten hours were deemed to be aware of how quickly nicotine leaves the body, and therefore (it was assumed) of how often withdrawal symptoms are experienced. On reflection, though, the researcher of this thesis considers this assumption to be not entirely justified, and that more informative data could have been obtained from the potential question: 'How long does it take after smoking a cigarette for the level of nicotine to reduce and cause withdrawal symptoms?'

A summary of respondents' reported quit attempts, frequency of nicotine withdrawal experienced, and time taken for nicotine to leave the body, is provided in the table in Appendix F. Also included in the table are participants' views on whether nicotine withdrawal and craving are part of the same process or are separate processes. The answers provided indicate an awareness by respondents Z, A6, A2 and K that nicotine withdrawal is experienced multiple times per day. Indeed, several participants reported that nicotine withdrawal had only been experienced the number of times a quit attempt had been made, or not experienced at all. Participants' estimates of how quickly nicotine leaves the body are presented below in Figure 4.6.

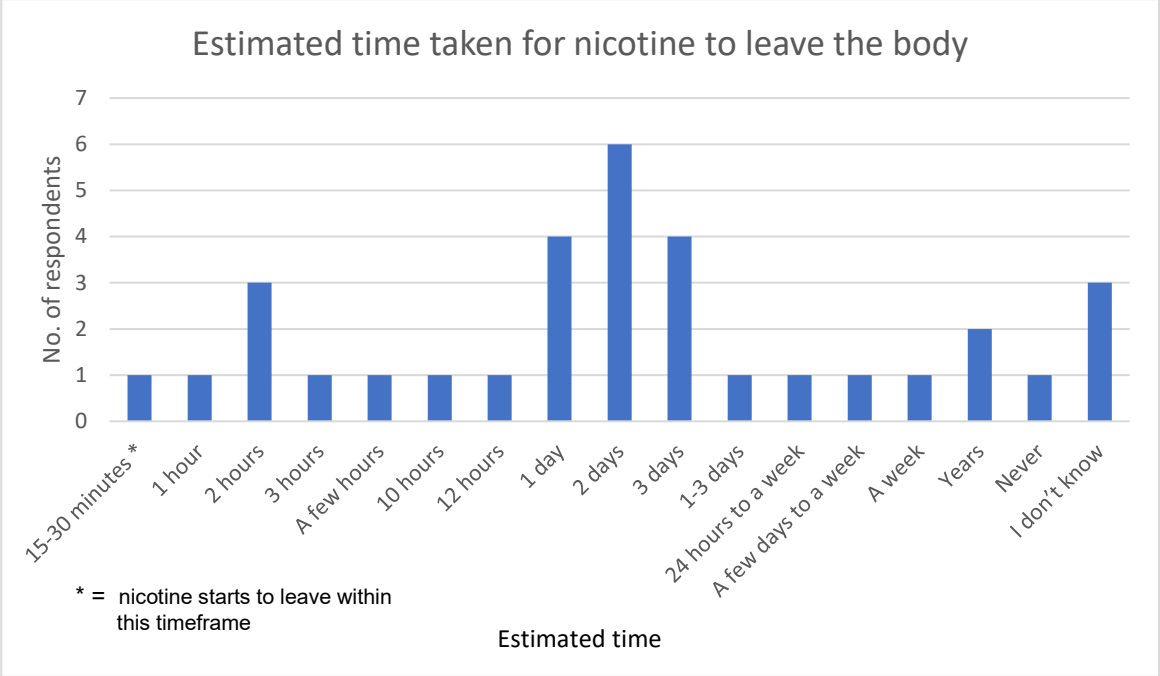

Figure 4.6 Participants' estimation of time taken for nicotine to leave the body

The inaccurate estimations of how quickly nicotine leaves the body, contributes to an erroneous understanding of withdrawal and potentially craving. A significant proportion of participants were unaware of how quickly nicotine leaves the body and therefore of how frequently withdrawal is experienced. This was one of the three major findings of the research project, which will be discussed next.

4.6 The main findings emerging from the data

Due to the small number of participants (n=39) in the research project, it is not possible to draw major conclusions and apply these to smokers more broadly. The findings identified warrant further research to explore smokers' experience and understanding of nicotine withdrawal and craving. Nevertheless, despite obtaining a relatively small sample, three main findings emerged clearly from the data collection. These were:

1. A majority of smokers, 80% (n=31), viewed withdrawal and craving as two separate processes.

2. Approximately 82% (n=27) of participants were unaware of how often withdrawal is experienced.

3. Most participants, 91% (n=30), considered that it was possible to crave something that was not desired. Further, 53% (n=17) of participants believed it was possible to crave nicotine while simultaneously not wishing to smoke.

4.6.1 Finding: Most participants viewed nicotine withdrawal and nicotine craving as two separate processes

The research question this thesis is based upon is 'How do smokers distinguish between nicotine withdrawal and nicotine cravings?' It was not assumed, however, that all respondents would differentiate between both processes. This was reflected in the survey question 'Do you think that nicotine withdrawal and cravings for nicotine are the same thing; different processes that may or may not happen at the same time or not sure?' This question was answered by 39 students with the following results obtained: Four respondents (10%) viewed withdrawal and craving as being 'the same thing', 31 respondents (80%) viewed withdrawal and craving as separate processes that may or may not occur at the same time, while four respondents (10%) were unsure. Respondents were also asked 'How do you tell the difference between when you are experiencing cravings for nicotine and when you are experiencing nicotine withdrawal?' This question was answered by 25 participants. Three participants who considered craving and withdrawal as distinct phenomena were uncertain how to distinguish between them. Answers provided by other participants on differentiating between the processes were arranged into the following minor themes.[3]

4.6.1.1 Theme: Withdrawal has a physical basis and craving has a psychological basis

Six respondents indicated that withdrawal symptoms have a physiological source whereas cravings are largely mental or psychological in origin. Respondent N answered:

> Cravings for nicotine for me … [are] thoughts in my head of 'I could go a cigarette' [withdrawals] maybe a bit antsy, shaking leg, anxious.

The following was offered by Respondent J:

[3] All participants' responses included in this thesis are direct quotes from answers provided to the questionnaire. Spelling and grammatical errors have not been denoted with the term '[sic]'.

> Nicotine withdrawal is physical e.g. it causes headaches, grumpiness, nausea, hunger etc. whereas the cravings are purely in the mind and have no physical symptoms aside from maybe some agitation.

Similarly, Respondent A wrote:

> Craving = thoughts and is a want [.] Withdrawals = physical and mental and feels like a need.

Consistent with the previous quotes, Respondent O suggested:

> Withdrawal causes me to be fidgety and easily agitated and cravings are caused by my brain thinking that the nicotine will stop them (I think).

Respondent K offered:

> craving is more like a sudden though[t] or I find myself taking a deep breath. It's open to a more automatic response to having a smoke … withdrawal feels more like a mood and is based more on physiological effects.

Respondent M indicated that craving and withdrawal were the same thing, yet suggested that the phenomena could be differentiated, stating:

> cravings is just feeling like i could do with a cigarette [whereas] withdrawal has more physical manifestations.

Reviewing the responses provided it became clear that if a participant indicated that withdrawal and craving were 'the same thing', it would have been appropriate for the questionnaire to 'skip' the question of 'How do you tell the difference between when you are experiencing cravings for nicotine and when you are experiencing nicotine withdrawal?' Notwithstanding this oversight, as the participant indicated withdrawal and craving were 'the same thing', and subsequently provided an answer to the question of how to distinguish between the two phenomena, this highlights that some participants' answers may have been drawn from an understanding that was applied inconsistently across all areas of the survey. The above statements do concur, though, with a comment by Poster 37 (2015) from the iCanQuit website forum, who stated:

> craving is a psychological urge, withdrawal is the physical.

4.6.1.2 Theme: Smokers distinguish between craving and withdrawal based on the intensity of what is experienced

Three respondents indicated that the intensity of what was experienced could be utilised to differentiate between craving and withdrawal. Respondent A also suggested:

> Personally, I notice it's a cravings (or what I think is a craving) when it's just a thought e.g. 'I want/could go for a coffee and a cigarette right now' but don't 'need to' have one verses a withdrawals … I'll be quick to annoy and anger, I find myself having to distract myself from giving myself an excuse to have a cigarette (if In an environment or situation where I can't immediately have one, e.g. stuck at home with my family over lockdown).
>
> Craving = thoughts and is a want.
>
> Withdrawals = physical and mental and feels like a need.

Similarly, Respondent P stated:

> Cravings– I'll feel like I want a cigarette but it doesn't bother me if I don't have one [.] Withdrawal– is when I feel like I need one and can't stop thinking about it.

Further, Respondent F indicated:

> Cravings feel like 'normal' processes (hunger, sleepy) withdrawal feels like an all consuming process (starvation, sleep deprivation).

The use of the phrase 'all consuming', by Respondent F, also indicates an increased level of intensity associated with withdrawal compared to craving.

4.6.1.3 Theme: Smokers distinguish between withdrawal and craving based on how each process is manifested

In addition to some respondents viewing withdrawal as a more intense physical process and craving as a less intense psychological process, several respondents differentiated between the phenomena by how each is manifested. Respondent B suggested:

> How you act I guess.

Another participant, Respondent T offered:

> My mood angry for withdrawal sad for cravings.

In contrast to the previous description, Respondent L stated:

> The physical symptoms– cravings make me grumpy withdrawal makes me shaky and sad.

Respondent A5 indicated:

> I want the taste or I feel anxious.

Finally, Respondent Q stated:

> Cravings usually happen at times of heightened stress while withdrawal presents more as irritation, personally.

4.6.1.4 Theme: Smokers distinguish between craving and withdrawal based on the situation the processes are experienced in

For two participants, the situations in which withdrawal and craving were understood to occur were a means for differentiating between the two phenomena. Respondent R stated:

> I crave a cigarette if I'm stressed. I also crave cigarettes when I'm drinking.

Respondent S offered:

> When I will be alone I crave for smoking.

Unfortunately, Respondent R and Respondent S only gave examples of situations when craving was experienced. Thus the respondents above suggested it was possible to distinguish between each process, depending on: whether the experience was physiological or psychological; the intensity of the experience; and how the experience manifested, without mentioning the time elapsed since the previous cigarette.

4.6.2 Finding: Most participants were unaware how often nicotine withdrawal is experienced

As noted above, Respondents Z, A6, A2 and K were the few participants who indicated an awareness of nicotine withdrawal being experienced at least daily. Indeed, a majority of respondents reported experiencing craving more frequently than withdrawal. This finding is not unexpected, given that a significant number of students were unaware of how quickly nicotine leaves the body. Responses from eleven participants who reported experiencing nicotine cravings more frequently than withdrawal and, more importantly, with a frequency that is inconsistent with nicotine pharmacology, are outlined below.

Respondent A stated:

> On a daily average I get a craving once a day on a weekly average 4 out of 7 days a week … I've experienced nicotine withdrawal approximately 7 times in the last year or at least what I believed to be withdrawals and not just cravings.

Respondent A reported smoking seven cigarettes per day and thought it took three days for nicotine to leave the body. Similarly, Respondent B denoted experiencing cravings:

> If im bored every half hour, if im busy or distracted I don't get cravings.

Respondent B, who smoked 20 cigarettes per day, also indicated that withdrawal is experienced:

> I think only after a day or 2 of not having one, then its 1 day of being moody and just thinking about wanting one.

Incongruently, Respondent B also stated nicotine:

> depletion starts approx. 15-30 mins after a smoke I think.

Further, Respondent C who smoked 15 cigarettes per day was uncertain how often withdrawal occurred, and stated that cravings were experienced:

> Almost every day especially if haven't smoked all day.

Respondent C did not know how quickly nicotine leaves the body, which could account for their uncertainty regarding how often withdrawal is experienced:

Respondent D smoked three cigarettes per day and stated cravings were experienced:

> when I'm drunk or in a depressed state.

This participant thought that after a few hours, nicotine was eliminated from the body. Respondent D also answered that the number of times nicotine withdrawal had been experienced was 'probably none'.

Additionally, Respondent E, who also smoked three cigarettes per day, said of cravings:

> I don't really crave having a smoke that much, there are times where I do feel like I want one more such as when I'm drinking or really stressed but I never really have a huge craving though.

Respondent E also stated withdrawal symptoms were experienced 'never really', and thought that nicotine was removed from the body after three days of not smoking. In the same manner, Respondent F smoked ten cigarettes per day and reported experiencing craving 'a few times a day'. This participant thought it took nicotine two days to leave the body and said withdrawal symptoms were experienced during 'Times when I have quit.'

Respondent G reported that cravings occurred:

> Twice a day, more so if I'm stressed with work or uni.

This participant said of withdrawals:

> I don't know if I've had major symptoms for nicotine withdrawal, it's hard to tell cause I usually just have one if I want one – otherwise I'll crave one when I'm stressed.

Respondent G smoked four cigarettes per day and thought that nicotine was removed from the body twelve hours after smoking. Comparably, Respondent H regularly smoked ten cigarettes per day and stated cravings were experienced 'Quite often … especially during times of stress', and that withdrawal had been experienced 'Only a handful of times'. This participant denoted that 'at least a few days' were required for nicotine to leave the body.

Respondent I stated that cravings occurred the 'Majority of the time' yet was 'Not sure really' how often withdrawal occurs: 'I don't take notice.' This participant thought that nicotine is removed from the body 24 hours post smoking. Respondent J suggested that cravings occurred frequently and withdrawal symptoms had been experienced 'only a few times.' This respondent smoked twelve cigarettes per day and estimated the time taken to remove nicotine from the body was up to a week.

Finally, Respondent R, who regularly smoked five cigarettes per day, reiterated the same point, reported experiencing craving more than 50 times, and denied experiencing withdrawal. Respondent R also thought that nicotine had left the body within two hours of smoking a cigarette.

In contrast to the above participants, Respondent L also viewed withdrawal and craving as separate processes, and reported experiencing cravings four times and withdrawal symptoms ten times. This participant smoked three cigarettes per day and thought nicotine was removed from the body within ten hours of smoking a cigarette. Respondent L did not indicate whether the number of times withdrawal and craving were experienced was over the time period of a day, week, month, year, or ever, making it difficult to draw further conclusions.

The finding that Respondents A, C, E, F, G, H, I and J reported experiencing craving much more frequently than withdrawal is not unexpected given that these participants also indicated that a longer period of time is taken for nicotine to leave the body than is the case. An unexpected result was participants stating that nicotine had left the body within a particular time yet not equating this with the experience of withdrawal, as occurred with Respondents B, D and R. This failure to equate nicotine leaving the body with the process of nicotine withdrawal identifies a potential area for future research to improve smoking cessation resources.

4.6.3 Finding: A majority of participants thought it was possible to crave something that was not wanted, including nicotine

Prior to conducting the research project, the researcher of this thesis had the expectation that if a person indicated craving something, then what was craved was also wanted. The responses provided by most participants surveyed, however, did not reflect this position. Question 25 of the survey was 'Do you think that you can crave something that you don't want?' A majority of respondents, approximately 91% (n=30), answered 'Yes', 6% (n=2) indicated 'Unsure', and 3% (n=1) answered 'No'. Although this question was included to gain an insight into smokers' perception of craving generally, eleven participants referred to smoking or nicotine craving specifically when

accounting for their answer in Question 26. Respondent P, who indicated 'No', and Respondent A8, who indicated 'Unsure', did not explain the reasoning their answers were based on. Respondent S, who also answered 'Unsure', rationalised their answer by stating:

> It's like habit. Once you taste it due to some reason it start[s] to make you crave. Thinking next time it might feel better.

Question 27 of the survey, 'Do you believe that if you experience cravings for nicotine that means that you want to smoke?', was completed by 32 respondents. Answers provided to this question resulted in an increased percentage of participants – 31% (n =10) – indicating that if nicotine was craved, this reflected that the person wanted what was craved and wished to smoke. Most participants – 53% (n=17) – however, responded 'No', while 16%, (n=5) answered 'Not sure'. Explanations provided in Question 26 by participants who thought that it was possible to crave something that was not wanted, and in Question 28 by participants who considered it possible to crave nicotine but not wish to smoke, will now be outlined. Responses were arranged into the three themes of addiction, habit, and conflicting urges as the cause of craving; these will be presented next.

4.6.3.1 Addiction causes craving

A number of participants suggested that addiction caused nicotine craving despite wanting to quit smoking. Respondent L stated:

> addiction makes you crave things regardless of whether you want to quit.

Respondent K offered:

> in the case of cigarettes, part of the addiction is physiological. My body wants it. my brain doesn't necessarily want it.

Similarly, Respondent N wrote:

> Yes because … I know it's bad for me and I don't want to be a smoker but my body wants it and my addiction side wants it.

Respondent U suggested:

> As with any addiction, your body is used to the particular substance and so you can not want to smoke for example, but your body may still be craving the nicotine.

Respondent E indicated:

> No because it's an addiction and that's how they work you want things you don't necessarily want/need.

Respondent M simply answered: ‘Addiction.’

Withdrawal and craving were considered to be same process by Respondent M and viewed as different processes by Respondents L, K, N, U and E.

4.6.3.2 Habit is responsible for craving

Three participants viewed smoking as a habit which contributed to craving. Respondent A2 suggested:

> I don’t want to smoke, I hate it and I know it’s damaging to my health. I think it’s more of a habit. Mind over matter.

Respondent G expressed:

> I think you might not necessarily want to smoke a cigarette, like partake in the action of doing so, but it can be … a habitual thing.

Respondent K also answered:

> You can crave things you don't want due to … things like habit.

The questionnaire did not ask respondents if they considered themselves to be addicted to nicotine. Had this question been asked the answers provided by Respondents A2, G and K may have been interpreted further. It would be congruent that participants who perceived themselves as addicted could also view smoking as a habitual practice as part of an addiction. If a participant had indicated not being addicted to nicotine yet saw habit as being the cause of craving something that was not wanted, then this position could have been examined.

4.6.3.3 Smokers feel conflicting urges

The most frequent explanation of why something could be craved but not wanted, including nicotine, was based on the concept of conflicting urges. A mental or psychological basis was often cited as an explanation for conflicting urges, examples of which will now be provided.

Respondent X, indicated:

> People are conflicted and have mixed motivations.

Respondent R offered:

> I can crave doing drugs because I like the high but don’t want to do it because of the come down and time spend in bed and not being able to function properly.

Respondent F suggested:

> There's a difference between your impulses and your desires.

Respondent A1 stated:

> You may not want something but your body and mind think it is good for you at that time.

Respondent A3 submitted:

> Bcs I know for a fact that I'm quitting … bcs it makes me sick to my stomach … Lately it has made me soo sick that I remember throwing up after it and now I generally can't even finish a whole cigarette and I still want it so yeah.

Respondent V proposed:

> Because when I quit I don't want to smoke but still crave it.

Respondent H indicated:

> Experiencing cravings is not necessarily the same thing as wanting something.

Respondent U posited:

> Smoking may be the easiest way to curb the cravings for nicotine, but just because you are craving for nicotine may not mean you want to smoke. I am sure there are alternatives to smoking cigarettes if you are craving nicotine. Right? I hope so.

Respondent W answered briefly:

> Because I don't want to smoke.

Respondent T simply stated:

> I have experienced this.

Respondent J recorded the identical phrase:

> I have experienced this.

Five participants described conflicting urges to smoke as due to perceptions of what was craved by the body, including the brain. Respondent Y stated:

> Cravings can be physical, but wants are a mental game. Eg, eating disorders. The body craves food, but the brain doesn't want to eat.

Respondent H offered:

> I think you can crave something because of the chemicals in the brain and body even if you don't want it.

Respondent O posited:

> Because it's a chemical imbalance your body adapts and starts to rely on substances.

Respondent B expressed:

> Knowing something isn't good for you has no bearing on how your brain responds to those chemicals and the want for those chemicals. Just like me with my ADHD [attention-deficit/hyperactivity disorder], my brain doesn't want to do anything that isn't stimulating, so I choose things that will increase dopamine etc. I know its not good to procrastinate the things I need to do, but my brain doesn't care and will cause me to procrastinate anyway.

In addition, Respondent Z reasoned:

> It's a chemical reaction I guess.

Thus the above responses highlight that although a smoker may not wish to smoke, conflicting urges, which may be rationalised by psychological and physiological explanations, can result in experiences which are identified as craving.

4.6.3.4 Other explanations of why smokers may crave nicotine but not wish to smoke

Four other participants indicated that although a person may crave nicotine it did not necessarily signify that the person wanted to smoke, however it was not possible to arrange their responses into specific themes.

Respondent Q expressed:

> I think it means I need to deal with my personal issues.

Respondent A proposed:

> I said no as I don't think they are mutually exclusive and … there's other factors to why I may have a craving for nicotine that isn't related to smoking, however generally speaking I would say Yes [if you crave nicotine you want to smoke] but not always.

Perhaps incongruently, Respondent A1 who indicated that craving nicotine did not indicate wishing to smoke suggested:

> I don't see the difference between wanting something and craving something. But I don't think either forces you to do it.

Respondent A5 stated:

> I don't know.

A greater number of explanations of why smokers consider that it is possible to crave nicotine but not wish to smoke may have emerged from the study had a larger sample been obtained, allowing further examination of the above participants' responses.

4.6.3.5 Participants' explanations of craving nicotine equating with wanting to smoke

Although a major finding of the research project was that 53% (n=17) of participants thought it was possible to crave nicotine but not wish to smoke, 31% (n=10) of respondents considered that craving nicotine reflected a desire to smoke, with the following explanations being provided.

Respondent V stated:

> the Body wants something.

Respondent I offered:

> Whenever I crave one I want one.

Respondent Z denoted:

> Might be different for everyone but I like the feeling of smoking.

Respondent X reasoned:

> If you crave nicotine, nicotine is in cigarettes, ergo you crave cigarettes.

Respondent R suggested:

> If you crave nicotine you normally want to smoke.

Respondent L rationalised:

> i don't want to stop smoking.

As stated above, Respondents V, I, Z, X, R and L all held the view that if a person craves nicotine, it indicates that the person wants to smoke. There was not consistency among these respondents, however, on whether withdrawal and craving were considered to be the same process or different processes. Respondent V indicated that withdrawal and craving were the same process, whereas Respondents I, Z, X, R and L viewed withdrawal and craving as separate processes. Greater variation was demonstrated among participants' responses regarding whether they wished to quit smoking. Respondents V and Z indicated wanting to quit, while Respondents X, R and L did not, and

Respondent I was unsure about wanting to quit. Therefore, a more robust examination of craving that addresses the question of what exactly it is that is craved by smokers could inform future quit smoking programs. Improved cessation resources may assist smokers to quit by encouraging the person to question their own use of nicotine, and to determine if nicotine is craved for a perceived benefit, temporary withdrawal symptom relief, or a combination of the two.

4.6.3.6 Participants' explanations of being uncertain if craving nicotine indicated a desire to smoke

Four survey participants were undecided as to whether experiencing nicotine craving determined that they also wanted to smoke. The respondents were asked to explain the reason for this uncertainty. Perhaps predictably, ambivalence was reflected in most of the answers offered.

Respondent A4 stated:

> I don't want to smoke forever, but in that instant the craving makes me want to smoke.

Respondent M offered:

> your body wants to smoke but your mind might not want to.

Respondent A2 was 'Not sure' about being not sure.

Intriguingly, Respondent W stated:

> I don't have the right education to comment.

Respondent W also suggested that nicotine left the body 48 hours after smoking a cigarette, reflecting a low level of health literacy regarding basic nicotine pharmacology.

The answers provided to Question 27, 'Do you believe that if you experience cravings for nicotine that means that you want to smoke?', may have been considerably different in the event that all participants were aware of how frequently nicotine withdrawal is experienced, and that withdrawal symptoms occur after nicotine has left the body.

4.7 Summary

This chapter has presented the results of the mixed-methods survey exploring smokers' understanding of nicotine withdrawal and craving. It was noted previously (in section 2.1) that a majority of researchers who have developed nicotine withdrawal and craving assessment tools consider craving to be a component of nicotine withdrawal. Results obtained from the research project, however, have shown that most respondents surveyed viewed withdrawal and craving as separate processes. An understanding of participants' perceptions of craving was obtained with the answers provided to the survey question 'Do you believe that if you experience cravings for nicotine

that means that you want to smoke?'. More than 50% of survey participants indicated that craving nicotine did not automatically signify that a person wished to smoke. Finally, the results also demonstrate that there was a widespread lack of awareness among participants of how quickly nicotine leaves the body, how frequently withdrawal is experienced, and that the process of up-regulation causes continued withdrawal symptoms. This finding provides a reference point for smokers' understanding and experience of nicotine withdrawal and craving to be explored further. This will be discussed in the next chapter.

CHAPTER 5: DISCUSSION

5.1 Introduction

The preceding chapter presented the results obtained from this research project, which included a range of participants' views, understandings and experiences of smoking, quitting, and SES indicators. Various comprehensions of nicotine withdrawal and craving held by respondents were expressed, including those contributing to the three major findings of the research project, which will be discussed in the current chapter. The three major findings of the research study were:

1. A total of 82% (n=27) of respondents were unaware of how quickly nicotine leaves the body and, therefore, of how frequently nicotine withdrawal is experienced.

2. Approximately 80% (n=31) of respondents viewed nicotine withdrawal and cravings for nicotine as distinct processes.

3. Approximately 91% (n=30) of respondents thought that in general it is possible to crave something that is also not wanted. Furthermore, 53% (n=17) of participants indicated that it is possible to crave nicotine specifically, but not wish to smoke. These findings will be explored with regard to the health literacy of smokers and the impact this may have on the ability to quit.

5.2 Major findings

5.2.1 A significant proportion of participants were unaware of how frequently withdrawal is experienced

Jessup et al. (2018) define health literacy as the capacity of a person to access, interpret and integrate information to restore, maintain or improve health. As noted above, 82% of participants were not cognisant of how quickly nicotine leaves the body and this lack of knowledge is a fundamental impediment to nicotine health literacy. Notwithstanding viewing withdrawal and craving as separate processes, a smoker will lack the ability to distinguish between these two phenomena if also unaware of when withdrawal occurs. Indeed, the lack of awareness of when withdrawal occurs is reflected in the respondents' own experiences of the phenomenon being the most frequently cited source of participants' understanding of the process, rather than information drawn from scientific literature. The participants' own experiences of nicotine craving were also the most frequently cited source of knowledge of the process of craving. However, any self-assessment of what is experienced by a smoker is potentially inaccurate if not founded on a basic understanding of nicotine pharmacology and neuroadaptation. Carr and Dicey (2020) and West and Schneider (1987) contend that smokers may misinterpret nicotine withdrawal as craving. Based on their observed deficits in understanding of nicotine pharmacology, this potentially occurred within the research project

participants. The frequency of the participants' experiences of withdrawal and craving reported by twelve participants is presented below in Table 5.1. These participants either did not know how long nicotine remained in the body or stated a longer period than is the case, and their responses confirm the potential misinterpretation of withdrawal as craving.

Table 5.1 Reported frequency of occurrence of nicotine withdrawal and cravings for nicotine

Respondent	Reported frequency of nicotine withdrawal experienced	Reported frequency of nicotine craving experienced
Respondent U	I actually do not know	I smoke maybe 10-20 cigarettes. Usually it's between 1-10 a day
Respondent A5	Not sure	Twice a day if I don't have it
Respondent C	Not sure	Almost every day especially If haven't smoked all day
Respondent J	Only a few times	Almost every day or every couple [of] days.
Respondent M	never	not too regularly as im not a heavy smoker but during times of stress I do
Respondent H	Only a handful of times	Quite often … especially during times of stress
Respondent E	Never really	I don't really crave having a smoke that much, there are times where I do feel like I want one more such as when I'm drinking or really stressed but I never really have a huge craving though
Respondent N	No idea	No idea
Respondent I	Not sure really I don't take notice	Majority of the time
Respondent X	Never	never
Respondent A	I've experienced nicotine withdrawal approximately 7 times in the last year or at least what I believed to be withdrawals	Very often
Respondent F	Times when I've quit	A few times a day

Furthermore, an individual's cognition of withdrawal is limited if not founded on basic nicotine health literacy and may potentially hinder quitting. The statements made on the iCanQuit (Cancer Institute NSW, 2022) website by Posters 28, 29, 30 and 31 cited in Chapter 2 highlighted that the negative feelings experienced during the withdrawal process were tolerable, and not perceived as craving, when understood to be withdrawal symptoms as the brain returned to its pre-neuroadapted state.

This stance therefore illustrates that nicotine health literacy is essential to a smoker's understanding of the demarcation between withdrawal and craving.

5.2.2 Most respondents viewed nicotine withdrawal and nicotine craving as distinct processes

Approximately 80% (n=31) of respondents considered nicotine withdrawal and craving to be distinct processes, while 10% (n=4) of participants viewed both processes to be the same, and a further 10% (n=4) did not concur with either of those positions. Several factors were provided by respondents as to how withdrawal and craving were differentiated between, namely: how each process is manifested; the intensity of what is experienced; and that withdrawal is physical in nature whereas craving is a mental process. Based on the absence of research identified in the literature review, this finding is significant, as the current research project appears to be the first exploration of if, and how, smokers distinguish between the two phenomena. Further, as the research question of this thesis[4] appears to have not previously been examined, current and previous cessation programs have been implemented without a more developed understanding of smokers' perspective of both processes, potentially reducing the effectiveness of the measures.

In addition to cessation resources being produced with an incomplete understanding of smokers' perceptions of withdrawal and craving, cessation measures have also been developed from differing understandings and explanations of both phenomena. It was observed previously (in section 2.1) that developers of withdrawal and craving assessment tools consider craving to be a component of the singular process of nicotine withdrawal (Heishman et al., 2008; Smith et al., 2021). Craving also is likely viewed as an element of withdrawal in the PRIME (Plans, Responses, Impulses/inhibitions, Motives and Evaluations) theory of craving advanced by West and Brown (2013). The originators of numerous other theories of craving, however, describe craving as a consequence of withdrawal rather than a component of the process (Koob & Le Moal, 2008; Paulus et al., 2009). Consequently, the advice provided in a specific smoking cessation resource may vary depending on the perspective taken from one of these conflicting standpoints. Moreover, if the understanding of withdrawal and craving held by the smoker differs from those who design smoking cessation measures, the advice may be misinterpreted. Incontrovertibly, a uniformly held understanding of withdrawal and craving among researchers, health professionals and lay people would reduce any potential confusion, and maximise the impact of smoking cessation resources.

[4] The research question is: 'How do smokers distinguish between nicotine withdrawal and cravings for nicotine?'

5.2.3 Something that is not wanted can also be craved, including nicotine

The third major finding of the research project was that 91% (n=30) of participants indicated that it was possible to crave something that was not wanted. However, when asked about nicotine specifically, a significantly reduced proportion of respondents, 53%, (n=17) indicated that craving nicotine did not equate with wanting to smoke. Indeed, ten participants, or 31% of respondents, denoted that craving nicotine signified a desire to smoke. The significant proportion of 31% of respondents viewing craving as a desire to smoke highlights the importance of establishing what exactly it is that smokers crave – a benefit provided by nicotine which non-smokers do not receive, the temporary relief of withdrawal symptoms, or a combination of the two? A total of five participants (16%) were uncertain as to whether craving nicotine indicated a desire to smoke.

Twenty-five participants answered Question 25, 'Do you think that you can crave something that you don't want?' Question 26 asked respondents to explain why the answer provided to the previous question (Question 25) was given. Nine respondents thought it was possible to crave nicotine because the body wanted nicotine, even if they themselves did not wish to smoke. A further five participants suggested that addiction was the reason for this occurring, whereas two respondents cited habit. Question 27, 'Do you believe that if you experience cravings for nicotine that means that you want to smoke?', was answered by 21 participants. Although 53% (n=17) of respondents answered 'No', with similar explanations given for the answer provided to Question 26, 31% (n=10) of participants perceived that craving nicotine reflected a desire to smoke. The following responses were provided as an explanation of why when nicotine is craved the person wishes to smoke:

> I don't see the difference between wanting something and craving something
> (Respondent A1)

> Whenever I crave one I want one
> (Respondent I)

> I don't want to smoke forever, but in that instant the craving makes me want to smoke
> (Respondent A4)

> If you crave nicotine you normally want to smoke
> (Respondent R)

and

> If you crave nicotine, nicotine is in cigarettes, ergo you crave cigarettes
>
> (Respondent X).

Statements made by the above participants are consistent with the definition of craving provided by Taniguchi et al. (2019), which describes craving as a desire or want for what is craved.

The result of 53% (n=17) of participants indicating that craving nicotine did not equate with wanting to smoke could potentially be explained by the suggestion of Carr and Dicey (2020) and West and Schneider (1987), that smokers may misinterpret withdrawal as craving. If accurate, this position could be construed as the smoker not wanting to smoke per se, but rather wanting the withdrawal symptoms to cease, and smokes to achieve this, albeit temporarily. Indeed, this possibility could be examined by smokers themselves who possess basic nicotine pharmacology health literacy. Additionally, any self-assessment of the experience of withdrawal and craving would be enhanced if smokers could access research which examined whether or not smokers receive benefits unavailable to non-smokers, if, in fact, such research existed.

5.3 Health literacy

The survey participants were well-educated tertiary students, yet 82% (n=27) had a low level of health literacy regarding basic nicotine pharmacology. This was evidenced by the results obtained, with numerous respondents being unaware of how quickly nicotine leaves the body, and therefore of how frequently withdrawal is experienced. Only four participants indicated that withdrawal occurred at least daily. Incongruently, three participants were aware that nicotine levels fall quickly, yet indicated that withdrawal had been experienced infrequently or not at all. Further, the same participants stated cravings arose: '3-4 times a day' (Respondent A4); 'when I'm drunk Or in a depressed state' (Respondent A7); and '50 or more [times]' (Respondent R).

The above discussion demonstrates a substantial lack of nicotine pharmacology health literacy among many respondents, as was the case with some members of the iCanQuit (Cancer Institute NSW, 2022) website forum identified in the literature review. Poster 35 (2020), who smoked their last cigarette less than 48 hours prior to posting, wrote:

> I can't shake the cravings and … actually the thing about it that's bugging me isn't the fact I can't have a cigarette, I just can't understand why I want one! … WHY am I so hooked on these things when I can't find ONE positive for smoking them!

It is clear from the timing of the writing that Poster 35 would have been experiencing withdrawal, yet assumed what was felt to be nicotine craving. Also reflected in the statement is Poster 35's belief that if something is craved it is also wanted.

Smokers who understand that nicotine is responsible for causing withdrawal, a process which continues as the brain returns to its former non-neuroadaptive state, while also viewing craving to be a distinct process arising from a desire for an actual benefit which nicotine does not provide,

would no longer link withdrawal and craving (Carr & Dicey, 2020). The experience of withdrawal would become irrelevant to any perceived experience of craving. Indeed, such an understanding may be reflected by Poster 36 who described not wanting or craving a cigarette, but rather wanting the withdrawal symptoms to cease, which are two distinct wishes (Carr & Dicey, 2020). Poster 36 (2020) wrote:

> I am proud to say that I have not touched a cigarette for an entire month. My withdrawal symptoms have been really bad … I do not wish to go back to smoking but I do wish for this feeling to go away.

Further, smokers who deduce that nicotine is no way advantageous could also conclude that, when quitting, nicotine will not be craved due to not feeling deprived of a non-existent benefit (Carr & Dicey, 2020). Questioning the perceived benefits of smoking and nicotine (Carr & Dicey, 2020) is therefore central to understanding craving and what exactly is being craved.

5.4 Summary

This chapter explored the findings of the research project, which appears to be the first investigation of the research question of if and how smokers differentiate between nicotine withdrawal and nicotine craving. The three significant findings of the study were examined, specifically in regard to nicotine health literacy and the implications for smokers attempting to quit. It was noted that most participants lacked understanding of the fact that nicotine withdrawal is experienced at least daily. Further, it was observed that based on pharmacology, participants' accounts of craving were more closely aligned with the experience of withdrawal than reports of withdrawal, indicating that respondents may have potentially misinterpreted withdrawal symptoms as cravings.

A significant finding of the research project was that 80% (n=31) of respondents considered nicotine withdrawal and craving to be distinct processes. It was noted that this perspective may assist smokers to stop smoking; however, any quit attempt could be undermined if the smoker is also not cognisant of when withdrawal is experienced, which was the case for approximately 82% (n=27) of participants. Indeed, eight participants reported not experiencing withdrawal, or were uncertain if they had experienced withdrawal. The findings obtained from the research project are based on a relatively small and highly specific population of smokers, reducing the extent to which the findings can be applied. Despite the limitations of the study, potential areas of future research have emerged, which will be discussed in the next chapter.

CHAPTER 6: CONCLUSION

6.1 Introduction

Tobacco smoking continues to be a significant cause of mortality both nationally (AIHW, 2021) and globally (WHO, 2022). In 2019 approximately 31% of smokers unsuccessfully attempted to quit (AIHW, 2020a), a statistical fact that has changed little since 2001 when 30% of smokers also unsuccessfully attempted to quit (AIHW, 2002). These statistics patently demonstrate a need for improved smoking cessation resources. An objective of this research project, as outlined in Chapter 1, was to explore if and how smokers distinguish between nicotine withdrawal and cravings for nicotine. The literature review conducted did not identify research which explored this question. Utilising netnography (Kozinets, 2020), posts on the online iCanQuit (Cancer Institute NSW, 2022) website forum were examined and it was found that a proportion of smokers do consider nicotine withdrawal and cravings to be distinct processes, a position which contrasts with that of numerous researchers (Smith et al., 2021). Indeed, posts on this forum also demonstrated that smokers have varied understandings of nicotine withdrawal and craving, as was the case in the research project sample.

Critical theory recognises that those with lower SES have reduced influence compared to those with higher SES (Paradis et al., 2020; Parry 2023), and therefore are less likely to have their experiences and perspectives reflected in the literature. The lack of research identified in the literature review therefore confirms the choice of critical theory as an appropriate methodology on which to base the research. An identified lack of health literacy among the survey participants also validates utilising a critical methodology. Although respondents were well-educated tertiary students, many had low levels of health literacy regarding nicotine pharmacology and this lack of knowledge may significantly reduce the participants' ability to quit. Additionally, if this lack of health literacy inhibits the ability to quit and results in morbidity, this could reduce the person's future SES, further validating utilising a critical methodology. This final chapter discusses the objectives and limitations of the research project. Recommendations arising from the research project will also be proposed.

6.2 Research project objectives

The research question this thesis was based upon was: 'How do smokers distinguish between nicotine withdrawal and cravings for nicotine?' Although the question appears to assume that smokers do view withdrawal and craving as separate processes, survey questions allowed respondents to indicate and explain an alternative position. It can be seen through reviewing the individual research objectives that the primary research question was answered. The six research project objectives were outlined in Chapter 1. Objectives 1 to 5 of the six research project objectives were achieved within the survey sample. As the results were produced from 39 respondents'

surveys, it is not possible to draw major conclusions and apply these to smokers more broadly. The findings of this thesis, however, will be useful in guiding further study on the research question.

The first objective of the research project was to explore smokers' understanding and experience of nicotine withdrawal. This objective was achieved through the collation and analysis of answers to several specific survey questions, the responses to which are summarised in Appendix F. The finding that 82% (n=27) of participants were unaware of how quickly nicotine leaves the body, and therefore of how frequently withdrawal is experienced, also reflected this objective's being realised.

The second objective of the research project was to explore smokers' experience and understanding of nicotine craving. Results from the research project demonstrated that most participants understood craving to be a process distinct from withdrawal, a position which is at odds with developers of nicotine withdrawal and craving assessment tools. This finding contributed to the second research objective being met. Further, based on nicotine pharmacology, it was observed that participants' reports of craving were more closely aligned with the occurrence of nicotine withdrawal than their reports of withdrawal. Additionally, the objective was met through the finding that 53% (n=17) of participants did not view that craving nicotine signified wanting a cigarette, whereas 31% (n=10) did, while 16% (n=5) were uncertain.

Objective 3 of the research project was to determine if smokers' understanding of when they experience nicotine withdrawal is consistent with nicotine pharmacology. This objective was realised with the finding that only four respondents were aware that nicotine withdrawal is experienced at least daily, while 21 respondents indicated that a period of abstinence of at least 24 hours was required before nicotine had left the body. Indeed, Objective 3 was achieved with the finding that most respondents did not report experiencing withdrawal with a frequency consistent with nicotine pharmacology.

The fourth objective of the study was to identify the information sources that smokers' understandings of nicotine withdrawal were based upon. Although this objective was relatively simple to achieve, the implications of the results are significant if representative of smokers generally. As noted above, the most frequently cited source of information on withdrawal was the person's own, and often inaccurate, awareness of the process, rather than scientifically informed health literature.

Identifying the information sources that smokers' understanding of cravings for nicotine are based upon was the fifth research project objective. This objective was also able to be met by asking participants to identify their information sources. Consistent with Objective 4, the respondents' own experience of craving was the most commonly indicated source of knowledge on the process.

The final research project objective was to ascertain why smokers do or do not consider themselves, or are uncertain about, whether they are able to have control over craving something they do not

want. This research project objective was not achieved. It became evident through the thesis writing process that this particular objective could not be met as the survey questions did not adequately address the objective. Although the survey questions, namely 'Do you think that you can crave something that you do not want?' and 'Do you believe that if you experience cravings for nicotine that means that you want to smoke?', provided responses that explained certain aspects of the participants' understandings of craving, these responses did not directly address the research objective.

6.3 Limitations

There are several limitations on the findings of the research project, with the relatively small number of 39 participants being the most significant. It is also noted the findings of this single research project involving a specific cohort may not be representative of the perspectives of all smokers. Consequently, it is not possible to apply the findings of the study to smokers generally. Several factors conceivably contributed to the low number of completed questionnaires. As noted above (section 3.3.4), in 2021 the means of informing students of research projects via a specific email to the student body was no longer available. An attempt to increase research project participation by placing information flyers on campus was also probably hampered by fewer students being on campus due to the COVID-19 pandemic. As a result of the low number of participants, and the questionnaire not being examined by several experts in the field to determine if it possessed face validity (Jackson, 2020), the research project is being considered as a pilot study.

Another limitation of the research project is that, based on a number of demographic measures, the population of smokers surveyed is not representative of a cross-section of smokers. The mean age of survey participants was 23.69 years whereas smoking rates are highest among people aged 40 to 49 and 50 to 59 (AIHW, 2020c). Further, smoking rates are significantly increased among people with lower SES and are reduced in those possessing a higher SES, including the SES factor of a tertiary education (AIHW, 2020c). Although participants were not questioned on financial aspects of their SES, it is probable that the financial position of many of those surveyed was not consistent with the wider smoking population. Czarnecki (2018) and Koshy (2019) report that despite recent efforts to increase university enrolments of students from a lower socio-economic background, this population group continues to be under-represented. Finally, due to the difficulties experienced with survey distribution described above, 94% (n=36) of respondents were female and 5% (n=2) were male. This contrasts starkly with 12% of males and 10% of females aged 14 years and older in Australia being daily smokers (AIHW, 2020a).

The research project questionnaire was a mixed-methods survey, though the questions asked were predominantly quantitative (Polit & Beck, 2019). Participants were, however, encouraged to write as much as they wished in response to qualitative questions (Polit & Beck, 2019); nevertheless, all

answers provided were brief, which reduced the amount of data collected. The design of several quantitative survey questions did not facilitate the respondent including specific details in their answer. In an attempt to avoid influencing participant responses, certain answer categories were not pre-determined, including timeframes during which withdrawal or craving occurred. Three respondents did not indicate the period of time in which withdrawal symptoms were experienced, reducing the data that could be collected. The findings of the research project, though, alongside the limitations, could inform the development of a more nuanced and larger scale study to examine if and how smokers distinguish between nicotine withdrawal and cravings for nicotine.

Data was obtained on participants' understanding of nicotine withdrawal through Question 21, 'How long do you think it takes for the nicotine in a cigarette to leave your body after you have finished smoking the cigarette?' However, more detailed information could have been gathered from the potential question, 'After smoking a cigarette, how long does it take for the nicotine level in your body fall to a level where withdrawal symptoms are experienced?' Further, a clearer understanding of participants' knowledge of withdrawal and neuroadaptation could have been gained had the following survey question been included: 'Do nicotine withdrawal symptoms stop once nicotine has left the body?' The results of a future study including these questions could inform the development of smoking cessation resources, if a significant lack of nicotine health literacy is demonstrated. Such a finding could also be explored to examine the possibility that smokers may misinterpret the experience of withdrawal as craving.

A final limitation was the omission of two additional potential survey questions. These questions were not included as they were only conceived of during the writing of this thesis. Further data may have been gained if participants who indicated that withdrawal and craving were separate processes were also asked, firstly, 'Do you think that cravings for nicotine *always* occur when a person is experiencing nicotine withdrawal?', and secondly, 'If you are experiencing withdrawal and craving at the same time, how do you differentiate between both processes?'

6.4 Recommendations

It is strongly recommended that future research be conducted to assess smokers' understanding of nicotine withdrawal and cravings for nicotine, focusing on the following areas:

1. Conducting research to establish whether or not people who commence smoking gain a benefit that is unavailable to people who do not smoke.

2. Ascertaining how prevalent are the views held among smokers that nicotine withdrawal and cravings for nicotine are the same process, or separate processes.

3. Determining the percentage of smokers who understand withdrawal and craving to be separate processes who also consider that craving always occurs concurrently with withdrawal.

4. Establishing smokers' understanding of the time between smoking a cigarette and when withdrawal is experienced, and whether this is consistent with nicotine pharmacology.

5. Ascertaining the percentage of smokers who are aware that withdrawal symptoms are experienced after nicotine leaves the body and who are aware of the duration of withdrawal symptoms.

6. Conducting semi-structured interviews with smokers who wish to continue smoking to explore what smokers perceive as being craved, and which is unavailable to non-smokers.

7. Conducting additional semi-structured interviews with smokers who want to stop smoking to explore what is being craved while simultaneously wishing to quit.

6.4 Summary

This research project addressed the question of if, and how tobacco smoker distinguish between nicotine withdrawal and cravings for nicotine. Based on the findings of the literature review, it appears this question has not been examined previously. A significant finding of the research project was that 80% of respondents consider nicotine withdrawal and nicotine craving to be distinct processes, a position which is inconsistent researchers who developed nicotine withdrawal and craving assessment tools. This has significant implications for the development of smoking cessation resources, which often include advice on how to navigate both processes. Further, it was found that within the sample of well-educated university students, a majority of participants had a low level of health literacy regarding nicotine pharmacology which could impact on the ability to quit smoking. It would not be unexpected if the low level of nicotine pharmacology health literacy was reflected among smokers more broadly. These findings have informed the research recommendations provided above, the outcomes of which could be utilised to improve nicotine health literacy and smoking cessation programs and further reduce smoking rates.

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APPENDICES

Appendix A: Literature search in PubMed

Table A.1 Literature search in PubMed

Search number	Search terms	Results obtained
1	smoker OR nicotine OR tobacco AND (withdrawal AND craving)	1,009
2	smoker OR nicotine OR tobacco AND (withdrawal AND craving) AND (understanding OR perception OR knowledge OR experience OR attitudes)	185
3	smoker OR nicotine OR tobacco OR Smoking/psychology AND (withdrawal AND craving) AND (understanding OR perception OR knowledge OR experience OR attitudes)	187

Appendix B: Literature search in PsychINFO

Table B.1 Literature search in PsychINFO

Search number	Search terms	Results obtained
1	smoker.sh OR nicotine.sh OR tobacco.sh OR smoker.tw OR nicotine.tw OR tobacco.tw	40,727
2	craving.sh OR craving.tw OR crave.sh OR crave.tw	8,762
3	withdrawal.sh OR withdrawal.tw OR withdraw$.sh OR withdraw$.tw	42,257
4	Searches, 1, 2 and 3 were combined for the fourth search	658
5	experience.sh OR experience.tw OR knowledge.sh OR knowledge.tw OR perception.sh OR perception.tw OR attitude.sh OR attitude.tw	917,420
6	Searches 4 and 5 were combined for the sixth and final search	80

Appendix C: Research project survey

PARTICIPANT INFORMATION SHEET FORM

Title: 'How do tobacco smokers tell the difference between when they are experiencing nicotine withdrawal and cravings for nicotine?'

Chief Investigator

Ms. Jaime Reed

College of Nursing and Health Sciences

Flinders University

Tel: 8201 7500.

Supervisor

Dr. Yvonne Parry

College of Nursing and Health Sciences

Flinders University

Tel: 8201 7500.

My name is Jaime Reed and I am a Flinders University student in the Master of Nursing (Coursework and Research) programme. I am undertaking this research as part of my degree. For further information, you are more than welcome to contact my supervisor. Her details are listed above.

Description of the study

This project is a confidential and anonymous online survey that will explore how tobacco smokers tell the difference between when they are experiencing nicotine withdrawal and cravings for nicotine. This project is supported by Flinders University, College of Nursing and Health Sciences.

Purpose of the study

This project aims to find out how smokers tell the difference between when they are experiencing nicotine withdrawal and cravings for nicotine. It is hoped that by learning more about smokers'

understanding of nicotine withdrawal and cravings for nicotine that this will lead to improved smoking cessation resources and programmes.

Benefits of the study

The sharing of your experiences will help to explain how smokers tell the difference between when they are experiencing nicotine withdrawal and cravings for nicotine from the smokers' perspective. Most of the research on smoking is conducted from the scientists' or researchers' perspective. To fully understand smoking, it is important to have smokers' perspectives about smoking. A benefit of the study is to have your perspective included in the research project.

Participant involvement and potential risks

If you agree to participate in the research study, you will be asked to:

• respond to an online survey regarding your understanding and experience of nicotine withdrawal and cravings for nicotine.

Completing the survey will take 10 – 30 minutes depending on how much time and detail you would like to put into answering the questions. Participation in the research is entirely voluntary.

It is not expected answering the questions will cause any harm or discomfort to you. However, if you experience feelings of distress as a result of participation in this study, you can contact the following services for support:

• Lifeline – 13 11 14, www.lifeline.org.au

• Beyond Blue – 1300 224 636, www.beyondblue.org.au

• Quitline – 137 848, www.cancersa.org.au

• Flinders University Counselling Service – 8201 2118
https://students.flinders.edu.au/student-services/hcd or email:
counselling@flinders.edu.au

• Your doctor will also be able to provide you with information and support.

Withdrawal Rights

You may, without any penalty, decline to take part in this research study. If you decide to take part and later change your mind, you may, without any penalty, withdraw at any time without providing an explanation. To withdraw, simply close the internet browser and leave the online survey. Any data collected up to the point of my withdrawal will be securely destroyed.

My decision not to participate or to withdraw from this research study will not affect my relationship with Flinders University and its staff and students.

Confidentiality and Privacy

Only researchers listed on this form have access to the individual information provided by me. Privacy and confidentiality will be assured at all times. The research outcomes may be presented at conferences, written up for publication or used for other research purposes as described in this information form. However, the privacy and confidentiality of individuals will be protected at all times. I will not be named, and my individual information will not be identifiable in any research products without my explicit consent.

No data, including identifiable, non-identifiable and de-identified datasets, will be shared or used in future research projects without my explicit consent.

Data Storage

The information collected may be stored securely on a password protected computer and/or Flinders University server throughout the study. Any identifiable data will be de-identified for data storage purposes unless indicated otherwise. All data will be securely transferred to and stored at Flinders University for at least five years after publication of the results. Following the required data storage period, all data will be securely destroyed according to university protocols.

How will I receive feedback?

It is expected that the both the research project and findings based upon it will be completed by 30/09/2021. If you would like to receive feedback on the research project, please request a summary of the findings via email: reed0035@flinders.edu.au

Ethics Committee Approval

The project has been approved by Flinders University's Human Research Ethics Committee (Project ID: 2721).

Queries and Concerns

Queries or concerns regarding the research can be directed to the research team. If you have any complaints or reservations about the ethical conduct of this study, you may contact the Flinders University's Research Ethics & Compliance Office team via telephone on 08 8201 3116 or email human.researchethics@flinders.edu.au.

Thank you for taking the time to read this information and if you accept our invitation to be involved in the research project, please proceed to the survey.

ABOUT YOU

Question 1

Are you a Flinders University student?

- ☐ Yes
- ☐ No

(If “No” is selected the survey closes)

Question 2

Are you aged 17 years or older?

- ○ Yes
- ○ No

(If “No” is selected the survey closes)

Question 3

What is your age?

Question 4

What is your gender?

- ○ Female
- ○ Male
- ○ Other
- ○ Prefer not to say

Question 5

Do you identify as Aboriginal and/or Torres Strait Islander?

- ○ No
- ○ Aboriginal
- ○ Torres Strait Islander
- ○ Aboriginal & Torres Strait Islander

Question 6

What country were you born in?

Question 7

What was the first language that you learned to speak?

Question 8

Are you currently enrolled in a health related course?

- ○ Yes
- ○ No

Question 9

What is the highest level of education you have commenced, including the course you are currently enrolled in?

- ○ Undergraduate
- ○ Graduate Certificate
- ○ Graduate Diploma
- ○ Honours
- ○ Masters
- ○ PhD

YOU AND SMOKING

Question 10

How old were you when you started smoking?

Question 11

Do you want to stop smoking?

- ○ Yes
- ○ No
- ○ Not sure

Question 12

Have you tried to stop smoking?

- ○ Yes
- ○ No

Have you tried to stop smoking?

(If “No” is selected survey skips to question 16)

Question 13

How many times have you tried to stop smoking?

Question 14

What is the longest amount of time that you stopped smoking?

Question 15

Why do you think that you returned to smoking?

Question 16

On average how many cigarettes do you smoke a day?

Question 17

How many years have you smoked in total?

YOUR THOUGHTS ON NICOTINE WITHDRAWAL AND NICOTINE CRAVINGS

Question 18

Do you think that nicotine withdrawal and cravings for nicotine are?

- ○ The same thing
- ○ Two separate processes that may or may not happen at the same time
- ○ Not sure

Question 19

How many times or how often have you experienced cravings for a cigarette or nicotine? (You don't need to write an exact number but please give an estimate).

Feel free to write a comment if you like and write as much as you want.

Question 20

How many times or how often have you experienced nicotine withdrawal? (You don't need to write an exact number if you aren't sure, but please give an estimate).

Feel free to write a comment if you like and write as much as you want.

Question 21

How long do you think it takes for the nicotine in a cigarette to leave your body after you have finished smoking the cigarette?

(Please give an estimate of the number of hours, days, weeks or months that you think it takes for nicotine to leave the body).

Question 22

How do you tell the difference between when you are experiencing cravings for nicotine and when you are experiencing nicotine withdrawal?

(Write as much as you want)

Question 23

Where did you gain your understanding of nicotine cravings from?

Question 24

Where did you gain your understanding of nicotine withdrawal from?

Question 25

Do you think that you can crave something that you don't wan't?

- ○ Yes
- ○ No
- ○ Not sure

Question 26

Please write your thoughts on why you gave the answer “Yes”, “No” or “Not sure” to the question, "Do you think that you can crave something that you don't want?
(Write as much as you want)

Question 27

Do you believe that if you experience cravings for nicotine that means that you want to smoke?

- ○ Yes
- ○ No
- ○ Not sure

Question 28

Please write your thoughts on why you gave the answer “Yes”, “No” or “Not sure” to the question, "Do you believe that if you experience cravings for nicotine that means that you want to smoke?

(Write as much as you want)

It is not expected that participation in this study will cause any feelings of distress, however if you do experience any distress you can contact the following services for support:

Lifeline – 13 11 14, www.lifeline.org.au
Beyond Blue – 1300 22 4636, www.beyondblue.org.au
Quitline – 137 848, www.cancersa.org.au
Flinders University Counselling Service - 8201 2118, https://students.flinders.edu.au/student-services/hcd or email counselling@flinders.edu.au
Your doctor will also be able to provide you with information and support.

Thank you very much for the time you have taken to complete the survey. It is appreciated.

Appendix D: Research project survey flyer

SMOKERS

tell us what you really think

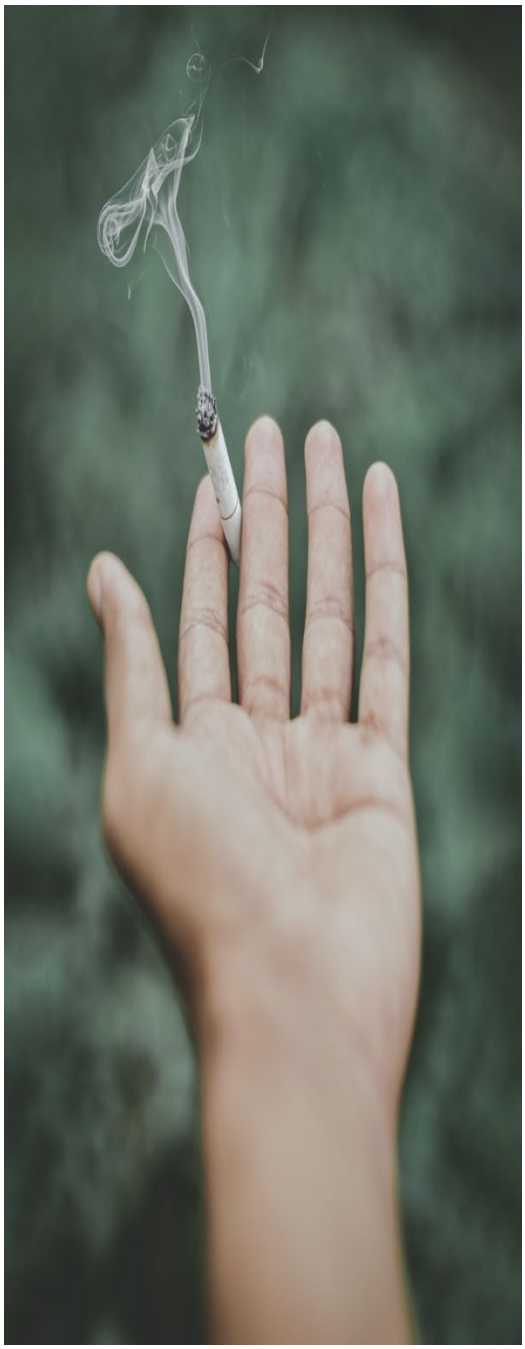

Photo credit: mr_Jb_57. Pexels.com

By completing a short voluntary, confidential and anonymous survey on how smokers tell the difference between nicotine withdrawal and cravings for nicotine.

Open to Flinders University students who are current tobacco smokers aged 17 years or older.

The project has been approved by the Flinders University Human Research Ethics Committee (Project ID:2721)

For more info scan the QR code

Appendix E: Ethics approval

10 December 2020

HUMAN ETHICS LOW RISK PANEL

APPROVAL NOTICE

Dear Dr Yvonne Parry,

The below proposed project has been **approved** on the basis of the information contained in the application and its attachments.

Project No: 2721

Project Title: How do tobacco smokers tell the difference between when they are experiencing nicotine withdrawal and cravings for nicotine?

Primary Researcher: Dr Yvonne Parry

Approval Date: 10/12/2020

Expiry Date: 04/10/2021

Please note: *Due to the current COVID-19 situation, researchers are strongly advised to develop a research design that aligns with the University's COVID-19 research protocol involving human studies. Where possible, avoid face-to-face testing and consider rescheduling face-to-face testing or undertaking alternative distance/online data or interview collection means. For further information, please go to https://staff.flinders.edu.aulcoronavirus-information/research-updates.*

RESPONSIBILITIES OF RESEARCHERS AND SUPERVISORS

1. Participant Documentation

Please note that it is the responsibility of researchers and supervisors, in the case of student projects, to ensure that:

- all participant documents are checked for spelling, grammatical, numbering and formatting errors. The Committee does not accept any responsibility for the above mentioned errors.
- the Flinders University logo is included on all participant documentation (e.g., letters of Introduction, information Sheets, consent forms, debriefing information and questionnaires – with the exception of purchased research tools) and the current Flinders University letterhead is included in the header of all letters of introduction. The Flinders University international logo/letterhead should be used and documentation should contain international dialing codes for all telephone and fax numbers listed for all research to be conducted overseas.

2. Annual Progress / Final Reports

In order to comply with the monitoring requirements of the *National Statement on Ethical Conduct in Human Research 2007 (updated 2018)* an annual progress report must be submitted each year on the approval anniversary date for the duration of the ethics approval using the HREC Annual/Final Report Form available online via the ResearchNow Ethics & Biosafety system.

Please note that no data collection can be undertaken after the ethics approval expiry date listed at the top of this notice. If data is collected after expiry, it will not be covered in terms of ethics. It is the responsibility of the researcher to ensure that annual progress reports are submitted on time; and that no data is collected after ethics has expired.

If the project is completed *before* ethics approval has expired please ensure a final report is submitted immediately. If ethics approval for your project expires please either submit (1) a final report; or (2) an extension of time request (using the HREC Modification Form).

For student projects, the Low Risk Panel recommends that current ethics approval is maintained until a student's thesis has been submitted, assessed and finalised. This is to protect the student in the event that reviewers recommend that additional data be collected from participants.

3. Modifications to Project

Modifications to the project must not proceed until approval has been obtained from the Ethics Committee. Such proposed changes / modifications include:

- change of project title;
- change to research team (e.g., additions, removals, researchers and supervisors)
- changes to research objectives;
- changes to research protocol;
- changes to participant recruitment methods;
- changes / additions to source(s) of participants;
- changes of procedures used to seek informed consent;
- changes to reimbursements provided to participants;
- changes to information / documents to be given to potential participants;
- changes to research tools (e.g., survey, interview questions, focus group questions etc);
- extensions of time (i.e. to extend the period of ethics approval past current expiry date).

To notify the Committee of any proposed modifications to the project please submit a Modification Request Form available online via the ResearchNow Ethics & Biosafety system. Please note that extension of time requests should be submitted prior to the Ethics Approval Expiry Date listed on this notice.

4. Adverse Events and/or Complaints

Researchers should advise the Executive Officer of the Ethics Committee on 08 8201-3116 or human.researchethics@flinders.edu.au immediately if:

- any complaints regarding the research are received;
- a serious or unexpected adverse event occurs that effects participants;
- an unforeseen event occurs that may affect the ethical acceptability of the project.

Yours sincerely,

Mr Hendryk Flaegel

on behalf of

Human Ethics Low Risk Panel
Research Development and Support
human.researchethics@flinders.edu.au
P: (+61-8) 8201 2543

Flinders University
Sturt Road, Bedford Park, South Australia, 5042
GPO Box 2100, Adelaide, South Australia, 5001

http://www.flinders.edu.au/research/researcher-support/ebi/human-ethics/human-ethics_home.cfm

ResearchNow
Ethics & Biosafety

Flinders University
Research Development and Support
Proactively supporting our Research

Appendix F: Table F. 1 Respondents' understanding and experience of nicotine withdrawal and craving[5]

Respondent	No. of times quit	How often craving has been experienced?	How often withdrawal has been experienced?	How long does nicotine take to leave the body?	Are cravings viewed as the same or a different process?
U	0	Between 1 -10 a day	I actually do not know the difference between cravings and withdrawals.	I also do not know this. I will guess maybe 24 hours?	Different
Z	A few	Every few hours	Every day, usually a couple hours after without it	Like an hour or 2 or maybe 3	Different
A5	3	Twice a day	Not sure	3 days	Different
N	Estimated 1. Respondent wrote: 'I gave it up last year and didn't smoke for ages except socially now I am dabbling again.'	No idea	No idea	Isn't it like 24 hours [?]	Different
I	1	Majority of the time	Not sure really I don't take notice	24 hours	Different
A6	Too many	Everyday	Multiple times a day	No idea	Different
A7	3	Cravings when I am drunk or in a depressed state	Probably none	A few hours	Different
V	3	Probably 3 times a day	I'm not sure maybe 3-5	Probably years with my build but for a	Same

[5] All responses included in the table from the inner four columns are direct quotes from the survey participants. Spelling and grammatical errors were not denoted with the term '[sic]'.

Respondent	No. of times quit	How often craving has been experienced?	How often withdrawal has been experienced?	How long does nicotine take to leave the body?	Are cravings viewed as the same or a different process?
				person who hasn't smoked, one cigarette may be flushed out the system quicker	
A1	3	When: stressed, the thought crosses my mind, discussing smoking, drinking	Usually after food. A similar time of day I used to smoke.	3 hours? I've heard it is longer but that's how it feels to me.	Same
A2	0	Many times	Many times	1 hour	Same
B	2	If im bored every half hour, if im busy or distracted I don't get cravings.	20 times	Honestly I think only after a day or 2 of not having one, then its 1 day of being moody and just thinking about wanting one	Different
Q	3	Around 3 times a week depending on my stress level	Once a week since stopping	More than 24 hours, probably 1-3 days	Different
A4	5	3-4 times a day	I only notice withdrawal symptoms when I finish a packet and can't get another one straight away and have to go a 5-6 hours without one.	A couple of hours	Not sure
T	2	A lot	At night mostly when I haven't had one for a while	Years	Different

Respondent	No. of times quit	How often craving has been experienced?	How often withdrawal has been experienced?	How long does nicotine take to leave the body?	Are cravings viewed as the same or a different process?
			After about 4 hours I start craving one		
C	2	Almost every day especially If haven't smoked all day	Not sure	Isk [It is assumed Isk is an abbreviation for 'I should know']	Not sure
O	0	Whenever my nicotine levels go down I go into withdrawal due to the chemical imbalance in my brain. Depends on if I'm in a stressful situation. Or not	Whenever my nicotine levels go down I go into withdrawal due to the chemical imbalance in my brain. Depends on if I'm in a stressful situation. Or not	I know that your body starts healing from the damage done overnight but as I smoke everyday there will never be no nicotine in my body	Different
K	Too many	Extremely often … that's why I smoke.	A few times a day. I find I start getting fidgety/restless or irritable if I haven't had a smoke in awhile. Its especially bad if I know I'm trying to quit.	I believe it's at least 24hrs before properly starts to leave but possibly up to a week to clear out.	Different
W	6	Quite a lot especially when I'm stressed	A fair bit	2 days	Different
X	1	Never	Never	No clue	Different
R	0	50 or more	0	2 hours	Different
A	0	Very often	I've experienced nicotine withdrawal approximately 7 times in the last year or at least	Maybe about 3 days	Different

Respondent	No. of times quit	How often craving has been experienced?	How often withdrawal has been experienced?	How long does nicotine take to leave the body?	Are cravings viewed as the same or a different process?
			what I believed to be withdrawals and not just cravings		
L	0	4	10	10 hours	Different
Y	6	It's usually after the completion of a task, in a rest time. Just today, I have had maybe 10 cravings, and I haven't had a cigarette today, and have been awake since 6am (it is 2:30pm)	I usually feel withdrawal if I haven't had nicotine in a longer time, such as days. This withdrawal can kick in as soon as 8 hours, but usually takes around and above 24 hours	It feels like the amount of time is a matter of hours (2-3), but I know it takes about 3 days.	Different
F	3	A few times a day	Times when I've quit.	2 days	Different
M	0	not too regularly as im not a heavy smoker but during times of stress I do so maybe 20-30 times	Never	2 day[s]	The same thing
S	10	It's been two days that I have quit … smoking but I crave for smoking.	Number of times	2 days	Different
P	1	Maybe once a day but can suppress it and not give in	If I have a cigarette on a Monday an' haven't had one till Tuesday ''ll usually start to feel a craving	Couple of days	Different

Respondent	No. of times quit	How often craving has been experienced?	How often withdrawal has been experienced?	How long does nicotine take to leave the body?	Are cravings viewed as the same or a different process?
			around Tuesday afternoon to have a cigarette		
H	2	Quite often … especially during times of stress	Only a handful of times	At least a few days	Different
G	0	Twice a day, more so if I'm stressed with work or uni work	I don't know if I've had major symptoms for nicotine withdrawal, it's hard to tell cause I usually just have one if I want one	12 hours?	Same
E	0	I don't really crave having a smoke that much, there are times where I do feel like I want one more such as when I'm drinking or really stressed but I never really have a huge craving though	Never really	Maybe like 3 days?	Different
A8	0	No	0	1 day	Not sure