Applying the Population Health Approach to school planning to support children's early development

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Address the determinants of children's progress by exploring the contextual and operational factors at play 151
Base decisions in evidence: Use evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities 153
Increase upstream investments: concerned with the impact of studies to inform the direction of, and to improve educational outcomes. Investments are both short- and long-term 154
Apply multiple strategies: Applying concepts from other disciplines, such as health and wellbeing, to education settings. Strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges 155
Collaborate: Occurs with other leaders, educators, and community partnerships 156
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ABSTRACT

Background: The population approach is increasingly recognised for reducing healthcare demand and contributing to health system sustainability. However, its application to education could also benefit leaders and educators in school settings who already apply some of these concepts in their work. Currently, there has been no application of the population health approach to education. This PhD thesis explores *why, how, and in what contexts can a population health approach be applied to school planning to support children's early development?*

Methods: This thesis reports on six studies that sought to address the gap in the literature by applying the population approach to education. These studies included: a systematic review and critical interpretive synthesis of the existing literature on the population health approach in education (Study 1); a document analyses of six Australian education planning and curriculum documents, using an *a priori* coding framework specifically developed to assess the extent to which the population health approach was present in the documents (Study 2); 20 interviews with leaders and educators from schools across two Australian jurisdictions (Study 3); 11 interviews with policy-makers across two jurisdictions directly involved in the development of Australian education policy and supports, analysed using Shiffman's and Smith's political science theory (Study 4); a linear regression analysis of South Australian students to identify schools whose students performed above or below expectations on Year 3 NAPLAN tests (Study 5); and a mixed-methods analysis of 35 schools and their planning documents to identify whether schools that performed better than expected reported a greater number of population health approach elements (Study 6).

Findings: This thesis has demonstrated that incorporating population health approaches into planning within school sites can improve academic development. Integrating each element into school and policy planning allowed for a more coordinated approach to supporting children's needs, sharing resources, and informed decision-making. Using data to inform decision-making and an informed understanding of how children's past experiences have an impact on their progress allowed leaders and educators to develop appropriate approaches and work with families to support their needs. A conceptual model of the approach (see, p.162) demonstrates the elements involved and their intersection. Addressing the factors that impact upon learning at both the individual and community levels in the early years will ensure that students are better prepared to overcome the educational barriers to success.

The findings from Study 1 demonstrated that although a population health approach to planning does not explicitly exist within education, it would indeed be possible to adapt the approach to prior-to-school and school educational planning, and that doing so is likely to be advantageous for children's development. The findings from Study 2 showed that elements of the population health approach do exist within various educator frameworks; however, their inclusion was often limited

and superficial. Study 3 showed that State and Federal policies acted as both barriers and facilitators to implementing the population health approach within schools. Policies in some cases did, however, restrict how sites were able to address the social and emotional needs of children. Data-informed decisions and priorities, and the work of leaders and educators across jurisdictions underpinned the application of the population health approach within schools. The findings from Study 4 demonstrated support for early investments in child development and an understanding that schools could play an essential role in supporting families holistically, with principals acting as influential leaders within the community. The findings from Study 5 demonstrated that some schools shift children's developmental trajectories before they sit their first NAPLAN assessment in Year 3. Study 6 found that schools that reported on a larger number of activities that reflected the population health approach were more likely to shift children's academic trajectories and improve academic outcomes in literacy and numeracy. The model was highly predictive of schools that performed above expectations on NAPLAN reading, and was most helpful when at least five school documents were assessed. Finally, school annual reports were the most predictive of whether a school performed better than expected, particularly in NAPLAN reading.

Implications: This research is the first to convert the population health approach to a quantifiable framework for education and test the predictive capability of the approach, as measured by school scores. The results showed that children's academic trajectories could be shifted before their first NAPLAN assessment in Year 3, further supporting the economic benefits of investing in education in the early years. These findings are of great significance to the education sector, as they demonstrate that schools that include more elements of the population health approach in their work, as reported in their site documents, are more likely to shift student outcomes between the first year of full-time school and their NAPLAN reading and numeracy tests in Year 3.

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.

Signed.....Ashleigh Collier.....

Date.....17/11/2022.....

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ABBREVIATIONS

ACARA – Australian Curriculum, Assessment and Reporting Authority

ACF – Advocacy Coalition Framework

AEDC – Australian Early Development Census

APS - Australian Principal Standard

APSfT - Australian Professional Standards for Teachers

CHD – Community Health Development

CIS – Critical Interpretive Synthesis

DOI – Diffusion of Innovation

EAL/D - English as an additional language or dialect (EAL/D)

ECA – Early Childhood Australia

ECEC – Early Childhood Education and Care

EYLF - Early Years Learning Framework

ICSEA - Index of Community Socio-Educational Advantage

IRSD - Index of Relative Socio-economic Disadvantage

ITE – Initial Teacher Education

NAPLAN - National Assessment Program Literacy and Numeracy

NQS – National Quality Standard

PA – Population Approach

PAE – Population Approach Elements

PAT - Progressive Achievement Tests

PHA – Population Health Approach

SDoH – Social Determinants of Health

SES – Socio-economic status

TFD – Toronto First Duty

UNICEF - United Nations Children's Fund

WHO – World Health Organization

CHAPTER 1. INTRODUCTION

Introduction

This thesis reports on six studies conducted to explore the presence and applicability of the population health approach (PHA) to education in Australia. The PHA aims to improve the health of entire populations and reduce health inequities among population groups by considering the risk factors and conditions that influence health (Health Canada, 2001, p. 4). While the approach is commonly used in the health sector, it has the potential to support leaders and educators in their work, and the systems that support them. In this thesis population refers to a group of people, such as children living within a local geographical area, or students enrolled at a school.

Aims and objectives

This PhD thesis explores the question: *Why, how and in which contexts can a population health approach be applied to school planning to support children's early development?* The studies within the thesis have investigated the presence and applicability of the PHA to the education system, schools, and a range of cohorts in Australia by addressing the following aims:

1. Investigate what is currently known about the applicability of population health approaches to planning in school settings, and the extent to which applying relevant concepts such as collaboration, data use, and the consideration of risk and protective factors are likely to improve children's outcomes.
2. Investigate the presence of elements of a population health approach in national frameworks to better understand educator motivations, their ability to integrate the approach into their planning, and agencies that play a role in supporting school planning.
3. Identify to what extent elements of a population health approach are evident within educators' planning for learning and teaching, the barriers and facilitators to working in this way, and the benefits these practices have for children's learning and development.
4. Understand the perceptions of policy actors of the factors which facilitate or constrain the development of planning practices.
5. Identify South Australian schools which performed either above expectations, below expectations, or as expected on the Year 3 NAPLAN as predicted by students' AEDC scores at school entry.

Background

Children's early development

Early childhood, defined as birth through to the age of eight, is recognised as a critical stage of development (Bronson, 1962; Robson, 2002; Sylva, 1997; UNESCO, 2015). Children's development in these years is known to have significant and lasting impacts on their later physical, social, and emotional health, and their academic achievement and employment (Beauchamp et al., 2011; Begg, 2007; Ben-Shlomo & Kuh, 2002; Smith, 2007).

Children's growth, learning, and development are influenced by a wide range of environmental, familial, geographical, and socioeconomic factors, and can often be anticipated early in life (Bronfenbrenner, 1986; Pem, 2015). For example, academic achievement and cognitive development can be predicted by children's exposure to socioeconomic disadvantage (Ferguson et al., 2007; Goldfeld et al., 2021; Moore et al., 2017). Education can help mediate between early-life socioeconomic status and adult mortality; however, upon school entry, many children have already faced significant adversity (Black et al., 2017; Campbell et al., 2014; Galobardes et al., 2008). These experiences can present as challenges in integrating into the classroom, and without intervention, children are likely to fall behind their peers as they continue through school (Heckman & Masterov, 2007). Children who score below the 10th percentile in one or more domains, as described by the Australian Early Development Census (AEDC), at age five were more likely to be in the bottom 20% of students' scores on the National Assessment Program – Literacy and Numeracy (NAPLAN) assessments at Years 3, 5, and 7 (Brinkman et al., 2013). These children may demonstrate a lower than average ability in one or more of the areas of basic physical health and wellbeing, social competence, emotional maturity, language and cognitive skills, or communication skills and general knowledge. An absence of basic competencies in any of these areas, coupled with prior adversities, can present in problematic behaviours in the classroom, such as poor emotional self-regulation and difficulty interacting with peers, resulting in educators spending more time managing their classroom and less time spent supporting learning (Hind et al., 2019; Kerr & Nelson, 1983; Tayler, 2015). The COVID-19 pandemic has also had a significant impact on already marginalised communities, families, and children. The divide between those in advantaged and disadvantaged communities has continued to grow and has been accelerated in recent years (Bessell, 2021), making the need to reduce inequities even more important.

Research by McCain et al. (2007) suggests that policies and programs that aim to reduce inequity are critical to improving outcomes for children. In addition, numerous studies show that investments in the early years are one of the most cost-efficient investments in human capital, leading to a country's sustainable development (Naudeau et al., 2012; WAVE Trust, 2013). These trajectories and predictive models have driven support for prevention in the early years with the view that it will have a lasting impact on later adult health, wellbeing, and academic achievement. PHAs are present in health, where large population-level data sets are regularly used to track trends and identify potential areas of need. An opportunity exists for education leaders and sector

heads in Australia to use these data to similarly track children's development at a higher level and better coordinate efforts to address systemic disadvantage and inequity.

Educators in both schools and at Early Childhood Education and Care (ECEC) sites are increasingly required to consider different types of data in their planning and accountability for children's learning and development (Datnow & Hubbard, 2016). While on-entry assessments, continuous formative and summative assessments, and standardised testing such as NAPLAN are standard practices, population-level data sets such as the AEDC are often under-utilised (Schildkamp, 2019). Population data sets such as the AEDC are relatively new to the education system and could provide insight into children's early experiences and their communities. Adapted for use in Australia from the Canadian version of the Early Development Instrument, the AEDC is a population measure of how young children have developed by the time they enter their first year of full-time school (Janus et al., 2007; Silburn et al., 2009). The AEDC occurs every three years and provides national, state, community, and school-level data on children's abilities. The census reports on communities rather than individuals, and informs all levels of government, related agencies, schools, ECEC contexts, and community organisations and groups to understand the environments and experiences children are exposed to from birth through to school age. School reports are provided only to principals and contain high-level data for the children at their school and those in their local communities. The most recent data collection occurred in 2021, with the community and school reports released in early 2022. Australia is currently the only country to regularly collect these data through a national census, making it an invaluable data set that can be drawn upon for planning and establishing community partnerships, while at the same time, posing unique challenges for educators who are increasingly expected to integrate the data into their planning. These challenges, including a lack of understanding of the usefulness of the data, time constraints, and inexperience in data analysis, all lead to limited use of the data by educators (Datnow & Hubbard, 2016; Kippers et al., 2018; Schildkamp, 2019). The fifth wave of data is particularly unique as it demonstrates the impacts of COVID-19 on Australia's children as they enter school.

The education sector may choose to look to other sectors where this has become common practice in order to adapt to new ways of utilising this data. Health is one such sector, where a common approach has been developed for using population data sets for tracking trends and identifying potential areas of need. An opportunity exists for educators and systems in Australia to use AEDC data to similarly track trends in children's development at a population level. The AEDC is a rich data source that could also be drawn upon at the system, school, and cohort levels to better understand the factors driving children's development. Subsequently, it could be used to inform planning to address the underlying factors influencing children's learning and wellbeing needs in their communities.

Early Childhood Education

Early childhood is defined as birth through to the age of eight; however, this age bracket sees children supported by educators across two distinct contexts: the prior-to-school and school settings (UNESCO, 2017). Importantly, children's earliest experiences, including participation in high-quality early childhood education and care, are understood to have a significant impact on children's academic achievement through their school and post-school options and in relation to their general wellbeing (Beauchamp et al., 2011; Ben-Shlomo & Kuh, 2002; Smith, 2007; Smithers et al., 2017; Tanner et al., 2015). What is also known is that by the time children commence school, factors such as not yet demonstrating proficiency in English, low socioeconomic status, and non-attendance at pre-school are understood to predict lower academic achievement (Feinstein, 2003; Goldfeld et al., 2016; O'Connor et al., 2014). The research indicates that those experiencing difficulties, as measured by developmental vulnerability on the AEDC in their first year of full-time schooling, are likely to remain behind their peers. These children are likely to experience challenges meeting the national minimum standards for literacy and numeracy (Brinkman et al., 2013).

The factors impacting children's learning and development in the early years are likely to continue to affect their ability to engage in school, as determinants such as income, support for learning within the home, and access to service centres around the child's home and community, are unlikely to change significantly over time (Moore & West, 2016). Several models have been proposed to explain the effects of socioeconomic status, and ultimately, life experiences on later life outcomes. The timing model suggests that socioeconomic factors have the most significant influence if experienced during specific developmental periods such as from birth to three years (Cohen et al., 2010). This model emphasises the importance of early sensitive periods and their impact on later health and development. Research has also demonstrated that learning is cumulative, meaning that even if prior challenges impacting development are no longer evident, children who begin schooling behind their peers will need to make significant learning gains to catch up and keep up (Australian Early Development Census, 2014).

Education systems need to address the factors impacting learning at both the individual and community levels to overcome the barriers to educational success. This may include strategies to identify children who require additional support at an individual level. When combined, action at both the individual and community level to address barriers to learning, inclusive of the social determinants of health, has been shown to support children's learning and foster academic success (Moore et al., 2015). However, Phillips and colleagues (2016) noted that policies that focused on the social determinants of health in early childhood tended to take a 'narrow view of the evidence' and focused on the individual (Phillips et al., 2016). Additionally, at present, little work has been undertaken to demonstrate how these factors could be integrated into school planning

processes once children enter formal education. Doing so would be significant for children's development and their later academic success.

Education planning processes

Early childhood education within Australia remains complex, with variations in policy and approaches and little consistency across states and territories (Cheeseman & Torr, 2009). This has led to a fragmented system in which there is a disconnect between educators working in the birth-to-five and school sectors (Molla & Nolan, 2019; Press & Hayes, 2000). Educators across early childhood education settings are required to meet teacher standards (Australian Institute for Teaching and School Leadership, 2011), but these may be understood and applied differently depending on the context of their position. This differentiation between standards and expectations causes frustration for educators, as those working with children aged birth-to-five face external moderation of their practice as the services in which they work are assessed by the National Quality Standards process. In contrast, educators on school sites are positioned with far greater autonomy (Press & Hayes, 2000). This research will focus primarily on early childhood education within school sites. Although the responsibility of early childhood development falls on educators working across the birth-to-eight age span, the planning documents and processes required by the two contexts differ significantly. As such, school contexts may have greater consistency in children's experience than the diversity found in prior-to-school contexts.

Within the Australian education system, educators are required to fulfil their professional responsibilities, such as contributing to site improvement plans linked to state and national frameworks. Curricula and policy are used to inform the planning process within each learning environment, and form an essential part of their responsibilities to, and the educational entitlement of, every child and young person. These documents vary in content, purpose, and length and can be time-consuming for educators to execute. The increasing complexity of planning and assessing for learning and teaching and the requisite demand on educators can lead to frustration and may be particularly challenging for early career educators (Harrison et al., 2019). Alongside the National Assessment Program – Literacy and Numeracy (NAPLAN) targets, these documents are ultimately used to measure the academic proficiency of each child and of cohorts of children. However, there is little evidence that children's holistic development is supported by the plethora of education documents, policies, and curricula that educators must navigate, thereby presenting an opportunity for additional research.

The significance of coordinating system-wide efforts to positively impact children's development is clear and continues to be a focus on a national and international scale (Gove & Black, 2016; Madani, 2019; Van Eyk et al., 2021). Addressing inequities is a requirement of governments as per the Convention on the Rights of the Child (1989) and the Sustainable Development Goals (2019). Investment in these areas has been committed to by the Australian Government. Therefore,

research informing practice in this area is vital to governments, sites, schools, and communities as it may inform cross-sector commitment to work together collaboratively to achieve their goals of reducing inequities. This thesis will specifically inform practice as it proposes how a PHA can be integrated into the early years of school planning, promoting inter-sectoral partnerships and improved development for all children.

Within Australia, children face challenges across several developmental domains of physical health and wellbeing, social competence, emotional maturity, language and cognitive skills, and communication skills and general knowledge (Social Research Centre, 2016). Addressing these vulnerabilities is crucial to ensuring that children reach their full potential. However, this early prevention work requires a collaborative approach between schools, early childhood education and care providers, governments, and families (Haslip & Gullo, 2017; Schiariti et al., 2021).

Ecological systems theory, as initially proposed by Bronfenbrenner (1986), suggests that individuals are influenced at the individual, interpersonal, community, organisational, and policy levels. Further research has shown that children's development is similarly influenced by these levels and is most likely to generate lasting gains when individual characteristics are considered alongside changes within the family, the school, or in policies (Pem, 2015). Health promotion research demonstrates that creating sustainable and long-term change is most effective when it occurs across each level and through various systems (Shelley & Jo, 2012; Stokols, 1996)}.

Early prevention is critical

Early prevention has been shown to develop children's strengths and skills, and to provide opportunities to thrive, be prepared for adult life, and contribute to their communities (Richter et al., 2017; Teager et al., 2019). This notion is fundamental as children's early experiences are built upon as they grow, influencing their health and wellbeing, education, social participation and inclusion, peer and family relationships, and civic and economic engagement (Campbell et al., 2014). Interdisciplinary collaboration and partnerships possess unique opportunities to influence children's development. By sharing resources and wide-spread messaging, this approach is more likely to reach a greater number of families and generate a significant return on investment in terms of economic, health, and social outcomes (Halfon et al., 2004; Heckman & Masterov, 2007).

Investing in early childhood generates a significant return and is also a low-risk and effective strategy for reducing social costs (Heckman & Masterov, 2007). Heckman and Masterov (2007) also suggest that a complementary investment in families through coaching sessions can further compound this return in the long-term. Furthermore, work driven by local champions rather than through outside organisations, based on the needs of those in the community itself has been shown to be more successful in generating change (Rothman, 1996). The Locality Development Model, proposed initially by Rothman (1996), suggests that to affect change, a wide variety of people should be involved in the planning, implementation, and evaluation of the process.

Furthermore, place-based approaches which authentically engage with communities through the process of design and service delivery, and that are responsive to needs, have been shown to provide effective early prevention support (Moore et al., 2015). As a central structure in children's lives, schools can play a critical role in early prevention to assist in shifting children's trajectories and improving the lives of their families. However, addressing the underlying needs that are likely to impact on these vulnerabilities requires a more proactive approach focused on families, the community, and the individual, such as that described by the PHA (Health Canada, 2001).

Original contribution to knowledge

This thesis explores if, why, how, and in what context a PHA might be useful within education sites. It explores the potential challenges associated with the approach and the benefits to children's learning and development at a system, cohort, and individual child level.

Currently, no research has been conducted applying the PHA to the education sector. This gap in the literature is clearly articulated in Study 1, where a systematic review of the PHA and its use in education is undertaken. This thesis addresses this empirical gap by exploring if, and how, the PHA elements can mediate school practices and, ultimately, children's academic development.

In addition to addressing the empirical gap, this thesis contributes to understanding at a conceptual level by developing the PHA for education (Varpio et al., 2020). Based on the existing PHA developed by Cohen and colleagues (2014), an initial conceptual definition of the PHA for education is identified in Study 1. Additional constructs are added to the approach, and various elements adjusted based on the application of the approach in education in Studies 2, 3, 4, 5, and 6.

The PHA aims to improve the health of entire populations and reduce health inequities among population groups by considering the risk factors and conditions that influence health (Health Canada, 2001). Integrating elements of a PHA within education could improve children's learning trajectories by ensuring classroom educators have a deeper understanding of the strengths and challenges of their cohorts and adapting their programs to suit the children's needs. This would also provide systems with an opportunity to produce a more effective funding model, which allows for greater equity and resource sharing to reduce systemic disadvantage.

Structure of the thesis

For this thesis, six studies were conducted to explore the presence and applicability of the PHA in education, and to determine the suitability for use by leaders and educators in Australian schools and educational systems. The structure of the thesis is as follows:

In Chapter 2, *A Population Health Approach in education to support children's early development: A Critical Interpretive Synthesis (Study 1),* the process of systematically reviewing the health and

education literature was undertaken to identify the uses of the PHA in education. A lack of empirical research that adopts the PHA for education was identified. A total of 42 peer-reviewed articles that reported on empirical research were reviewed, all of which were of rigorous quality as determined by the Joanna Briggs quality appraisal tool or provided theoretical or practical insight. How educators employ elements encompassed in PHAs in planning, using data to plan, and how education providers effectively work with their communities to support children and families' needs were described. This chapter reported the main themes and sub-themes extracted from the studies included in the review. These were then used as a basis to generate four synthetic constructs: (1) Elements of population health models exist within communities and can assist in improving outcomes for more children; (2) Inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development; (3) Children's development can be influenced at a variety of levels; and (4) System change requires a range of drivers and supports. These constructs were used to provide a basis to identify gaps in the literature, propose how the PHA could be used in education, and develop the aims for Study 2.

In Chapter 3, *Investigating the applicability of the Population Health Approach to Education: An analysis of planning documents (Study 2)*, six education planning and curriculum frameworks in Australia were reviewed using an *a priori* coding framework specifically developed to examine the extent to which school leadership and educators were, through these frameworks, supported to undertake the kind of planning required to positively shift children's development and learning trajectories. The findings were then presented and discussed in relation to the PHA elements for education proposed in Study 1 before concluding and considering future avenues for exploration in Studies 3 and 4.

Chapter 4, *Population Approaches to improve children's learning – a qualitative exploration into how schools implement the approach into their planning and programs (Study 3)*, detailed the qualitative methods employed, including semi-structured interviews with 20 leaders and educators across two Australian jurisdictions. The findings, which were developed through thematically analysing the data using a deductive approach, were presented describing how schools engaged in practices encompassed by the PHA; how elements of the approach could support children's academic and wellbeing outcomes; and the barriers and facilitators of its use. Finally, conclusions were drawn and areas for future research were suggested, which assisted in developing the aims for Studies 4, 5, and 6.

In Chapter 5, *Perceptions of policy actors on positively impacting child development through policy and collaborative partnerships (Study 4),* the methodology, including the political science theories and frameworks used to guide the study were presented (Sabatier & Weible, 2007; Shiffman &

Smith, 2007), including semi-structured interviews with 11 policy-makers across two Australian jurisdictions. The findings were presented in relation to Shiffman and Smith's (2007) framework for global priorities. This framework explores how policy priorities are determined and how collective action by education policy-makers can generate change. In this discussion, the findings were presented in relation to the existing literature to show how schools can play an essential role in supporting families holistically, and principals can act as influential leaders in the community.

Chapter 6, *Exploring how schools can influence children's academic achievement in the early years – a secondary analysis to identify school sites for further investigation (Study 5)*, detailed the methods used to identify schools whose children performed better or worse than expected on the Year 3 NAPLAN based on their AEDC profiles. First, the process of obtaining the linked data set was outlined, containing linked data for individual children from 430 school sites in South Australia, totalling 13,415 students who took part in both the 2015 AEDC and 2018 NAPLAN assessments. Next, linear regression modelling was used to identify 65 schools for further investigation into the elements which may lead students in a school to perform above or below expectations in Year 3 NAPLAN reading and numeracy testing, based on their developmental vulnerability at school entry as measured by the AEDC, for analysis in Study 6.

In Chapter 7, *A quantitative methods analysis of on/off-diagonal schools planning documents, to identify how children's development is supported and trajectories can be shifted (Study 6)*, the qualitative and quantitative methods used were detailed, including developing a rating system for assessing the presence of PHA elements in school planning documents, to investigate 65 schools across South Australia whose children performed above expectations, below expectations, or as expected on the Year 3 NAPLAN, based on the level of developmental vulnerability measured at school entry by the AEDC. The linear and binary regression analyses used to explore whether including elements of the PHA in planning could be advantageous for improving children's academic achievement were then described. Finally, the findings and implications in relation to the existing literature were discussed before concluding.

In Chapter 8, the overall *Discussion*, the findings from each of the studies within the body of research in relation to the PHA elements were discussed. This was achieved by summarising the results from each study in relation to the individual population elements for education. Secondly, a conceptual model of the approach was presented, including a diagrammatic depiction of the elements and their intersection as understood in the findings of the studies presented in this thesis. An interpretation of the approach in relation to the broader literature and concepts underpinning the model was then discussed. Finally, a reflection on the methodology used, highlighting the strengths and weaknesses, was presented, followed by a discussion of the practice and policy implications of the thesis.

Chapter 9*,* the *Conclusion*, summarised the main findings and discussed the original contributions to knowledge of the thesis. The chapter described how the PHA could be applied to education, the benefits and challenges of using the approach, and the potential implications for children's later development.

CHAPTER 2. A POPULATION HEALTH APPROACH IN EDUCATION TO SUPPORT CHILDREN'S EARLY DEVELOPMENT: A CRITICAL INTERPRETIVE SYNTHESIS

Published version appears in Appendix A:

> Wilson AL, Jovanovic JM, Harman-Smith YE, Ward PR (2019) A population health approach in education to support children's early development: A Critical Interpretive Synthesis. PLoS ONE 14(6): e0218403. https://doi.org/ 10.1371/journal.pone.0218403

Candidate's contribution:

> The candidate was responsible for the conceptualisation, data curation, formal analysis, investigation and methodology, project administration and writing of the paper. Data analysis was supported by Ward, with minor comments on the interpretation and manuscript provided by Jovanovic and Harman-Smith.
>
> Research design 50%; Data collection 100%; Analysis 95%; Writing and editing 85%.

Introduction

This chapter reports on Study 1, which involved a systematic review and critical interpretive synthesis of the health and education literature. First, the guiding questions are detailed, search terms identified, and the initial inclusion/exclusion criteria that provided the basis for a systematic search of the academic literature on the topic are outlined. The search strategy is explained, the quality of the retrieved articles assessed, and the results presented in a PRISMA diagram. In total, there were 42 articles included in this review, which were used to inform the discussion and conclusions. A full description of these articles is presented in the data extraction table in appendix B.

The process of data extraction is described, outlining how key themes and concepts were extracted from across the selected literature. From this process, 29 concepts were identified which were consolidated into five general themes. These themes were then later re-examined and critiqued to determine four synthetic constructs: (1) Elements of population health models exist within communities and can help improve outcomes for more children; (2) Interdisciplinary collaboration and partnerships possess unique opportunities to influence children's development; (3) Children's development can be influenced at a variety of levels; and (4) System change requires a range of drivers and supports. While developing the synthetic constructs, the synthesising argument also evolved.

Finally, the gaps in the literature were identified and used to develop the aims and objectives for Study 2 (Chapter 3).

Construct definitions

Due to the interdisciplinary nature of this work, it was deemed important to define a number of key terms used throughout the chapter, to ensure inclusivity of the birth-to-eight sector, health, and education. These definitions are for the purpose of the thesis and may differ in other contexts.

Educators – Inclusive of all staff involved in learning and teaching duties in prior-to-school and early years at school sites (Department of Education Employment and Workplace Relations (DEEWR), 2009, 2010).

Leaders – School principals, early childhood education and care directors, and staff involved in education policy roles such as partnership coordinators.

Learning – "A natural process of exploration that children engage in from birth as they expand their intellectual, physical, social, emotional and creative capacities. Early learning is closely linked to early development" (Department of Education Employment and Workplace Relations (DEEWR), 2009, p.49).

Development – "Knowledge of age-related characteristics that permits general predictions about what experiences are likely to best promote children's learning and development" (Copple & Bredekamp, 2009, p.9). Development is not static knowledge, but a dynamic process.

Population data – Data that are not available at the individual level, but may come from aggregates.

Population health approach to planning

The population health approach (PHA) is becoming increasingly recognised for reducing healthcare demand and contributing to health system sustainability (Cohen et al., 2014). Despite a lack of an official definition, the PHA aims to improve the health of entire populations and reduce health inequities among population groups by considering the risk factors and conditions that influence health (Health Canada, 2001). Additional key elements and actions that can be used to characterise a PHA include a focus on the health of populations, addressing the determinants of health and their interactions, basing decisions on evidence, applying multiple strategies, employing mechanisms for public involvement, collaborating across sectors and levels, increasing upstream investments, and demonstrating accountability for health outcomes (1999, 2001). Early childhood educators, in both prior-to-school and school settings, already apply some of these concepts in their work. This chapter seeks to draw comparisons between the ways in which education and health use data to inform their planning, and the extent to which lessons from a PHA could be applied to support education to incorporate new population data sets in their planning. In Table 2.1 below, the key elements of a PHA have been listed, alongside the interpretation used in this thesis of how these concepts may be applied in both the health and education sectors. The descriptions for the health sector have been based on an interpretation of the literature, as well as the table

presented by Health Canada (2001) on 'key actions', and may help to develop a shared understanding between these sectors.

Table 2.1: Alignment between population health approach elements, in Health and Education

Population Health Concepts	**Health (Health Canada, 2001)**	**Education**
Focus on:	The health of populations using indicators for measuring health status	Children's developmental and learning progress
Address the determinants of:	Health and their interactions by analysing and measuring their relationships	Children's progress by exploring the contextual and operational factors at play
Base decisions on evidence	Emphasis on the robustness of evidence, often using randomised control trials; and drawing on a variety of data and methods throughout all stages of policy and program development before disseminating findings	Uses evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities
Increase upstream investments	Concerned with impact of interventions on health outcomes. Criteria are applied to select priorities for investment. There is a balance of short- and long-term investments, and an aim to influence investments in other sectors	Concerned with impact of studies to inform the direction of, and to improve, educational outcomes. Investments are both short- and long-term
Apply multiple strategies	Taking action on the determinants of health and their interactions to reduce inequities between population groups. Interventions are integrated and improve health over the lifespan. Approaches are often across multiple settings and layers of health (primary, secondary, tertiary)	Applying concepts from other disciplines, such as health and wellbeing, to education settings. Strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges
Collaborate:	Across sectors and levels with partners who share values and vision early in the process, with a focus on visible results. Leadership, accountability, and rewards are shared	Occurs with other leaders, educators, and community partnerships

Population Health Concepts	Health (Health Canada, 2001)	Education
Employ mechanisms for public movement:	To capture the public's interest and contribute to health literacy	To promote family and community engagement and the value of education
Demonstrate accountability:	For health outcomes through a results-based accountability framework. Measures and targets are set to demonstrate improvement, and evaluation processes put in place	For education outcomes to ensure they are evidence-informed over time; and include all involved in the learning community as a part of a process of continuing quality improvement and reflexive practice

By applying concepts from a PHA to the education site, leaders (principals and site directors) and educators could leverage the diversity of aptitudes and influence of their transition partners (those who also influence children either before or during their time in school, including family, early childhood education and care service staff, education providers, community organisations, and key community individuals) to mitigate risks and develop solutions aimed at improving children's development. This would also assist in promoting true collaboration between the prior-to-school and school settings.

Supporting developmental trajectories

Children's development and early education is internationally recognised as a significant contributing factor to health. The United Nations has formally recognised the importance of this through the Sustainable Development Goals. The fourth goal, 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all', specifically seeks to promote access for all children to quality education (United Nations, 2018, p. 6). These goals are also reflected in the Convention on the Rights of the Child, which stipulates the rights of children to be afforded opportunities to maximally develop their capabilities, the right to education, and to develop their personality and talents through education (UNICEF, 1989).

Despite the clear impact that the first few years has on a child's trajectory, there has been little investigation of the extent to which early childhood experiences are considered and planned for in early childhood education. Additionally, planning for children using population-level data and approaches is a relatively new practice within the early childhood education sector, with aggregated population data about children's early development emerging only in the last decade or so. Moreover, little is known about the applicability of aggregated early child development data and

the processes for its integration into planning, posing questions for leaders, educators, and their communities.

Aims

The primary objective of this review is to investigate what is currently known about the applicability of PHAs to planning in prior-to-school and school settings, and the extent to which applying relevant concepts such as collaboration, data use, and the consideration of risk and protective factors are likely to improve children's outcomes. The results from this review will form the basis of the thesis, investigating how a PHA can be applied to educational planning to support children's early development.

There is much literature on intradisciplinary teams within health systems; however, as the focus of this review is on early childhood education, these will not be reviewed in detail and will only be referred to where appropriate.

Method

Search method

An initial scoping search using the PICO process was undertaken to identify key words and phrases that would be integral to the success of the search strategy (Armstrong et al., 2011; Jacobs, 2008). This scoping search assisted in identifying appropriate parameters, developing the exclusion and inclusion criteria, determining quality filters, and refining the scope of the review. A protocol for the review was published on the International Prospective Register of Systematic Reviews (PROSPERO), registration number CRD42018098835 on 31st July 2018.

After significant review, the critical interpretive synthesis (CIS) method was determined as the most suitable as it enables the researcher to synthesise a diverse body of evidence and enables the generation of theory with strong explanatory power (Dixon-Woods et al., 2006). As PHAs are common in the health sector, the CIS method allows the researcher to gather information from a wide range of interdisciplinary research and resources, while still assessing its suitability for integration into the education system. The systematic nature of the review also aims to minimise bias through the use of explicit, systematic methods and transparent explanations and analysis, providing rigour, reliability, and validity to the results (Higgins & Green, 2011; Vickers, 1995).

A systematic review using the CIS method was undertaken, guided by a preliminary research question, '*How can a population heath approach be applied to educational planning to support children's early development?'*. Primary and secondary outcomes were also determined as a way of adding rigour to the review (Bero & Rennie, 1995). '*How is children's holistic development supported throughout the early years?'* was identified as the primary outcome. Secondary outcomes were identified as:

- How do educators employ aspects of population health approaches in routine educational planning?
- How are data used within prior-to-school and school settings to plan educational programs?
- How do prior-to-school education and care services and schools work with their communities to ensure they are more effectively supporting the children's and family's needs?

Once the guiding research question and outcomes were identified, the systematic literature search was initiated.

Keywords associated with the PHA, the social determinants of health, and schools and early childhood education and care, planning, and development were established and combined into a search strategy. The search was translated for use in relevant databases, as determined by the research team and with the assistance of a library liaison. The search strategy was constructed to return results related to how schools can use data within their planning, rather than current educational quality and curriculum planning documents. Terms were added to the search strategy as required to ensure concepts related to the PHA such as Health in all policies, were captured. Databases searched included ProQuest, Medline, Emcare, Scopus, and Open Grey. An example of the search strategy, as adapted for use in Proquest, can be found below.

> noft("population health approach" OR "public health approach" OR "population health model" OR "public health model" OR "integrated service approach" OR interdisciplinary approach OR "critical population health" OR healthy cities OR healthy communit* OR "health in all policies" OR HiALP) AND noft(school* OR "early learning centre" OR ECEC OR preschool OR child*) AND noft(wellbeing OR well-being OR develop* OR leadership OR planning*) AND stype.exact("Conference Papers & Proceedings" OR "Government & Official Publications" OR "Reports" OR "Books" OR "Scholarly Journals" OR "Dissertations & Theses") AND la.exact("English")

Table 2.2 displays the number of articles retrieved from each database as of the 13th of May 2018. Due to the potential for smaller case studies and reports of sites and schools to use a PHA, a wide range of document types were included in the search. Documents written in English were searched, including annual reports, articles, books, case studies, commentaries, dissertations/theses, literature reviews, reports, and technical reports.

Search outcome

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram in Figure 2.1 summarises the process of article selection. The initial search yielded 20,122 results, 1,571 of which were identified as duplicates and removed immediately. PRISMA diagrams were used throughout the search to document the process and findings.

Table 2.2: Electronic database search results

Database	Articles retrieved
ProQuest	13,173
Medline	450
EmCare	3,446
Scopus	3,032
Open grey	21
TOTAL	20,122

The inclusion criteria included any documents discussing multidisciplinary collaboration and planning to support children's development, public/population health models, and examples of sites and schools using data. Exclusion criteria included university or council-based programs with no collaboration with schools, interdisciplinary curriculum planning within the site or school (including assessment planning), interventions for special groups only, papers not available in English, and those without any reported outcomes or recommendations. Studies identified through the literature search were uploaded to a reference manager program, EndNote X7. Study titles, abstracts, and full-text were reviewed by the PhD researcher.

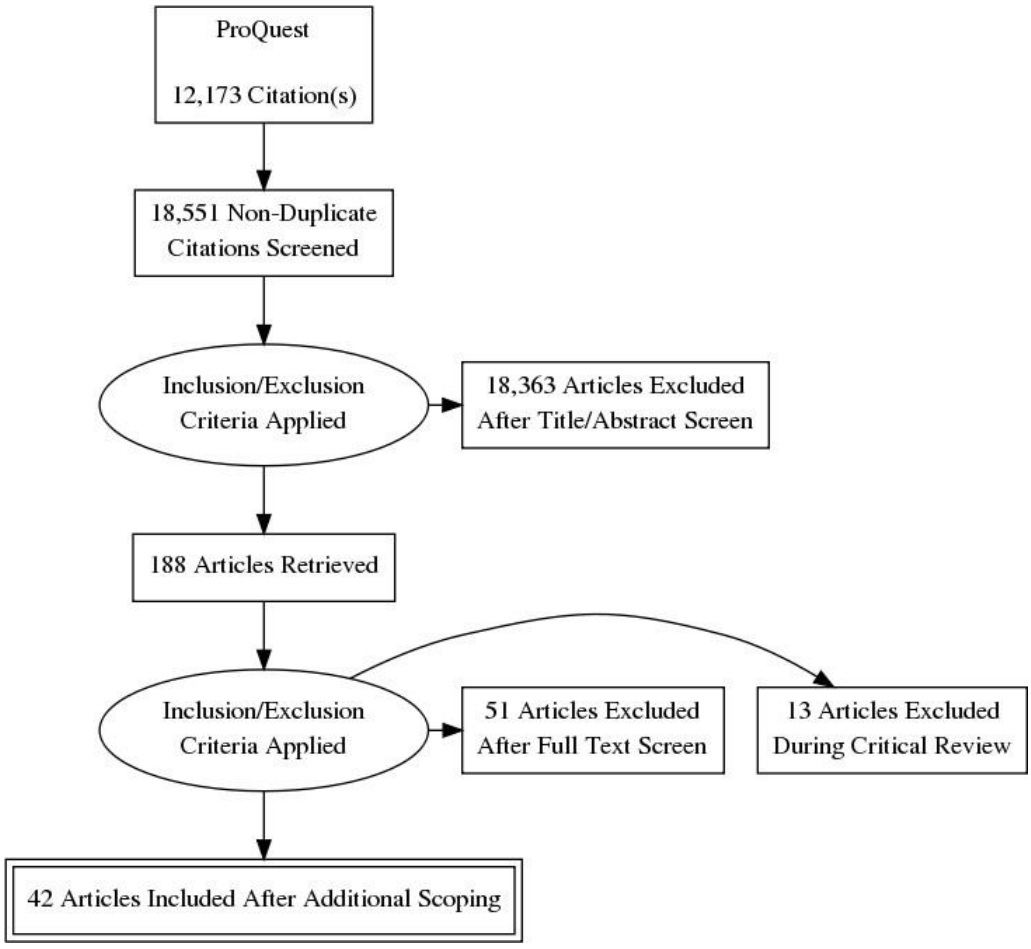

Figure 2.1: PRISMA diagram outlining the process of electronic database and other searching

Quality appraisal

After applying the exclusion criteria, 51 articles remained. Methodological quality was based on a critical appraisal using the specific Joanna Briggs Institute checklists for particular types of studies (Dixon-Woods et al., 2006). The types of articles included in the review were analytical cross-sectional, cohort, qualitative, quasi-experimental, systematic reviews, and opinion pieces. The appraisal was undertaken independently by the PhD researcher and principal supervisor to ensure rigour and reliability. Disagreements were resolved through discussion between the two researchers. Four articles were identified as methodologically weak, but remained in the analysis as they provided theoretical or practical insight. Thirteen papers were excluded based on the critical appraisal for their methodological weaknesses and providing little or no additional insights over and above the already included papers.

The CIS approach resulted in an analysis that was iterative, interactive, dynamic, and recursive (Dixon-Woods et al., 2006). This resulted in the addition and removal of articles throughout the analysis process. The reference lists of the five most relevant papers were also interrogated during the appraisal process to identify any additional research. From this, four additional papers were identified and added for review.

Data extraction

A data extraction form was developed, and extraction performed by the PhD researcher. Data were entered on an EXCEL spreadsheet and included the type of paper, methods, summary, and key findings and concepts. The data extraction table can be found under appendix B. Each concept consisted of one to four key words or phrases that summarised the underlying themes of each article. Twenty-nine individual concepts were identified through data extraction, making up a total of five general themes once consolidated. These themes were later developed into the synthetic constructs required for a CIS.

Synthesis

The CIS approach involves the development of synthetic constructs which interpret and transform the evidence into a new conceptual form before developing a synthesising argument (Dixon-Woods et al., 2006). A data extraction table was used to summarise the key findings from each article in relation to the initial primary outcome. Throughout the analysis, the selected articles were summarised, but also critiqued and interrogated, with the authors' assumptions and biases being questioned. As such, the general themes identified in the initial coding were re-examined to determine four synthetic constructs. While developing the synthetic constructs, the synthesising argument also evolved.

Results

Development of synthetic constructs and synthesising arguments

Four synthetic constructs emerged from the CIS: (1) Elements of population health models exist within communities and can help improve outcomes for more children; (2) Inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development; (3) Children's development can be influenced at a variety of levels; and (4) System change requires a range of drivers and supports.

It is important to note that the constructs presented are of a theoretical nature, emerging from the literature review and informed by researchers' professional discourse in education, health, and epidemiology. Consideration should also be paid to the key strengths of this approach, in its ability to allow the author to critique and generate theory from a wide range of evidence.

Elements of population health approaches exist within communities and can help improve outcomes for more children

The review demonstrated that models such as 'Health Promoting Schools', the 'Whole School, Whole Community, Whole Child Approach' (WSCC), and 'Healthy Communities' are in place within schools across the world, each possessing key elements of PHAs. A review of how these approaches are working could be used to identify the impact of applying such a model of planning within education. These models typically embody a focus on the health of children, their

development and educational attainment, and thus reflect a commonly applied approach to population health. These approaches attempt to promote health behaviours within the school, but fail to address the underlying mechanisms, use evidence-based practices, collaborate across sectors and levels, or apply multiple strategies to reduce inequities. Despite their popularity in countries such as the United States, Canada, and the United Kingdom, there is currently insufficient evidence of the success of such models in improving children's outcomes.

The Health Promoting Schools approach, for example, contains some but not all PHA concepts. Although no strict definition exists, a Health Promoting School "constantly strengthens its capacity as a healthy setting for living, learning and working," with a focus on creating conditions that are conducive to health, building capacities, preventing leading causes of death, influencing health-related behaviours, making healthy decisions, and caring for oneself and others (Langford et al., 2015). The concepts applied are limited to a focus on the health of populations. Therefore, it could be argued that Health Promoting Schools applied health education in a school setting, rather than applying population health planning methodologies within education. Grants are offered by state health departments to support the increasing emphasis on health promotion in schools, and can assist with the development and implementation of programs. While these studies have clearly demonstrated the benefit of health interventions on health outcomes, and that these can be delivered in an education setting, there is little evidence that these benefits extend to other domains (Langford et al., 2015). In education, interventions are typically implemented to improve the capacity of children to benefit from education opportunities (i.e., to improve educational outcomes by addressing factors impacting on children's health and wellbeing). A Cochrane systematic review of the impacts of Health Promoting Schools found that of 67 eligible trials, 11 reported the impact on educational outcomes, of which only 6 reported on student measures (Langford et al., 2015). Of these studies, the most commonly reported educational outcome was absenteeism, which saw a slight improvement from interventions focused on multiple risk behaviours and hand hygiene (Langford et al., 2015). Improvements stemming from interventions on multiple risk behaviours specifically targeting academics, character, and student behaviour included decreased student disaffection with learning, educators' ratings of academic motivation, improved standardised test scores for reading and maths, and reduced suspensions (Langford et al., 2015). Additionally, programs aimed at mental health and anti-bullying also reported increased school attachment and wellbeing (Langford et al., 2015). Despite some instances of educational improvement, the review concluded that on the whole, there was a distinct lack of evidence regarding the educational impact of the Health Promoting Schools framework (Langford et al., 2015). With schools facing increasing demands to support children to have good academic outcomes, it could therefore be argued that it is unreasonable to expect schools to employ such approaches without the benefit of flow-on effects for academic achievement. However, despite little empirical evidence, there are still many communities across the world employing these models within their schools. In an environment where resources and funding are typically limited, and

where the focus is on improving educational achievement, it is crucial that programs employed are grounded in evidence and able to demonstrate improved educational outcomes for children.

When successfully applied, the elements of a PHA, such as collaboration, inclusion, healthy environments, engagement, and evidence-based practices that are embedded in policies, practice, and relationships, can support children's development (Bassett-Gunter et al., 2016; Gleddie, 2010; Murray et al., 2015; Slade & Griffith, 2013; St Leger, 1999). Three of these elements also comprise a PHA in the form of inter-sectorial action and partnerships (collaboration), addressing the social determinants (evidence-based practices), and understanding needs and solutions through community outreach (engagement) (Cohen et al., 2014). By integrating these elements into the functioning of a site or school, the potential to improve outcomes for a wider range of children is increased. Although the focus and success of these programs has typically been linked to physical health, similar principles could theoretically be applied to improve the social, emotional, and cognitive development of the child. As educational practice occurs in partnership with families and communities, it is likely that children's learning and development could be further supported if these elements of collaboration and engagement were applied outside of the school and site.

Inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development

As described in Table 2.1, collaboration, basing decisions on evidence, drawing on a variety of data, and demonstrating accountability are key elements of a PHA. Although collaboration across multiple sectors is common in public health departments, this review found that within education, interdisciplinary collaboration appears to exist at a relatively superficial level with schools within Australia, occasionally involving communities coming together to form genuine partnerships (Lowe et al., 2001; Mort, 2007).

Where relationships were formed, data were used to support initial conversations between staff and across sectors, and to build accountability systems (Belansky et al., 2011; Murray et al., 2015). Murray described how schools and jurisdictions are held accountable for academic outcomes and process measures, and how "incorporating metrics related to health and wellness into data tracking and school accountability systems [provides] educators, policy makers and the public with a refined understanding of how to achieve learning and academic outcomes" (Murray et al., 2015, p. 798 p.798). Aligning data such as attendance, discipline, behaviour, and absenteeism with intervention efforts allowed schools to demonstrate the effect of their programs and to inform policy, processes, and practices (Murray et al., 2015). In Belansky's adapted version of Intervention Mapping, school-level data were introduced alongside handouts of best practices to supplement conversations on what could be changed about the school environment (Belansky et al., 2011). This created common ground where all those involved could discuss children's development and begin their journey grounded in evidence. By working together towards a shared goal, the stakeholders reduced the burden placed on any one organisation by sharing resources, contacts, knowledge,

and experiences (Blank, 2015; Denman, 1999; Halfon et al., 2004). The most common barriers to continued partnerships and programs were time and money (Ambrose & Short, 2009; Bartlett & Freeze, 2018; Kern et al., 2022; Weist et al., 2006). However, where groups pooled their resources, these barriers were reduced often leading to sustained programs and improved outcomes (Halfon et al., 2004). Additionally, sharing knowledge of the community and their challenges and strengths allowed for more suitable and ultimately successful responses (2009).

A focus on building genuine relationships, and a commonality of intent and shared goals were key components of success (Thomas et al., 2010). Additional elements for successful partnerships included active and engaged leadership, effective use of data, integration of the process within the existing site and school improvement process, distributed team leadership, ongoing and embedded professional development, and the creation or modification of policy (Valois et al., 2015). In one such example, Toronto First Duty (TFD) brought together kindergarten, child care, and parenting supports into a single program and produced positive outcomes for children's development as well as improved quality of family life (Corter & Pelletier, 2015). TFD demonstrated short-term positive effects on children's social-emotional development on the Early Development Instrument and found that more intense use of the program (i.e., higher dose) also predicted improvement in children's cognitive and language development (Corter & Pelletier, 2015). Elements from this prior-to-school approach could be applied to school settings to develop a successful collaborative model.

The results of the search returned minimal results demonstrating how schools work with other stakeholders in the community to support children's development in the years prior to beginning their formal education. This is likely due to a lack of time, funding, and support for this type of research, with educational research being primarily focused on educational constructs (e.g., curriculum, pedagogy, educational leadership). This does not mean that schools were not engaging with the community. Community engagement is a recognised strategy for enabling schools to best facilitate learning and improve their educational outcomes for children (Valli et al., 2016). Accounting for constraints around time, funding, and support, schools may simply not envisage their work as having broader health- or child development-focused outcomes. Nevertheless, there has been a call for schools to play a larger leadership role, allowing them to address health in a more strategic manner, supporting the idea that schools could have a more active role in communities (Anderson et al., 2006; FitzGerald & Quiñones, 2019)Bruce, 2012 #13760}. As the factors influencing learning and development are complex and multifaceted, it is important to consider the role of the school in children's lives and their ability to bridge critical home and community ecologies. Regardless of their position in the community, either in leadership or as an active member of a local partnership, schools will continue to be a universal access point for families, creating a natural hub and the ability to play a significant role in the development of children in the community. It could, therefore, be argued that more clarity around the shared

intention of improved educational and life outcomes for children is required before the health and education sectors 'buy in' to the use of population-level data in their respective and shared professional practices (Fane et al., 2017; Grant et al., 2018; Wong & Sumsion, 2013).

Children's development can be influenced at a variety of levels

The review demonstrated that the impact of the family and community on children's development is well known and is often the focus of health campaigns. Like the population health model, the findings of this study suggest that the education sector is beginning to move towards a holistic approach and is considering the impact of the family and the community on development. However, an opportunity exists for sites and schools to further draw on these influences to support children's development both before they reach school and once formal education has begun. Initial search results revealed a large number of articles outlining how planning occurs for children's needs at the individual level, including Individual Learning Plans which are used by schools across Australia (Australian Institute for Teaching and School Leadership). There remains scope to increase the extent to which planning for children in the community is based on their holistic needs. By shifting the focus away from the individual, educators can anticipate the needs of their incoming cohorts and work to improve outcomes before they enter the classroom, working towards more upstream prevention strategies. For the individual, educators can use this knowledge to better understand how their learners' needs are shaped by a range of sociological factors. In turn, these considerations also help schools consider where strategic partnerships may be required to overcome systemic barriers such as waiting lists for the assessment of support needs.

The reviewed research indicated that PHAs that focus on strengthening protective factors in families and promoting the development of children are able to improve children's outcomes (2005). Reminiscent of the theory of proportional universality, common to the PHA, a mixture of targeted high-intensity services for those requiring additional support and universal services for all that address risk and protective factors, addressing the determinants of health and their interactions, have been found to enhance children's developmental trajectories (Halfon et al., 2004). Currently, school-based universal interventions are commonly focused on addressing the needs of educators and the site by improving school structure, and supporting educators' pedagogy and instructional policy, rather than focusing on the needs of the children (Greenberg et al., 2017). PHAs argue that focusing only on children with complex needs fails to address the needs of all children and thereby limits their potential for widespread impact in a community (Dworkin & Sood, 2016). Additionally, the prevention paradox illustrates that multiple levels of intervention are required to prevent poor outcomes in childhood and adolescence. A prevention paradox describes how the majority of cases of a disease come from a population at low or moderate risk, and only a minority of cases come from the high-risk population. A mix of universal interventions, selective interventions focusing on at-risk groups, and indicated interventions for those already facing challenges are required (Greenberg et al., 2017). By addressing risk at multiple levels, those who are at the highest risk are able to receive targeted support, while those

who would typically be overlooked due to a lack of risk factors are also served. However, in order to reach such a large group, cross-sector collaboration and policy that enables collaboration is essential.

Finally, the review highlighted that interventions that focus efforts on a single program or intervention are unlikely to create sustained improvement, and instead, that systems need to change to support children and families, and that this type of change is driven by changes to organisational policy (Dworkin & Sood, 2016). The generation of political support and building policy that promotes positive factors for children's learning and development could be considered other key elements of a PHA (Health Canada, 2001). The review demonstrated that investment by local authorities can provide much needed support to sites and schools, and can have a significant impact on priorities, enhancing health, and supporting academic achievement (Hayman, 2014). Policy in an education setting that promotes the healthy development of all children can take many forms, including promoting integrated systems of care, ensuring optimal use of existing resources, and enabling the use of data to document issues and inform advocacy (Dworkin & Sood, 2016). In summary, improvements require an individual acting as a champion, data to evidence the needs [of the local community], community members deciding their needs, and educational policies and procedures that have sufficient flexibility to enable reflexive change to be enacted.

System change requires a range of drivers and supports

This review highlighted the importance of considering how population change (improvement for many children in a community) is achieved and maintained. In order to achieve sustainable change, supports are required at the leadership level. Where schools have been successful in implementing population health models, support from senior staff was essential (Blank, 2015; Rooney et al.). Additionally, programs where there was a staff member acting as a champion for the community or intervention were also more likely to have success (Cappella et al., 2008). Described as a key action for collaborating across sectors and levels, identifying and supporting a champion also occurs in a PHA. Rooney (2015) describes the Whole School, Whole Community, Whole Child Model and the importance of having a strong leader who can advocate, communicate, and coordinate throughout the process. Leadership also supported the success of the program by clearly linking the initiatives within the model to academic indicators, thus establishing buy-in and sustainability (Rooney et al., 2015). Conversely, where there was little or no support from leadership or a key champion was no longer in the role, the project was more likely to fail (Mort, 2007).

A clear link to existing work such as curriculum planning and reporting may be useful to promote a PHA. Educators are already burdened with large amounts of paperwork and duties, therefore building on or modifying existing systems rather than adding new activities or programs is often a more successful approach (Bolton et al., 2017). Given the existing requirements within education to engage in site and quality improvement planning, document how these plans are enacted,

engage in collaborative work, and use evidence to support planning, there remains an opportunity to improve children's learning and outcomes by drawing on the systems already in place.

The review highlights the potential to draw on the theory of diffusion of innovations (DOI). The DOI theory seeks to explain how, why, and the rate at which, new ideas spread (Rogers, 2010). Rogers theorises that four main elements influence the spread of an idea: 1. The innovation itself; 2. Communication channels; 3. Time; and 4. A social system. Each of these elements are made up of adopters characterised as innovators, early adopters, the early majority, the late majority, and the laggers, each with different motivations and requirements for taking on a new idea (Rogers, 2010). Drawing on this theory, schools could be supported to adopt aspects of a PHA within their planning by identifying and tapping into existing supports within the education system. DOI theory can also be used as a reflective tool to review change programs and identify emerging barriers to successful implementation (Bostock et al., 2018). For some, proven stories of success are required before implementing change. Academic partnerships were discussed as being able to provide such stories, and therefore, to support the development and uptake of new programs (Belansky et al., 2011). When implementing a new approach, it will be important to consider both the target population and those executing the changes to ensure appropriate supports and motivators are in place.

Discussion

This review has identified four synthetic constructs that attempt to interpret some of the research in the area of educational planning in order to respond to the original question: '*How can a population heath approach be applied to educational planning to support children's early development?'* The four constructs identified from the literature were: elements of PHAs exist within education communities and can help improve outcomes for more children; inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development; children's development can be influenced at a variety of levels; and system change requires a range of drivers and supports. Despite their differing sources, these concepts contain unifying themes that can be used to draw generalisations from the findings.

Several elements of a PHA were identified within the education system including focusing on the health or educational attainment of children, addressing the determinants of health and their interactions, basing decisions on evidence, collaboration across sectors and levels, and identification of a key champion. Although these elements are present in various programs and processes, there was no evidence of all eight PHA approaches described in Table 2.1 being employed simultaneously. PHA elements that were not demonstrated in the review included increasing upstream investments, employing mechanisms for public involvement, and demonstrating accountability for health systems. It is possible that these elements were not reflected in this review as they are enacted upon in education in a different way and therefore were

not captured during the search. It could be argued that although the education sector does draw on elements of a PHA, they are often applying health or wellbeing interventions rather than employing the complete approach, and are therefore missing out on a critical opportunity to maximise return from their efforts to improve outcomes for children.

There appears to be two distinct areas of opportunity to integrate PHAs into planning. The first would be to include it in the work that is already taking place in prior-to-school and school settings through planning for children's needs based on their past experiences. Continuity of learning and successful transitions have been argued to play a crucial role in children's educational success and their ability to maximise learning opportunities (Peters, 2000). As such, there is a requirement within education systems to ensure that programs are organised in ways that maximise opportunities for each child's learning (Australian Children's Education Care Quality Authority, 2011). Educators who are prepared for their cohorts are better placed to support children at crucial transitions, thereby increasing the proportion of children who experience continuity in their learning rather than disruption. This review has identified the potential benefit of incorporating information about the factors influencing children's development into educational planning to better encompass and build on children's previous experiences and to anticipate how these may continue to have an impact on their learning, development, and capacity to engage with learning opportunities. Importantly, properly designed and managed education programs have been shown to generate large returns on investment, primarily in the way of savings in relation to reducing conditions later in life (Sweeny, 2014). Several models have been proposed to explain the effects of socioeconomic status and ultimately life experiences on later life outcomes, and each provides an argument for education systems to play a substantial role in reducing upstream burdens for individuals, communities, and economies. The timing model suggests that socioeconomic factors have the greatest influence if experienced during specific developmental periods such as birth to three years (Cohen et al., 2010). Within education, the research suggests that systems need to respond early in children's lives and provide an impetus for schools to advocate for children before they enter formal education in order to avoid challenges later in life. Conversely, the accumulation model suggests that the detrimental effects of socioeconomic status can accumulate throughout the life course and will continue to do so with increasing duration of exposure to disadvantage (Cohen et al., 2010). This model may help educators consider the factors that have influenced children's development and how these may present the child with additional challenges and barriers to engagement in learning. Although prior-to-school and school settings are not able to have an impact on socioeconomic status (SES), there are instances where education has also been able to mediate some of the negative impacts of SES (Galobardes et al., 2008). Regardless of their differences, these models each emphasise the importance of early sensitive periods and their impact on later health and development. If schools have insight into the capabilities children bring with them to school and plan education experiences that are well placed to build on these capabilities, there is not only a greater opportunity to cater to children's needs, but also an

increased likelihood of developmental gains.

The second area of opportunity to integrate a PHA would be to build on what is already occurring and increase the outreach into the community. The significance of partnerships emerged as a recurring theme across the four constructs. Partnerships with community stakeholders and families supported children's development by reducing inequities in access, ensuring all children were connected with the school, and children were receiving the services and supports they required. Once children are enrolled in school, there are many programs and interventions available to support children and families and improve health. However, there appears to be multiple challenges facing schools and their ability to increase their reach into the community prior to children starting school including funding, role constraints, and data sharing (Weist et al., 2006{Kern, 2022 #19652)}. To overcome these challenges, schools could employ aspects of a PHA to work with other stakeholders in the community to promote healthy child development before school entry. This could support families and the community so that their children can arrive at school with an increased capacity to learn. Early prevention programs can have positive effects on children's developmental trajectories and learning, particularly when applied prior to school age (Anderson et al., 2003; Campbell & Ramey, 1994). Local approaches that focus on addressing risk factors and promoting protective factors at a community level are not only more cost efficient, but could also improve the success of the program by ensuring it reaches all children during the crucial years of development (Heckman, 2011; Moore et al., 2017).

Data was discussed throughout the literature and across the constructs as supporting planning to ensure actions were grounded in evidence. Despite the recurring references to its importance, there was a lack of discussion about how to use data at a population level, with the majority of use centring around individual children. Despite the known interactions between early childhood education and later life outcomes, it appears there is a wariness of educational research and practice towards health paradigms. This may be due to educators feeling as though they do not possess the skills to draw these connections or being unable to obtain the appropriate data required to draw such links (Kerr et al., 2006). Within Australia, large data sets such as the AEDC can be utilised to demonstrate the connections between education and later life outcomes. Demonstrating these links can support diverse sectors to form partnerships to address shared concerns. Through interrogating the AEDC data, education leaders and educators can identify and understand where children in the community are facing challenges and explore what may have affected their development. Becoming more aware of children's contexts and early experiences supports sites and schools to be prepared for their incoming cohorts. Trend data, such as that from the AEDC, can assist with identifying where there are protective and risk factors at a community, state, or national level, and help educators to consider appropriate resources that can help them address the needs of incoming cohorts. In turn, educators are likely to be better placed to develop a suitable curriculum, and by understanding the source of the problems, can put in place supports

for children to reduce the time spent reacting to the everyday problems presented in the classroom. Further support in the way of professional development or integration into early childhood education courses, may be required to assist educators in developing relevant data interrogation skills and to acknowledge the usefulness of data in their practice.

If a PHA were to be applied to educational planning, with the ultimate goal of supporting children's development, it would require consideration of the supports and structures already in place at both the local and systemic levels. Recognising the differing goals of health and education systems, any approaches applied would need to be modified for the environment and goals of the education sector. It is likely that a new approach, specifically designed with education at the helm, would be required to meet the needs and restraints of the system. A population approach for education could see improved stakeholder relationships prior to school entry, and ultimately, improved outcomes for children.

Conclusion

This review utilised the CIS method to outline the key concepts that occurred in the literature around PHAs and their application to education planning and children's early development. Within education, there are a number of models which are used to improve outcomes for children and families. Although a PHA to planning does not explicitly exist within education, the results from this review indicate that it would indeed be possible to adapt the PHA to prior-to-school and school educational planning, and that doing so is likely to be advantageous for children's development. Presently, there is a dearth of research demonstrating this benefit, and more work is needed to articulate the ways in which population data adds value to schools, and the extent to which this type of planning improves the experiences of children in school and their educational outcomes. Finally, implementing such an approach will require system changes and supports that enable schools to connect with their communities and the flexibility to respond to the children's contexts.

Thus, the review asserts several key questions that could guide future research or inform practice. Firstly, does population data enhance educator understanding of context and the factors driving children's learning and development, and in this way, planning for children's development and learning? Secondly, how can partnerships support educators to plan holistically from a population-based perspective? Finally, are schools able to work with communities prior to children entering school, and if so, what impact does this have on children's development at school entry?

Chapter summary

In this chapter, the findings from the systematic review and critical interpretive synthesis of the health and education literature that is relevant to the PHA are discussed. Four synthetic constructs were developed: (1) Elements of population health models exist within communities and can help improve outcomes for more children; (2) Inter-disciplinary collaboration and partnerships possess

unique opportunities to influence children's development; (3) Children's development can be influenced at a variety of levels; and (4) System change requires a range of drivers and supports. Finally, gaps in the literature were identified and these, together with the synthetic constructs, were used to form a basis upon which to develop the aims and objectives for the remaining studies in the thesis.

This chapter found that although a PHA to planning does not explicitly exist within education, the results from this review indicate that it would indeed be possible to adapt the PHA to prior-to-school and school education planning, and that doing so is likely to be advantageous for children's development. The following chapters will explore the presence of the PHA in existing planning and reporting documents (Study 2), how the approach could be applied by leaders and educators within education (Study 3), and the benefit of doing so for children's learning and development (Study 4 and Study 5).

CHAPTER 3. INVESTIGATING THE APPLICABILITY OF THE POPULATION HEALTH APPROACH TO EDUCATION: AN ANALYSIS OF PLANNING DOCUMENTS

Australian Curriculum Review implications

Since this study was completed, a review of the Australian Curriculum has been undertaken by the Australian Curriculum, Assessment and Reporting Authority (ACARA). The review revealed that the Australian Curriculum is consistent with some of the best curricula internationally and is well regarded. The refinements and updates made to the Curriculum in April 2022 did not have a significant impact on the results of this chapter; therefore, the study was not repeated.

Introduction

This chapter builds upon the findings from Study 1, which considered that a population health approach (PHA) could be beneficial in education. In this chapter, education planning frameworks in Australia are reviewed to examine the extent to which school leadership and educators are, through these frameworks, supported to undertake the kind of planning required to shift children's development and learning trajectories in a positive direction. By undertaking a document analysis of the selected education frameworks using the PHA lens, this chapter seeks to identify potential areas of strength and areas where changes could better support a data-driven and context responsive approach to planning. Additionally, this chapter considers the revised element 'demonstrate accountability by ensuring education outcomes are evidence-informed over time; and include all involved in the learning community, as a part of a process of continuous quality improvement and reflexive practice' which was adjusted in Chapter 2 to better reflect the practices of educators.

This chapter outlines the process for the selection of the education frameworks to be analysed, analysis against the PHA, and a critical analysis using a deductive approach. The results are then synthesised to demonstrate the presence of the PHA elements across the various frameworks and explore where these elements could be integrated. Finally, areas for further exploration are identified, which form the basis of the remaining studies in this thesis.

Aim

This analysis aimed to investigate the presence of elements of a PHA in national frameworks to better understand educator motivations, their ability to integrate the approach into their planning, and the agencies that play a role in supporting school planning.

Methods

Document analysis was selected, as the systematic nature of the method allowed for a standardised analysis of the documents and a fair assessment of the PHA within each (Bowen, 2009). This process will ultimately enable a reflection on the applicability and suitability of the existing frameworks to adapt and include elements of the PHA. There are several additional advantages of using document analysis methods: time efficiency, ease of availability of documents, and stability in the research findings (Bowen, 2009).

Selection criteria

Documents were included in the analysis if they were: 1) required for use in Australian early childhood education (both in the prior-to-school and school settings); and 2) policies or frameworks which focused on planning to support children's development. Analysis was undertaken of the version current at the time of the review. Documents were excluded from the review if they were: expired; used only in certain jurisdictions[1]; or contained only supporting material to supplement the framework.

Relevant policies and frameworks were determined through an Internet search of Australian education frameworks and the practical knowledge of the candidate. Those matching the selection criteria were listed and downloaded in June 2019 from publicly accessible websites. Six frameworks were selected for analysis: the National Quality Standard (NQS); the Early Years Learning Framework (EYLF); the Australian Professional Standards for Teachers; the Australian Professional Standard for Principals and the Leadership Profiles; and the Australian Curriculum. These frameworks are required to be used by early childhood education settings across Australia. The Early Childhood Australia Code of Ethics was also included in the analysis. Although it is not required for use, it is well respected and routinely applied in early childhood education work. Jurisdiction specific policies which did not differ largely from the national policy, such as the Western Australian Curriculum (rather than the Australian Curriculum), were not included. While it is recognised that state-based documents also influence schools' activities, these were excluded as the aim was to determine the presence of PHA elements in national documents. Additionally, including PHA elements in policy would be most effective at a national level, as a way of improving outcomes for all students. Each policy and framework was entered into, and coded using, NVivo 12 data analysis software. An overview of each of the documents, their content, and rationale for inclusion in the review is provided in Appendix C.

Data analysis

Before beginning the coding process, a framework was developed by which each document could be assessed, and conclusions could be drawn on the extent to which elements of PHAs were

[1] Australia combines eight jurisdictions, including six states: Western Australia, South Australia, Victoria, New South Wales, Tasmania and Queensland, and two territories: Northern Territory, and the Australian Capital Territory. The term jurisdiction is used within this chapter to describe the states and territories of Australia.

evident. This a priori coding structure was based on categories constructed before the commencement of the study (Sarantakos, 2012). The categories developed were based on previous research by Health Canada and the authors' interpretation of the PHAs. As defined by Health Canada (2001), eight concepts define a PHA: 1) a focus on the health of populations, 2) addresses the determinants of health and their interactions, 3) bases decisions on evidence, 4) increases upstream investments, 5) applies multiple strategies, 6) collaborates across sectors and levels, 7) employs mechanisms for public involvement, and 8) demonstrates accountability for health outcomes. In an earlier study, these elements were translated into what they could be understood to look like in the education environment (Wilson et al., 2019). Both the elements defined by Health Canada (2001) and Wilson et al. (2019) were used to construct the eight categories. The research team oversaw the development of the coding framework, and an agreement was reached prior to the analysis commencing. The table developed by Wilson and colleagues aligning the PHA elements in health and education, which was used to determine the coding framework in the document analysis, is available in the original article (Wilson et al., 2019).

The results were then critically analysed using a deductive approach, allowing the researcher to determine the presence of elements of the PHA in the existing education frameworks (Hyde, 2000). Documents were also categorised as barriers or facilitators and coded for concepts that were not strictly identified as a PHA, but which supported or hindered their actions. Coding across the planning frameworks allowed triangulation between documents and a deeper understanding of how educators planned for children's early development (Bowen, 2009).

The documents were coded by the PhD researcher, with two documents also coded by a supervisory team member to minimise bias. Disparities within the coding were discussed and resolved by the two researchers, with inter-rater reliability determined to be high. After analysis, each document was added to a comparison table to allow for mapping against the frameworks and the PHA elements (seen in Appendix E). The approach taken to the thematic analysis demonstrated rigour and trustworthiness through transparent coding and note-taking processes (Nowell et al., 2017).

Results

Overall, the frameworks can be understood to provide leaders and educators with various approaches and methods by which their approach to learning and evaluation could be scaffolded to meet the needs of their children and the educational setting. Each of the elements of the PHA for education, developed by Wilson and colleagues (Wilson et al., 2019), was present in the educator frameworks. Elements from the traditional PHA, as described by Health Canada (2001),

were also present in the frameworks, except for: ‘focus on the health of populations’, and ‘demonstrate accountability for health outcomes’. As the focus of both of these elements is strictly health, this is unsurprising.

The most common PHA element coded across the frameworks was 'collaboration occurs with other educators, leaders and community partnerships', which occurred 58 times across the 6 frameworks. 'Employ mechanisms to promote family and community engagement and the value of education' was also frequently coded, with 56 occurrences across the 6 frameworks. A breakdown of each of the codes and their references can be seen in Appendix F.

The Australian Professional Standards for Teachers and the Australian Standard for Principals were the most densely coded frameworks, with 130 references across 12 and 15 codes. The General Capabilities frameworks contained the lowest number of codes, with only 5 references in the Personal and Social Capability learning continuum and 3 in the Critical and Creative Thinking learning curriculum. The coding of the introduction was often more useful as the content provided an overview and unpacked the concepts described in each section. The findings herein are discussed in relation to each framework and the PHA elements present within them.

Summary of results by Population Health Approach elements

Elements from both the traditional PHA (Health Canada, 2001) and the approach for education developed by Wilson and colleagues (2019) were coded. Only education approach elements were included in the analysis below, as the study intended to determine the applicability of such elements within the existing frameworks.

Focus on children's developmental and learning progress

The element 'focus on children's developmental and learning progress' was coded 29 times across 4 frameworks, providing examples of how educators were expected to incorporate various strategies to respond to children's needs and promote success.

> Educators recognise and respond to barriers to children achieving educational success. In response they challenge practices that contribute to inequities and make curriculum decisions that promote inclusion and participation of all children. (Early Years Learning Framework (Australian Government Department of Education and Training, 2019; 2009))

In order to achieve success, the frameworks asked educators to scaffold their teaching to build on children's learning.

> Demonstrate knowledge and understanding of strategies for differentiating teaching to meet the specific learning needs of students across the full range of abilities. (Australian Professional Standards for Teachers (2011))

These decisions at the curriculum level could be seen as supporting children's development and

building their confidence as learners.

> Curriculum decision-making contributes to each child's learning and development outcomes in relation to their identity, connection with community, wellbeing, confidence as learners and effectiveness as communicators. (National Quality Standard (2020))

Address the determinants of children's progress by exploring the contextual and operational factors at play

The second element, 'Address the determinants of children's progress by exploring the contextual and operational factors at play,' occurred 44 times across 7 of the documents. The frameworks asked educators to recognise potential barriers to success and plan appropriately within their curriculum:

> Educators recognise and respond to barriers to children achieving educational success. In response they challenge practices that contribute to inequities and make curriculum decisions that promote inclusion and participation of all children. (Early Years Learning Framework (2009))

Through this planning, educators should develop an understanding of their communities and children's past experiences, which may contribute to their learning experience:

> Learn about the communities that I work within and enact curriculum programs which are responsive to those contexts and community priorities. (ECA Code of ethics (2016))

> Children's identities, knowledge, understandings, capacities, skills and relationships change during childhood. They are shaped by many different events and circumstances. (Early Years Learning Framework (2019))

The codes demonstrated a strong focus on inclusion and responding to the needs of children with diverse backgrounds, particularly those from Aboriginal and Torres Strait Islander backgrounds, encouraging educators to facilitate learning through building on their strengths and past experiences.

> Demonstrate knowledge of teaching strategies that are responsive to the learning strengths and needs of students from diverse linguistic, cultural, religious and socioeconomic backgrounds. (Australian Professional Standards for Teachers (2011))

Base decisions in evidence: Use evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities

Codes for the element 'base decisions in evidence' occurred across two of the documents, the Australian Professional Standards for Teachers and the NQS, with a total of five references. There were few references to the use of data or descriptive studies; however, some referred to using student data to improve learning and assessment:

> Each child's learning and development are assessed or evaluated as part of an ongoing cycle of observation, analysing learning, documentation, planning, implementation and reflection. (National Quality Standard (2020))

Additionally, the frameworks prompted educators to evaluate their teaching strategies to improve children's learning.

> Monitor and evaluate the implementation of teaching strategies within the school to improve students' achievement in literacy and numeracy using research-based knowledge and student data. (Australian Professional Standards for Teachers (2011))

Increase upstream investments: concerned with the impact of studies to inform the direction of, and to improve educational outcomes. Investments are both short- and long-term

The element, 'increase upstream investments' occurred nine times across two of the frameworks: the Australian Professional Standards for Teachers and the Australian Standard for Principals. Investments were discussed as developing relationships with those in the community to ensure long-term engagement:

> They develop a mutually supportive, collaborative and trusting relationship with the community to ensure engagement in the life of the school. They collaborate effectively with other schools and agencies to promote an excellent education system in which all young people can thrive. (Australian Professional Standard for Principal and the Leadership Profiles (2014))

Additionally, principals were encouraged to consider their existing processes and how they could be improved upon in line with the school's vision and values:

> Principals identify trends and influences that will have an impact upon the management of the school and plan for them. They review the effectiveness of processes and use of data to improve school performance (Australian Professional Standard for Principal and the Leadership Profiles (2014))

> Principals identify the need for innovation and improvement that is consistent with the school's vision and values and is informed by student learning outcomes (Australian Professional Standard for Principal and the Leadership Profiles, (2014).

References to the impact of studies to inform and improve educational outcomes focused primarily on school staff's ability to monitor student data and modify teaching practice in response:

> Monitor and evaluate the implementation of teaching strategies within the school to improve students' achievement in literacy and numeracy using research-based knowledge and student data. (Australian Professional Standards for Teachers (2011))

> Demonstrate the capacity to interpret student assessment data to evaluate student learning and modify teaching practice. (Australian Professional Standards for Teachers (2011))

Apply multiple strategies: Applying concepts from other disciplines, such as health and wellbeing, to education settings. Strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges

The PHA element 'apply multiple strategies' was coded 17 times across 4 of the documents, primarily focusing on health and nutrition within the school. There was also a strong focus on students' wellbeing, described as an integral part of children's learning and development.

> Learning about healthy lifestyles, including nutrition, personal hygiene, physical fitness, emotions and social relationships is integral to wellbeing and self-confidence. Physical wellbeing contributes to children's ability to concentrate, cooperate and learn. As children become more independent they can take greater responsibility for their health, hygiene and personal care and become mindful of their own and others' safety. (Early Years Learning Framework (2019))

Collaborate: Occurs with other leaders, educators, and community partnerships

Collaboration was coded heavily throughout the documents, totalling 47 occurrences across 6 of the frameworks. References to collaboration were strongly linked to community engagement, particularly with families who were considered to be difficult to engage due to their social circumstances, characteristics, and behaviours or institutional relationships:

> Principals work with other agencies to support the health, wellbeing and safety of students and their families. They create specific strategies for hard-to-reach parents and carers, and explore the use of technology to deepen the engagement of parents and carers in student learning. They establish innovative processes to gather regular feedback from families and the local community that is systematically used to review school practices and inform decision-making. (Australian Professional Standard for Principals and the Leadership Profiles (2014))

Collaborating with other leaders and educators to improve learning and teaching practices was frequently encouraged through principal networks, educator networks, and engaging with the community and families:

> They encourage staff to contribute to education networks, supporting the learning of others and development of pedagogy. They model collaborative leadership and engage with other schools and organisations to share and improve practice and encourage innovation in the education system. (Australian Professional Standard for Principals and the Leadership Profiles (2014))

> Initiate collaborative relationships to expand professional learning opportunities, engage in research, and provide quality opportunities and placements for pre -service teachers. (ECA Code of ethics (2016))

The ECA Code of Ethics specifically called for educators to consider participation in research, enhancing collaboration with higher education and communities:

> Make every effort to understand the purpose and value of proposed research projects and make informed decisions as to the participation of myself, colleagues, children, families and communities. (ECA Code of ethics (2016))

Employ mechanisms for public involvement: To promote family and community engagement and the value of education

Within the element, 'employ mechanisms for public involvement', occurred 56 times across 6 of the frameworks. The frameworks encouraged education settings to promote inclusion and act as centres of the community in order to facilitate family engagement in learning and developing a deeper understanding of their needs. As in similar elements, there was a particular focus on building relationships to promote family and community engagement all children:

> Principals draw on expertise from other organisations to enhance and enrich the learning experience for students and their families. They encourage the community to use school facilities in order to strengthen community engagement with the school. They identify and implement strategies to meet the diverse needs of students and their families, challenge low expectations and close gaps in achievement for specific groups. They understand the strengths and needs of their communities, promoting high expectations and achievement for all. (Australian Professional Standard for Principals and the Leadership Profiles (2014))

> Educators understand, engage with and promote children's learning. They talk with families and communities to make locally based decisions, relevant to each child and their community. (Early Years Learning Framework (2019))

Successful transitions were another critical element discussed in the frameworks, as educators were prompted to consider how these transitions supported children's learning and development:

> Learning outcomes are most likely to be achieved when early childhood educators work in partnership with families. Educators recognise that families are children's first and most influential teachers. They create a welcoming environment where all children and families are respected and actively encouraged to collaborate with educators about curriculum decisions in order to ensure that learning experiences are meaningful. (Early Years Learning Framework (2019))

Parental engagement was noted as having a crucial role in ensuring student's academic success and was therefore encouraged throughout the frameworks through a culture of inclusion:

> Principals promote parental and carer engagement as a key aspect of raising the achievement of all students. (Australian Professional Standard for Principals and the Leadership Profiles (2014))

> [Principals] draw on best practice nationally and internationally to embed a culture of inclusion and high expectations for all and take steps to tackle the effects of disadvantage on learning. They develop a mutually supportive, collaborative and trusting relationship with the community

> to ensure engagement in the life of the school. (Australian Professional Standard for Principals and the Leadership Profiles (2014))

Additionally, partnerships with families and stakeholders were encouraged as they were suggested to contribute to the success of the school and its broader priorities:

> Initiate contextually relevant processes to establish programs that involve parents/ carers in the education of their children and broader school priorities and activities. (Australian Professional Standards for Teachers (2011))

> [Principals] build partnerships with the local community and external stakeholders so they are aware of the vision and values of the school and can contribute to its success. (Australian Professional Standard for Principals and the Leadership Profiles (2014))

> Identify, initiate and build on opportunities that engage parents/carers in both the progress of their children's learning and in the educational priorities of the school. (Australian Professional Standard for Principals and the Leadership Profiles (2014))

Demonstrate accountability: For education outcomes to ensure they are evidence-informed over time; and include all involved in the learning community, as a part of a process of continuing quality improvement and reflexive practice

The 'demonstrate accountability' element was coded heavily across the Australian Professional Standards for Teachers and APS frameworks, with references occurring 47 times across 6 documents. References varied in context, although they referred frequently to engaging in reflection on educators' practice to improve teaching:

> Work with colleagues to review current teaching and learning programs using student feedback, student assessment data, knowledge of curriculum and workplace practices. (Australian Professional Standards for Teachers (2011))

> Conduct regular reviews of teaching and learning programs using multiple sources of evidence including: student assessment data, curriculum documents, teaching practices and feedback from parents/ carers, students and colleagues. (Australian Professional Standards for Teachers (2011))

> Establish systematic methods for collecting and interpreting evidence to identify excellent teaching and learning, and share successful strategies with the school community. (Australian Professional Standard for Principals and the Leadership Profiles (2014))

Children's learning was also discussed, and evaluation of practices encouraged in an ongoing cycle of improvement:

> Develop and apply a comprehensive range of assessment strategies to diagnose learning needs, comply with curriculum requirements and support colleagues to evaluate the

> effectiveness of their approaches to assessment. (Australian Professional Standards for Teachers (2011))
>
> Each child's learning and development is assessed or evaluated as part of an ongoing cycle of observation, analysing learning, documentation, planning, implementation and reflection. (National Quality Standard (2020))

Discussion

This analysis aimed to investigate the presence of elements of the PHA to consider the motivation of educational leaders and educators towards planning and children's development. Through the results presented above, it is clear that the existing frameworks do, in fact, contain elements of the PHA, although their application in some instances is limited.

Although there is no research currently to demonstrate the suitability of applying a PHA to education settings, the researcher proposes that doing so would support children's learning and development as educators would have a better understanding of children's backgrounds, use effective monitoring processes, and engage in a continuous process of improvement. Several elements of the PHA were not present at all in this analysis, such as 'the focus on the health of populations', and 'demonstrate accountability for health outcomes' (Wilson et al., 2019). While this may not appear too problematic due to the focus of education being primarily on learning and teaching, research has shown that these settings frequently engage in health programs with little evidence supporting their use or demonstrating their effectiveness (Wilson et al., 2019). There was, however, evidence of the revised element by Wilson et al., which focused on 'ensuring education outcomes are evidence-informed over time; and include all involved in the learning community, as a part of a process of continuous quality improvement and reflexive practice' (Wilson et al., 2019). This supports using this revised PHA element over the original definition provided by Health Canada (2001), should the approach be applied within education, as it is clearly integrated into the existing documents.

Overall, the focus of the frameworks is to ensure quality in the learning environment and that all children are provided with an opportunity to learn in a safe and supportive environment. Educators are increasingly required to use frameworks to demonstrate the effectiveness of their learning and teaching. Understanding and reporting against these frameworks is time-consuming and laborious for all involved (Harrison et al., 2019); however, the effectiveness of the frameworks to measure an educator's proficiency and a child's learning has not yet been sufficiently explored. Additionally, there is no evidence to suggest that simply adhering to the frameworks provides advantageous outcomes for young children. Documents that included many elements of the PHA were the Code of Ethics and Australian Professional Standards for Teachers, both of which are clearly positioned to inform educator practise and rely on the educators' professional autonomy. The NQS, which is also used to inform educator practise, but is externally audited and assessed, contained

significantly fewer references to elements of the PHA. This differentiation may hold significant implications for the potential to integrate PHA elements into practice, as the need for educators to apply these elements to their teaching will differ.

As a policy document, the Australian Curriculum is distinctly different from the other frameworks and standards. Notably, the Curriculum focuses on children's learning and how they display proficiency in each curriculum area. Therefore, in coding this framework, the authors considered how educators would view these behaviours from the children they work with, rather than simply coding the statements themselves. However, the curriculum documents remained the least heavily coded during the analysis. This may be due to the espousing of key content ideas presented in the Curriculum.

Collaboration, partnerships, and engagement were frequently mentioned across the frameworks, indicating that this work is highly important to education sites. Within Australia, partnerships occur commonly at the individual level between educators to improve engagement with the school and attendance (Australian Department of Education Employment and Workplace Relations, 2013). Collaboration is less common, though it does occur at some school sites where research practices are encouraged and working with the community is at the core of the setting's approach (Lowe et al., 2001; Mort, 2007; Wilson et al., 2019). Research suggests that engaging with families and the broader community in which the education setting is situated is beneficial to children's educational outcomes and wellbeing (Halfon et al., 2004; Thomas et al., 2010). To further support children's outcomes, it may be beneficial to enable schools to engage in partnerships with the broader community, developing relationships with local services and families beyond what has traditionally been seen as their core business.

As evidenced by the documents analysed in this chapter, planning seems to be driven primarily by education outcome data rather than information about what impacts upon children’s learning and their abilities to engage in the learning process. Additionally, references to using data within the decision-making process are primarily based on outcomes data and applying evidence-based teaching approaches or programs to improve these outcomes. Within policy, education decisions are also becoming increasingly outcomes-driven at a national level, with a heavy focus on specific aspects such as literacy and numeracy, as perceived through standardised models of assessment. This approach is also driving changes to Initial Teacher Education in Australian universities (Department of Education and Training, 2020). In practice, planning the use of outcomes data is common within education settings. This may look like a focus on improving attendance through strategies such as awards for regular attendance, letters to parents, or shuttle buses to collect children and take them to the setting. One example of such practice is highlighted in research by the Department of the Prime Minister and Cabinet (2018), where attendance rates were targeted without considering the underlying factors impacting families. Importantly, this process does not

allow for a consideration of the factors which underpin children's ability to meet attendance requirements and, ultimately, their ability for academic success in the long-term.

Population-level data available at the site and community level, such as that of the Australian Early Development Census (AEDC), could help bridge this gap and provide an insight into the factors influencing children. Unfortunately, these aggregated data sets are often underutilised as they do not provide data for individual children within the school. Within the APS, principals and those in leadership positions are required to use data and collaborate. However, this expectation has not filtered through to educator frameworks. This disconnect may lead to frustration between leadership and educators as the reasoning behind leader action may not be clear, and may result in staff seeking limited involvement in what is considered additional work (e.g., collaboration). Research has shown that educators are most successful in implementing programs when there is support and recognition from leadership (Valois et al., 2015; Wilson et al., 2019). The use of data within reporting has the potential to shift developmental outcomes if correctly measured and acted upon (Murray et al., 2007). Current evidence suggests that educators may be hesitant to use data within their planning due to the perceived relevance of using the data, how the data is made accessible and applicable in their work, and existing high workloads (Kerr et al., 2006; Kerr & Nelson, 1983; Wilson et al., 2019). Therefore, understanding data use and how best to overcome these systemic barriers should be of paramount importance.

When applied within education settings, utilisation of the elements of the PHA would see a greater focus on children's contexts and the risk and protective factors which support or hinder their academic achievement. Considering these factors within the planning process would see a shift beyond the individual child to how children across the whole community could be supported to thrive. For example, some communities experience higher rates of family stressors such as mental health concerns, drug and alcohol dependence, and poor access to support services, and these are likely to have a negative impact on parental capacity to engage in their child's education, resulting in lower attendance and poorer educational outcomes. By focusing on the community as a whole, the school can draw on the support of agencies within their local area to help impacted families. Alternatively, the school might provide training for educators to support them in building relationships with families to more effectively engage them in their children's learning. This approach links to a number of PHA elements defined by Wilson et al. (2019), including: 'Address children's progress by exploring the contextual and operational factors at play', 'collaboration occurs with other educators, leaders and community partnerships', and 'employ mechanisms for public movement to promote family and community engagement and the value of education'. Addressing the underlying factors often also results in a better return from the initial financial investment outlaid by schools (Naudeau et al., 2012; WAVE Trust, 2013), making such approaches more sustainable over time while also ensuring accountability.

Across the frameworks, there are calls for considering children's contexts within the planning process and suggestions to engage with families to enhance learning. Statements in the frameworks also tend to ask educators to consider each child's learning and learning plan. Each of these practices links clearly to elements of the PHA; however, they lack a call to action asking educators to address the underlying factors or consider where data can inform planning at a higher level.

As previously discussed, applying elements from the PHA could, in fact, be advantageous for children's learning and development. However, due to the strain already placed on educators to adhere to a large number of existing frameworks, the researcher would not advise developing another framework. Instead, it may be more suitable to revise the existing frameworks to be more inclusive of PHA elements in documents where they are lacking, or emphasising the importance of the PHA in documents where elements are currently present. Future research should focus on how educators use these curricula and frameworks within their learning and teaching, any potential barriers to their use, and where they require more support.

A limitation of the document analysis is that through the process, researchers cannot learn how an organisation operates on a day-to-day basis and how the documents are enacted upon in practice (Atkinson & Coffey, 2004). Therefore, the researcher does not make any claims about the use of the documents within schools based on this analysis. Further research with school leaders and educators is needed to better understand the applicability of the PHA to education, with a particular focus on how educators plan, interpret the frameworks, and utilise population-level data in planning for children's needs. Additionally, future work should broaden educators understanding of health, so that it includes all elements in the PHA, not just academic scores.

Conclusion

This analysis aimed to investigate the presence of elements of a PHA in national frameworks to better understand educator motivations and their ability to integrate the approach into their planning. This research demonstrates that elements of the PHA do exist within various educator frameworks; however, their inclusion is often limited and superficial. Integration of elements of the PHA into existing frameworks may positively impact the planning of leaders and educators for learning and teaching with young children in the early years of school, and therefore, may translate into improved outcomes for children at this important period of their lives.

Chapter summary

This chapter has presented an analysis of the presence of elements of the PHA in national education frameworks and planning documents in Australia. The results showed that ‘collaboration’, ‘partnerships’, and ‘engagement’ were frequently mentioned across the frameworks, indicating that this work is highly important to education sites.

Utilisation of the elements of the PHA would see a greater focus on children's contexts and the risk and protective factors which support or hinder their academic achievement. However, there is currently no research to demonstrate the suitability of the PHA in education settings. Therefore, in the next chapter, the researcher will explore which elements of the approach are evident in educators' planning, the barriers and facilitators to working in this way, and the benefits these practices have for children's learning and development.

CHAPTER 4. POPULATION APPROACHES TO IMPROVE CHILDREN'S LEARNING – A QUALITATIVE EXPLORATION INTO HOW SCHOOLS IMPLEMENT THE APPROACH INTO THEIR PLANNING & PROGRAMS

Introduction

This chapter builds upon the results and recommendations of the systematic literature review presented in Chapter 2. The document analysis undertaken in Chapter 3 investigates how elements of the population health approach (PHA) could be of value to educators. Overall, these chapters suggested that more work is needed to articulate the ways in which population data add value to schools, and the extent to which this type of planning improves the experiences of children in school and their educational outcomes. Additionally, further research should be undertaken with school leaders and educators to better understand the applicability of the PHA to education, with a particular focus on how educators plan, interpret the frameworks, and utilise population-level data in planning for children's needs. Furthermore, an investigation into how data are used to develop and inform collaborations and partnerships beyond the school gates is required.

This chapter presents the findings from 20 interviews conducted with leaders and educators from schools across two Australian jurisdictions to investigate the extent to which schools are engaging in practices encompassed by the PHA, how elements of the approach can support children's academic and wellbeing outcomes, and the barriers and facilitators of its use.

Early prevention to address developmental vulnerability is critical

Within Australia, children are facing challenges across several developmental domains of physical health and wellbeing, social competence, emotional maturity, language and cognitive skills, and communication skills and general knowledge (Department of Education and Training, 2019). Addressing these vulnerabilities early is crucial to ensuring that children can reach their full potential once they enter into full-time schooling and continue their learning trajectories. However, this early prevention work requires a collaborative approach between schools, early childhood education, and care providers, governments, and families as children's development is influenced at a range of levels. Ecological systems theory, as initially proposed by Bronfenbrenner (1986), suggests that individuals are influenced at five key levels: individual, interpersonal, community, organisational, and policy. Further research has shown that children's development is similarly influenced by each of these levels and is most likely to generate lasting gains when individual characteristics are considered alongside changes within the family, school, or policies (Pem, 2015). Health promotion research has shown that creating sustainable and long-term change is

most effective when it occurs across each level and through various systems (Shelley & Jo, 2012; Stokols, 1996).

Early prevention has been shown to develop children's personal strengths and skills, provide the opportunity to thrive, be prepared for adult life, and contribute to their communities (Teager et al., 2019). This notion is fundamental, as children's early experiences are built upon as they grow, influencing their health and wellbeing, education, social participation and inclusion, peer and family relationships, and civic and economic engagement (Campbell et al., 2014).

One way in which partnerships and collaborations can improve outcomes for populations of children is by sharing resources and having a broader reach of consistent messaging. This approach is more likely to reach more families and generate a significant return on investment in economic, health, and social outcomes (Halfon et al., 2004; Heckman & Masterov, 2007). Investing in early childhood generates a significant return and is also a low risk and effective strategy for reducing social costs (Heckman & Masterov, 2007). As a central structure of children's lives, schools can play a critical role in early prevention and assist in shifting children's trajectories. However, addressing the underlying needs which are likely to have an impact on these vulnerabilities requires a more proactive approach that is focused on families and the community as well as the individual, such as that described in the PHA (Wilson et al., 2019).

Context and Terminology

Leaders and educators were recruited to participate in interviews from two jurisdictions with differing governance and support structures as a purposeful sampling strategy to identify the extent to which systemic supports contributed to school planning. To maintain anonymity, the jurisdictions will be referred to simply as Jurisdiction A and B within this chapter.

The terminology used across Australia to describe the first year of full-time schooling for children differs depending on the jurisdiction and sector. Therefore, to maintain clarity within this chapter, the choice has been made to remove any state-specific terminology such as 'reception'. Within Australia, children starting their first year of full-time schooling are at least five years old by 30th June.

Aim

This study aimed to identify to what extent elements of a PHA are evident within educators' planning, the barriers and facilitators to working in this way, and the benefits these practices have for children's learning, development, and wellbeing.

Methods

Recruitment

Schools from two separate Australian states and territories were selected as a focus for the proposed study. This purposeful sampling methodology was employed as the support and data provided to educators differed between the two jurisdictions. This decision was made in order to generate a richer understanding of the associated facilitators and barriers, and to understand the approaches in planning, to support children's development. Ethics approval was obtained from the Flinders University Social & Behavioural Research Committee (#8470) and the corresponding education-based research approval committees.

To minimise the burden placed on schools by conducting research, both jurisdictions required recruitment to be facilitated by the central office in each region using a purposive approach. This process was particularly important to both jurisdictions, given the timing of the research coinciding with the COVID-19 pandemic and the Department's caution towards overloading sites with unnecessary work. During recruitment and data collection both jurisdictions had remote learning orders in place. Within Jurisdiction B, initial meetings to explain the purpose of the research and identify potentially useful regions were undertaken before regional representatives were contacted by the Department and school sites nominated for participation via email. The approach taken by the regional representatives differed, with some requesting that the researcher make initial contact with school sites. In contrast, others required contact to be made by the office and followed up by the researcher. Within Jurisdiction A, a similar process was adhered to, with regional representatives nominated and school sites suggested, following subsequent conversations regarding the intent of the research. Up to three follow-up emails were sent to non-responsive participants, inviting them to participate in the research. The confidentiality of the participants was maintained by ensuring that no participant names were provided back to the state-level Department, and the results were presented by role rather than school or jurisdiction.

Participants

A total of 106 participants were invited to participate in the study across the two jurisdictions, of which 11 leaders declined due to time restraints, 20 proceeded with the interview, and 75 did not respond. Initially, school sites were included in the interview schedule if at least two staff members were willing to participate; one holding a leadership role and the other an early years educator role, to explore how messaging, responsibilities, and actions differed between leaders and educators within a site. However, feedback during recruitment indicated that due to the pandemic, school leaders were protective of their staff members' time, and while they were happy themselves to participate in the interviews, they were unwilling to suggest their educators take part. As such, educators were recruited regardless of whether there was a leader at their site who was also available and vice versa. This led to an uneven distribution across role types, and comparison within school sites of how practice differed between the leader and the educator was deemed unfeasible. A breakdown of participation by region can be found in Table 4.1 below.

Table 4.1: Participation by jurisdiction

		Jurisdiction A	Jurisdiction B
Leadership staff	School location		
	Major cities	1	3
	Inner regional	1	3
	Outer regional	2	1
Educators	School location		
	Major cities	3	2
	Inner regional	1	2
	Outer regional	1	

Interviews

Interviews were conducted by the PhD researcher between August and December 2020, primarily using Microsoft Teams video-conferencing software. Interviews were also conducted by phone or face-to-face at the school site when requested by the participants. Where there were multiple participants at a site, interviews were conducted separately on all but one occasion, where the leader and educator requested to be interviewed together due to time constraints. Informed written consent was obtained from each participant prior to the start of each interview, and audio-recorded alongside the taking of detailed field notes.

An overview of the research, the researcher's background, and the intent of the study was provided at the beginning of the interview to provide context for the forthcoming questions and to build rapport. The interviews were based on an open-ended question framework with discussions centred on the use of PHAs, including the use of population-level data, how such approaches supported their planning for children, the challenges they faced in integrating these data into their existing planning, and the role of planning frameworks (e.g., the National Quality Standard) in their processes. Inter-agency partnerships were also explored, including the benefits and use of data within these relationships. Prompts were developed based on the document analysis undertaken by the researcher in Chapter 3, which sought to understand how elements of a PHA were integrated into existing planning frameworks and where there may be barriers to, or opportunities for, their use. A copy of the interview framework can be seen in Appendix L. The interviews lasted approximately 50 minutes each, with the shortest being 21 minutes and the longest 86 minutes. Recruitment continued alongside data collection until data saturation was reached with no new themes occurring during the interviews.

A brief questionnaire (seen in Appendix M) was also provided to participants to gain a deeper

understanding of the characteristics of the group and to draw connections between the findings and different professional backgrounds, and jurisdiction groups. The data are presented in Table 4.2 below. Medians and ranges are presented to ensure the anonymity of the participants. Where appropriate, participant characteristics have been used to provide relevant context to the quotes herein.

Table 4.2: Participant characteristics

Characteristics	Years
	Median (range)
Time spent working as an educator/leader	16 (3 to 38)
Time employed in role	3 (<1 - 8)
Time at current school	6 (<1 - 18)

Analysis

The audio obtained during the interviews was transcribed verbatim using Otter and Rev AI software, while NVivo 12 software was used to thematically analyse the data using an ductive approach, creating codes from the interviews, and drawing links between the data (Braun & Clarke, 2021). Initially, preliminary codes were assigned to the data segments, creating themes that described the content. From this, patterns across the codes and interviews were identified and reviewed, which ultimately made up the key findings of the research. The coding process ensured validity, as the results were grounded in the data through quotes from the participants presented herein. The researcher analysed the interviews and the themes were discussed with the supervisory team during the initial stages of coding to ensure accuracy and rigour.

Neither the transcripts nor the preliminary results were returned to the participants for comment as the PhD researcher considered how some may have requested changes to better align their responses with political messaging, valuable data could have been lost (Mero-Jaffe, 2011). Participants were, however, invited to contact the researcher if they wished to change or redact any of their statements following the interview. At the time of publication, no participants had made any such requests.

Results

It is important to note that although interviews were conducted during the height of the COVID-19 pandemic in Australia, discussions were focused on the 'typical' work of leaders and educators within the school. References to the pandemic and how practices have differed were excluded from reporting the results as they did not reflect the typical work of schools at the time of the interview. While the researcher recognises that since the time of the interviews the typical work of

educators and leaders now frequently includes managing classrooms differently due to the pandemic, it was outside of the scope of this thesis to consider these practices within the results.

Overall, discussions with school leaders and educators across the two jurisdictions demonstrated the significant impact government policies can have on practices for sites. While leaders and educators from both jurisdictions were focused on how they could support children's academic development, some interviewees focused more on the importance of holistic development and how data could inform their decision-making, partnerships, and funding allocations.

A number of key themes were identified from the analysis, including accountability for quality improvement, reporting, and funding; collaboration with external providers, between early childhood education and care providers, with the Department and within the school; data use for ensuring decisions were based in evidence; increasing investments; mechanisms for public mobilisation to promote both family and community engagement; planning processes for children's developmental progress and understanding their past experiences; Department policies, curriculum frameworks, and programs across multiple levels and strategies. To thoroughly understand how elements of the PHA are integrated into school planning, and the barriers and facilitators to its use, the results presented are categorised by the eight PHA elements.

PHA elements

Focus on children's developmental and learning progress

Understanding what affects children's academic development and learning was a significant driver of data use within this study. Participants spoke of how they frequently used a variety of data sets to understand where individual children may be facing challenges and where they could benefit from additional supports.

> So we have a platform ... All the classes are on there, all of our NAPLAN, PAT data, running records, data, academic grades, whether or not they've had any level of intervention or not … It also identifies students, whether they're Aboriginal Torres Strait Islander, or if they have EAL/D learners, anything like that as well. (Education Leader J)

The term ‘Community data’ was met with confusion and uncertainty around what type of data this might include. Most educators considered their use of ICSEA measures of socioeconomic disadvantage for their school; however, knowledge did not often extend beyond this data set. Educators discussed how data describing the community's level of disadvantage could be used to support their planning by providing a deeper understanding of both the needs of the children and the facilities they might have access to:

> I have used [community data] often … if I'm joining a new school … if they're in a disadvantaged area, that means the school probably doesn't have a lot of funding … that can affect how you plan for the kids, because you might not have those resources there. So that's really important. (Educator B)

Data such as the AEDC were used more commonly by those in leadership positions, but often with a limited understanding of its value as a population data set, as it was more likely to be used at an

individual level. For some, this data set was viewed positively as a way of understanding the individual children in a cohort, prior to reporting at the end of term:

> Whenever the teachers do [the AEDC], and they do it in second term, they said, "I've actually got my framework for writing my next report to parents. I've got a framework for when I go to my next interview" … they find when they're writing reports, they go "I actually know all this stuff … I've actually got it, because I went through that process when I do the AEDC data". (Education Leader F)

The use of these data was facilitated by structures that allowed sufficient time to interrogate their meaning and apply them to the school context. One leader described how understanding the needs of the children in the area, provided them with an opportunity to identify patterns in development:

> We look at the [community level data] and [the Department staff member] supports that and translating that. It's good to know as a collective, because our students derive from surrounding areas and not just from [our suburb]. So it's good to know what patterns or things that might be across certain areas or parts of the region. (Education Leader R)

Additionally, educator's and leader's use of data were facilitated by an expectation set by the state Department, which encouraged schools to interrogate their data and apply it to their site, as described in the quote below:

> I think [the drive to use data] actually comes from the region. [They] put the pressure on the principals … The assistant directors [are] getting the squeeze from the regional director, who's getting the squeeze from the minister. [It's a] flow down effect. But I think, you can't argue with data. Data is data and it's there, that's the line in the sand. (Education Leader L)

Students' wellbeing was also discussed in relation to how it may impact their learning and ability to engage in the classroom. As the participant below shared, these data were similarly viewed for individual students, and analysis was supported through team meetings:

> As far as the wellbeing that's usually tracked through, we have two meetings within each term with, for each year level. And that's where we track different students and as a team, we can discuss for those students of how they going, not just academically, but socially and emotionally as well. (Education Leader G)

Another significant motivator to data use within schools was the benefit that triangulating evidence provided to educators' knowledge and planning processes, in that it allowed for a more informed understanding of students' needs. Overall, educators acknowledged the value of interrogating data for their class and of regular review. As demonstrated in the quote below, this process allowed an education leader to be more intentional with their planning, identify the students' underlying needs, and provide wrap-around supports at a school level.

> You never look at data on its own, you have to look at data in the context of other data … we've got to look at it in the context and not let one thing out sway the other, and pull it back and go, Okay, what is the total picture telling us with this? … We're very good at knee jerking, and we're trying to go through this process where we don't knee jerk and go "Okay, what do they actually need?" ... but we'll never get the gain if all the other things aren't wrapped around them. (Education Leader F)

Address the determinants of children's progress by exploring the contextual and operational factors at play

Children's past experiences were understood by educators through transition statements from the preschool and occasionally, work with the community. Reviewing children's transition statements alongside considering the challenges faced by the whole community was a beneficial practice in one school, where the school used this information to inform induction programs and training for all staff members in order to proactively support the children's learning, as shown in the quote below:

> So that understanding [of the community disadvantage] is filtered into our induction programs, so every staff member that works here must complete the training around understanding a framework for poverty, so that they have a broader understanding of the community and can connect the presentation of families, adults and children in a learning school environment, and why sometimes it can look different to what you might otherwise expect … It also informs the reason that our school has adopted that trauma informed practice. And that we proactively have a way of supporting the children to build safety, but also by doing that, able to increase their learning success as well. (Education Leader A)

The practice of proactively preparing for children's individual vulnerabilities was however varied, with several educators calling for more information about children's experiences, as this would allow them to plan for students more thoroughly and reduce the time spent at the beginning of term addressing their needs:

> The information that we have about the students before they come … I think even more of that would be good. I think we spend a fair bit of time at the beginning of each year getting to know them, and their backgrounds and how they operate in the classroom and how they react to things. (Educator T)

Educators spoke of the value that population data held in assisting them to set practical goals in advance and adjusting their teaching to the learning deficit based on the children's existing needs as a whole cohort:

> Because if you know that there's a whole group of kids that, you know, problem solving isn't a thing. And then you would like I would be on that at the beginning of the year. Okay, we're gonna learn about problem solving, what is problem solving, and then I'll be like, "Okay," and then I make that like a whole year kind of goal. (Educator B)

While educators understood the importance of early childhood development and the impact that families as children's first educators could have on their learning, some were hesitant to address these underlying mechanisms that may hinder development. One participant noted how the work of educators has evolved, and that there is now an expectation to work in the prior-to-school space:

> You never thought about catering for kids … you never thought about catering to that vulnerability … This is the work we've got to work on. Because otherwise, you know, you turn up and you think I'm delivering the curriculum, and I'll pack up and go home and prepare again for the curriculum delivery. But it's the wider jigsaw that needs to be all put into place so that we can get the child in the space to learn. And that's, that's the really challenging stuff. And it's about changing mindsets. (Education Leader D)

For many, this represents a significant barrier to undertaking such work and requires a shift in the mindsets of educators to address the underlying contextual factors affecting children's learning.

In order to undertake this work and address vulnerabilities for children outside of the classroom, operational support, funding, and leaders in the space are required, as described by the following education leader:

> There needs to be some sort of overarching guidance around saying, "look, we'll provide X amount of dollars to set this up for you." Because we are asking principals, we're asking schools to do so much additional planning, that is just not curriculum based … So, we need some lead learners in that space ... And I think we need champions that are really put forward to do that, so that we can be [supported in the] roll out. (Education Leader D)

Several participants spoke of Department-led initiatives which had facilitated their ability to work in the early year's space and address vulnerabilities of children outside of their school site. This work has subsequently improved communication with early childhood education and care providers, strengthening the relationship with families and the community as a whole. As demonstrated by the quote below, one school noted how working with their local ECEC through a Department-led initiative allowed them to identify 'vulnerable or invisible families' who would not usually engage prior to starting school, and how this had also led to increased enrolments in each of the schools in the partnership:

> [The program] has been great [in] that it's forced our hand to communicate more with [ECEC's], because now we're kind of scratching each other's backs ... the [ECEC] have got a vested interest in now attending our school because, you know, there's a, I guess, one of the better words there's a market share there. (Education Leader O)

Uses evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities

Overall, school staff were confident that the programs in place had a positive impact on the children's development, often sighting models such Lyn Sharratt's 'Putting FACES on the Data',[2] in their discussions of best practices. Evaluation was also discussed as a necessary component of all programs; it was important to understand and demonstrate whether educational goals were being met. The following leader described the significance of providing evidence that the supports provided were meeting children's developmental needs:

> It's not just about the feel goods, which we get a lot of, which is great. But it's actually about the data in the end, it's about the kids. Are they achieving, and how do we know? They can tell us every single day they love us, and they can do all those sorts of things and give us hugs and sing our praises. But in the end, if we're not being able to make a difference in that data then we have no idea if we're making it or not, really. (Education Leader L)

The schools discussed the wide range of programs they were currently implementing and how these aligned with the state's priority areas for children. Data were discussed as a way of understanding where the school should focus its initiatives, providing focus areas that leaders

[2] Lynn Sharratt and Michael Fullan's *Putting FACES on the Data* is discussed frequently by leaders and educators in Australia. The book demonstrates how educators can personalise their data to see the data as 'faces' of students, rather than just numbers. The strategy then encourages educators to implement specific actions for specific students.

could then use to base their decisions around funding and programs. The participants quoted below shared how they used data on both their families and their classrooms to understand needs, drive their planning, and adjust their supports appropriately:

> Look at it tells us that you know, I mean, we have we have 79%, non-English speaking background. And so, for us, you know, it tells us how, how vulnerable they are within them, their future learning, and we really need to scaffold what we provide, when they come into [their first year of school]. (Educator P)

> We also look at what's happening for our teachers and the classrooms for the students and their outcomes. Some of that information gives us good information about, you know, some of the programs that we run, do we need to, for instance, do more fine motor – it depends on what the data shows. (Educator S)

Increase upstream investments - Concerned with the impact of studies to inform the direction of, and to improve educational outcomes. Investments are both short- and long-term

Investments into children's academic achievement were discussed in various ways, with conversations focused on both short- and long-term programs. Funding was frequently mentioned as a barrier to investing in long-term programs, as many discussed how their budget did not allow for work outside of the school, which would allow them to work to address the root causes of the issues. Where investments outside of the school grounds were made, such as investing in local network building to address barriers to learning, this was often facilitated through shared resources across schools and organisations in the area to lift the whole community. One leader discussed how principals in the community came together to pool their funding to employ a community liaison officer who could work with families in the community and assist them in connecting with services to address the vulnerability beyond what is possible for a single school:

> … we were obviously reflecting on that data that came out about our developmentally vulnerable students, and going, Okay, we need to do something more, or we need to do something better. We sort of through a community of practice and a lot of discussion, we sort of figured that we don't have links to all these organisations. And we actually as principals can sort of, 23 of us can't go to [the community service] and build that relationship across all our schools. So, if we invested in one, then that one person might be able to disseminate the information we want, plus link with health, and just try and be that conduit to get information out to a wider group of people. (Education Leader C)

Schools also discussed how their decisions around which programs to implement were facilitated by understanding what had worked for others and how they could improve the quality of their educational practice. This approach provided school leaders with the confidence they needed to invest in approaches they believed would work similarly for them:

> One of the best things I found was to actually go into a school that I really admired the work that they were doing with their improvement work. It was similar to what we were going after, but a completely different context … they were actually below us, but we're achieving so much more than us and then other schools who were way above that sort of level of SES. So, part of the planning, I think, some of the best things to do is actually going to see what best practice looks like in the flesh and actually learn from those sorts of people … the work they were doing was amazing and had been tried and tested. And the results were there that proved that what they were doing was having a big impact, but a sustained impact too. (Education Leader R)

Leaders also spoke of the need for a sustained change within their sites, moving beyond a short-term focus to one, such as an aspect of literacy or numeracy, which would continue to see improvement over time. The quote below describes how driving a type of approach without embedding it results in short-lived benefits. Therefore, there is a need for embedded ways of working to address population needs and drivers of outcomes, rather than focusing on improving an outcome with intensive targeted and sustained intervention.

> You can focus on something and get a spike. And then it drops off as soon as you drop the focus, and it's something we wanted to be embedded. And while still happening, it's not their focus at the moment but the improvement is still there, and the growth is still there. So, it's an embedded process and not a quick fix. (Education Leader R)

Transition programs were the most frequent long-term investments discussed by school sites across both jurisdictions. Data such as the AEDC were used to inform these investments and track how the program was working to improve development prior to starting school.

> … so, we do use [the AEDC] too, I suppose, look at how our transition programs are working, whether … they are they successful, "do we need to change anything?" (Educator S)

Long-term investments also frequently took the form of playgroups, which some schools had chosen to fund for families in the area out of their own budgets. This was viewed as a non-confrontational way of getting to know families and instilling the importance of early childhood development prior to the children starting school:

> We have a playgroup. So, we offer that out of the school budget, basically, that's on every Monday morning, any, any child is welcome at that with their parents. So that's another lens for us to get to know some of these families. That's another [thing] that can be quite useful developing those relationships. (Education Leader O)

Applying concepts from other disciplines, such as health and wellbeing, to education settings. Strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges

Investments in children's wellbeing were discussed, as schools developed their understanding of how supporting holistic development can benefit academic achievement. These programs were facilitated frequently through external providers and monitored using student and parent surveys and yearly data collection, such as information routinely collected about children's wellbeing. School leaders spoke of how investing in programs that fostered wellbeing could have positive indirect effects in relation to reducing bullying and improving attendance and were, therefore, a better investment than

enforcing behaviour management policies at an individual level. The participant below describes an upstream investment where their school sought a proactive approach to behaviour management:

> We still wanted to do more proactive stuff around wellbeing than always be reactive. In terms of enforcing a behaviour management policy or a bullying policy it's almost redundant. But what we've done practically is work with the Resilience Project over the last three years to deliver that curriculum all around building empathy, mindfulness and gratitude in children. And then if you're proactive in your thinking that way, it makes the other things less occurring. (Education Leader R)

Although working with the community outside of the school grounds is a relatively new practice, one school spoke about how they aimed to address the vulnerability of families in the area through the provision of a community hub. This process was facilitated by a sound understanding of community needs and how outreach could foster relationships with families, improve access to health services, and provide an opportunity for richer conversations about their children's academic achievement when required. The quote below outlines how by investing upstream, the hub has had a positive impact on the families and the school community as a whole:

> We have a hub, community hub, [the aim of the hub] is to facilitate the non-English speaking families and build this skills. You know, so they might have a playgroup there, or they'll have you know, sewing or, you know, just how to fill out your bank forms and all those sorts of thing. Yeah. We also have like food banks, so food banks will be delivered to us, and, you know, they'll go out to our families, as well. As I said, we pay for extra guidance, they'll go to doctor's appointments with our people, so that, you know so that they feel that they can use the language as required, with our non-English speaking families … we see, probably a greater, it's like a real, it's a, it's a really strong respect for each other. So that we, you know, we have respectful relationships with them. And they really quite respectful of, you know, what we're trying to do for the kids and what we want to achieve. You know, there's, of course, you have hard conversations in schools, but I would say that, you know, those families that know that we're there to support them are there to support us as well. (Education Leader P)

The educator quoted below discussed how they could incorporate aspects of wellbeing and emotional development into their health program in a way that still enabled them to meet their curriculum requirements.

> We try and incorporate their needs with our health program and then aligning what we're doing there so we can address what support that they need, emotionally and I guess their wellbeing plus what the curriculum tells us we should be teaching, so trying to package it all up there together in that time. (Educator I)

Embedding an approach that recognises and addresses the barriers some children face to engaging in learning because of issues outside of their cognitive capacities is vital. However, participants also noted the challenge of integrating alternate programs which facilitated children's holistic development while ensuring they were still meeting their academic goals as determined by the state Department.

> The challenge we have is that an improvement focus as a system is purely literacy and numeracy, not social and emotional. And so it's working out how you're going to balance that if your improvements focus is on literacy and numeracy, how do you then keep the ball rolling with the social and emotional and have accurate plans for that? (Education Leader F)

Achieving the appropriate balance between traditional academic development and social and emotional learning remains a challenge for educators.

Collaboration occurs with other leaders, educators, and community partnerships

Discussions around collaboration reflected activities at five distinct levels: between educators at the school site, between educators across school sites, with early childhood education and care centres, with community organisations, and with the Education Department. All participants valued these relationships, and the work undertaken as a result was highly regarded. Collaboration

frequently occurred between educators and across the year levels within the school to plan for assessments, undertake moderation, or discuss strategies to support specific children.

> We get together we discuss everything. It could be creating new assessments, it could be just talking about all the term plans, the year plans, just what's happening generally for children. We get together and we, you know, kind of get ideas from each other on how to how to cope with things, deal with things, how you're tackling things … Formally, it might be once a week. But informally, we're always talking at lunchtime or after school. We're constantly just, you know, asking, checking, making sure that everyone's on track doing what we need to be doing. (Educator M)

Connections with early childhood education and care providers generally occurred to identify students with additional needs prior to them entering the classroom; however, they also assisted in developing an understanding of the learning that takes place in these early years and setting expectations between school and prior-to-school sites.

> So they work from their … guidelines … And we do Australian curriculum. So being able to then, for us, because so many times you hear [the first year of school] teachers going, "What the heck do they do in [ECEC]. What are they doing? I think, they come in to us, they can't write their name. They can't even pull their pants up." And where it gave us a really good opportunity to see their guidelines and what they have to work from. And then it gave them a great opportunity to see what we've got to do as well and where we're heading to and where we need to get them. (Education Leader L)

Transition statements provided by the ECEC settings were frequently discussed as a way of understanding the needs of the incoming cohort.

> … we like to do early intervention is our philosophy and key here at our school. So all of that information [from preschools] helps to create a picture of the child and what the child needs to be successful at school. (Educator S)

Occasionally, schools invested beyond transition to engage more meaningfully with the ECEC sector. One such example is provided below, where a Principal shared how their site was working to facilitate early language skills in the children prior to them starting school, to foster their development and interest in learning:

> Before they obviously even come to our school, we start working with the Early Learning Centres, just to start getting to know our kids at an early age … So we do things where our Japanese teacher actually goes into our local kindy and starts Japanese lessons with our kindy … Our [first year of school] Kids are learning Japanese from an early age only because we know that that connection between learning a language and academic growth is great. So there's these things that we're doing on a regular basis to try and stimulate that love of learning and sharing of resources with us in the ECEC setting. (Education Leader C)

Where more meaningful collaboration with ECEC sites occurred, this was often facilitated by Department priorities, whereby schools were supported to work beyond their school grounds.

> So we've had a really big push in outreach and especially in it at school, around inside the gate, outside the gate. So that K-2 space. So not just as soon as they walked through our gate [on their first day of school], but actually trying to extend beyond that into the kindy area (Education Leader L)

Department priorities often drove collaborations across school sites and requirements to participate in partnership groups with nearby schools and ECEC providers. Department staff were discussed as useful supports that could be drawn upon to assist in both strategic and practical matters, further facilitating collaborative relationships, as the quote below suggests:

> A senior guidance officer will often ring and say, hey, we've got this problem, what do you suggest? They're great with providing that that sort of social emotional support? Or where to from here for kids? You know, HR, people are great. Our finance guys, you ring up? And you say, "okay, so I need to find this in the budget? Where, where can I find it? How can I do it?" So you know, absolutely our region are, are very helpful. (Education Leader P)

Employ mechanisms for public mobilisation, to promote family and community engagement and the value of education

Schools discussed the many ways they worked to promote both family and community engagement, mainly to promote the value of education to families and support their current cohorts in accessing services that would ultimately benefit children's development. This work was understood as a necessary step in addressing the underlying mechanisms that have an impact on children's learning and development. Participants spoke of how they connected with families through education sessions, which would increase the skills of parents and foster learning for the students at home:

> I've only got a dozen teachers within my school, but I've got 66 parents now, if I can teach them to better support some of their learning at home and kids learning at home, Suddenly, I have 78 parents, 78 teachers of support. So we are very much about teaching our parents. (Education Leader C)

> We wanted to get a lot more parent engagement at school. So we had literacy afternoons for the parents to come along to, because a lot of them don't have strong literacy themselves. So the reason they don't read to kids is because they're not that strong readers. So we wanted to really empower parents, regardless of literacy, of the importance of reading to the kids, and getting them interested in that. (Education Leader Q)

This work was facilitated through actualised gains in children's development and the school's ability to engage in collaborative relationships with the community, as demonstrated by the quote below:

> I could see so much improvement, not only in number sense, but I could see improvement in collaboration with community. So I have more parents coming in asking, "Oh, I did this with my son yesterday and it was fantastic. You sent that game and we were cooking and he was looking at these different measurements that he learned, and we were measuring the dining table at home." So it was not only ... It was that connection making the link with school and community through the different tools that we equip children with so they improve their learning, but at the same time, they improve their confidence and they are in growth mindset. And they would not say, "No, I can't do it. I can do it because I have tools." So it was one of the projects that I was involved in. (Educator H)

Transition visits were again highly valued and facilitated engagement with both families and the community as a whole. Visits that included information sessions for families were discussed as having a positive and long-lasting impact on how families connected with the school and its staff. The quote below describes how one school set up information sessions for families during a

transition visit prior to the children starting school, which supported families coming into the school and their understanding of the processes and also the children's sense of belonging:

> We have a day where the [5 year old's] actually start early … the parents come in have some parenting sessions that sort of thing … It also is making the parents start to feel part of the community … They start to feel like they have been welcomed in the school. So they feel part of that as well. And just sort of getting them to understand a few things that we're about, so like our phonics system and things like that. It's quite involved and very different to how the parents would have been taught in school. So it's just getting that understanding of that as well and more so when the teachers in send homework home. (Education Leader N)

Although beneficial, several participants noted how participation in the transition process and parent sessions was usually attended by families who were likely already highly engaged in their children's learning journey and unlikely to require additional support, as demonstrated by the quote below.

> That's the unfortunate thing is, though, if you set up a training or a workshop for parents, it's the same parents that come. And it's the parents who don't need to come. (Educator E)

This example also reflects using a single strategy rather than considering how applying multiple connected strategies could assist in addressing barriers to engagement, as evident in the population approach.

Several leaders noted how they were unsure about how to reach these families beyond the work they were already undertaking. This remained a barrier for them in promoting the importance of education to families who were less likely to participate in transition programs and who faced barriers to engaging with schools. One educator discussed how they had been working with other schools in the area in an attempt to reach disengaged families, connecting with their local supermarket and holding education sessions and health check-ins in an effort to reduce the systemic barriers preventing families from accessing services. The quote below provides an example of how a partnership group were able to move to an approach that applied multiple strategies to address engagement:

> So [the principal's alliance] worked with our local supermarket … And they actually set up a play area for children. And then they always have a guest speaker for the parents … So sometimes that person is an occupational therapist, speech therapists, nutritionists ... We'll say have the health nurses come from the hospital, and they bring all the things to do weigh-ins and check-ins, because from a lot of the community that we found that a lot of young mothers, early 20s and even teen mothers we're not having their babies weighed … So this was an area where we thought that by doing it in a shopping centre where there's a play [area], you know, there's food is everything like that it was a bit less confronting them. (Education Leader N)

Educators called for a more collaborative response to promote the importance of education for families and the community. However, data sharing restrictions presented barriers and resulted in difficulty collaborating with other sectors, as demonstrated below:

> I think that there needs to be a community collaborative response. We're working fairly closely now with our childcare centres, our early childhood development teachers and staff at the early childhood development centre at one of our schools, we're now starting to look also at having a

> coalition of educators and health professionals, that start sharing data. One of the areas that we probably have fallen down on over the years is that we aren't always good at sharing that data, or we rely on parents bringing forward information, information to the childhood development teams, where they don't bring it we don't get it. And so there's an issue there. (Educator K)

Stronger collaboration between sectors, as suggested above, could facilitate a richer understanding of children's strengths and vulnerabilities, eliminating the need to obtain this information from parents directly.

Demonstrate accountability for education outcomes to ensure they are evidence-informed over time; and include all involved in the learning community, as a part of a process of continuing quality improvement and reflexive practice

Finally, participants discussed how they remained accountable for education outcomes over time, both through collaborations and as a way of meeting their reporting obligations. Leaders spoke of how programs that were promoted and supported by government priorities often received a larger buy-in from schools and were embedded in their reporting processes at a deeper level. One common example was the recent focus on early literacy, as measured by phonics screening. The participant below describes how the school's focus has shifted to align with this priority area, ultimately providing top-down support which drives to shift on-the-ground practices:

> We've gone after phonics screening for year one's in the last couple of years, whereas five years ago, we weren't looking at that at all as a valued data set. [the Department has] gone after it, they've resourced it, they've trained teachers, they've helped with analysis, they've promoted what works well in sites and things like that, and they're getting buy in and improvement that way. So when things are well resourced, when there's common understandings when there's a clear need for why this is happening, you're much more likely to get buy in and uptake from it. (Education Leader F)

School site improvement plans were discussed as a way of tracking achievement towards goals and reflecting on the work over time:

> I'd say [the site improvement plans are a] pretty good [reflection of our work] and actually this year we had outstanding results … (Education Leader F)

The process was discussed in relation to the goals set by the respective state Departments, particularly concerning the external review process. Schools reflected positively on the process and how it enabled them to set goals and respond to needs in ways that were unique to their setting:

> The recommendations of the external review are what you're implementing through your site improvement plan … the review recommendations are very broad. You know, "consider doing this …". Whereas your improvement plan is where you're actually going after [specific goals]. (Education Leader F)

Some participants were acutely aware of the impact that the early years could have on children's later development, and drew on this understanding to plan programs that were frequently monitored and evaluated within the school. The leader below shared his understanding of children's developmental trajectories and their importance:

> Because, kids, if they can't read by the time they're in year three, the evidence says that the odds are stacked against them, later in life. So it's really important [to address this]. (Education Leader Q)

Accountability processes were facilitated by Department policies and ensured that educators were maintaining high-quality learning environments. One educator noted how despite generally liking the structure the policies provided, they found it often restricted their work in the classroom:

> I like the policies, because I like to be up to date with all the new things that are happening. The inclusive education policy, for instance, is one that had a lot of changes in it, so that was good. Some of them, your hands are tied with some things sometimes like you think, "oh, that'd be really good to do," but you can't actually do it. (Educator S)

In reflecting on Department policies, one participant noted how a student-to-teacher ratio policy, designed to maintain quality across sites, enabled them the flexibility to employ additional staff, which could subsequently be used in the early year's space:

> I'm a bit lucky. I have [X number of] kids, as you know, and I have an FTE full time teacher equivalent of 12 and a half. So if I start doing the figures, I'm pretty good. I've got bodies everywhere. So in that because being a [school with primary school students], what happens is obviously an allocation for primary school. And then you get a standard allocation of six teachers for high school, so having six extra bodies, because I've only got [a small number of] high school students, it allows for some flexibility across my school. (Education Leader C)

Data were viewed as a facilitator to maintaining high-quality, evidence-informed processes. Following the Department guidelines for best practice was viewed by one participant as a useful strategy for quality improvement:

> I'm very data driven, I guess. So I use it a lot to inform. And I also try to stick as close as possible to the Department's best advice documents that they release around what best practices looks like, what the evidence and courses are around, if you're deemed a certain level of school, so an improvement level at your site, there are the things you should be working on. So I tried to just use those as much as possible. (Education Leader R)

Additionally, data were frequently drawn upon to inform funding applications, and therefore, assisted educators in ensuring their practices were supported by an evidence-based need:

> We have to pull them obviously processes first and documentation, but then data drove so much of that. And data drives so much of our money. Data drives our funding. So therefore we're not looking at data we're stupid because that's what drives what we get. (Education Leader L)

Discussion

This study explored if, how, why, and in what contexts elements of the PHA were integrated into school planning, as well as the barriers and facilitators of its use. The results indicated that each of the eight PHA elements proposed initially by Wilson et al. (2019) were, in fact, present for leaders and educators as they planned for children's academic achievement and wellbeing. However, the level to which the elements were implemented varied. This chapter contributes to the knowledge base on the applicability of the PHA for educators by providing examples of how each of the elements were applied at a school level.

From the results, three key themes emerged. The first was that having an understanding of how systems and early environments influence development allowed some educators to consider children's past experiences, plan for their learning, and collaborate with their peers in a more meaningful and impactful way. Second, the work was frequently underpinned by an understanding and use of data, both at an individual and population level. Finally, Department policies and strategic directions both supported and hindered educators' efforts to plan for children's needs. Providing sufficient hands-on support and resourcing should be a priority of jurisdictions.

Data use was a common thread and drove decision-making

Despite conversations focusing on different elements of the PHA and how these were integrated into school planning, data use underpinned a significant number of these discussions and generally acted as a facilitator to leaders' and educators' work. This finding supports recent work by Rickinson et al. (2022) which discussed the use of research on classroom practice as well as its benefits, including educator skills and confidence, school and system performance, and student attainment. Furthermore, data has been shown to support educators' collaborations, drive decision-making at the leadership level, and foster self-reflection on practices (Marsh & Farrell, 2015; Wayman et al., 2017).

These findings may be considered alongside structuration theory. This social theory suggests that an individual's autonomy is influenced by structure, which is maintained and adapted through the exercise of agency (Giddens, 1984). Within structuration theory, Giddens describes three components, structure, agents, and the duality of structure. Structures are the rules and resources that make it possible for similar social practices to exist to create a systemic form. Agents are groups or individuals who draw upon structures to perform social actions. The duality of structure emphasises that structure is both a medium and an outcome (Giddens, 1984). In essence, the structure can be both enabling and constraining for change. Within this research, this reflects the actions of individuals (agents) who were influenced to use (or not use) population data by rules (external conditions) or resources (material objects or people) (Stones, 2005). This distinction is demonstrated across the participants, whereby conversations with those who were more likely to draw upon population data in the form of the AEDC were supported to do so by their Department through access to one-on-one support, written resources, and funding. The duality of structure is visible through the actions of schools to shift outcomes, which are then reflected in planning documents and added to overarching priorities, thereby increasing the budget available to spend on generating change. This finding supports recent calls for data to be used more effectively to track children's trajectories and the impact of early investment, as well as to improve data-driven decision-making by reporting spending and outcomes for children across levels of government (Teager et al., 2019).

Socio-ecological model informed understandings

Through an understanding of the socio-ecological model, the ways in which children's development is influenced and acted upon at various levels often drove the work of the small number of participants who chose to engage with their communities. Several participants noted how their work had evolved to engaging more with the community and developing the skills of parents, which further supported children's ability to learn at home. This approach is supported by research by Teager et al. (2019) which shows that strong engagement in learning in the home environment can protect against the effects of poverty on children's academic achievement at school. This notion draws on concepts from Community Health Development (CHD), which emphasises improving the population's health status and building community capacity to address factors influencing health (Burdine et al., 2010). However, as discussed in the results, shifting educators' mindsets to see the value of working in this space beyond their usual work requires significant support from leadership, policy, and resources.

Policy impacted school directions

Department policies were discussed by participants as both barriers and facilitators to integrating elements of the PHA into their planning. For some, these agendas enabled their work as they provided funding and practical support to take on new approaches. This finding supports previous research, which found that departmental structures and agendas can have a significant impact on children's development through the way in which families access services, the support provided to the education sector, and the funding which is provided to focus areas (Archibald et al., 2011; Australian National Audit Office, 2017; Bauman et al., 2006).

It is evident from the data presented in this study that by adding the AEDC to the Department agenda, the focus of schools has simultaneously shifted to understanding the importance of the census and how they can work with communities to influence children's development in the time before they enter school. Without this priority and subsequent support from the Department, both financial and practical, it appears unlikely that schools would consider working so extensively in the early year's space. It is important to consider how policies are developed to address the needs of both children and educators. As many participants spoke of both the benefits and challenges that policy decisions brought to their work and their ability to support children's academic development, future research should consider how best to support this relationship and how educators' voices are considered in policy decisions.

Strengths and limitations

The research presented in this chapter possesses several strengths in both the design and the findings. One of the key strengths of qualitative research is the nature in which findings are collected and presented allows for a rich depiction of the participants' experiences. A variety of participant voices are present throughout the results, demonstrating rigour and transparency in the

research (Tong et al., 2007). Another strength of this research is that it explored the facilitators and barriers across the different contexts from which the participants were drawn, providing an opportunity to assess the approach's applicability in different contexts, which was previously identified as a gap in the research. As the two jurisdictions have significantly different structures and processes to support schools, confirming that elements of the PHA are present across both states is of great significance and will allow for a more nuanced understanding of the factors which may impact its applicability if integrated into the education system.

As mentioned previously, recruitment for this study was significantly impacted by the COVID-19 pandemic in Australia, which resulted in school closures and a restriction of research activities within schools. A desire to protect the time of their educators led to, in many cases, more leaders taking part in the research than classroom educators. As such, the results should be considered with this in mind and may be more reflective of the leaders' opinions overall. Additionally, as with most research, those who chose to take part may have been more willing to share their opinions due either to feeling pride in their work, or feeling they had relevant content knowledge to share. The inverse of this was reflected in recruitment in Jurisdiction A, where many school staff chose not to participate as they did not believe they had enough knowledge of either the AEDC or of data use within the school. Finally, recruitment facilitated through Jurisdiction B's Department for Education may have had an impact on the results. Although schools were selected from a range of areas and with varying levels of AEDC data use, there is the possibility that schools were nominated due to their already existing relationships within their regions.

Implications for practice

The study sought to understand how elements of the PHA were integrated into school planning, and to identify the barriers and enablers to doing so in order to support children's learning. The short-term benefits of this work include an increased knowledge of how sites and schools presently plan for children's learning and development, and using data to understand and respond to factors that impact upon their learning. Additionally, understanding how policies support and hinder work with data, families, and the community is vital in considering whether the PHA can be applied across settings.

In the longer term, the results from this research could be used to inform future support and resources for sites and schools. Knowledge of barriers and enablers for effective data use can contribute to an understanding of what resources schools need to utilise data. Appropriate resourcing is likely to enable more schools to use data on children in their communities to inform their planning for quality improvement, curriculum delivery, and community outreach. Increased use of population data in the education sector could contribute to reducing later inequities by helping sites and schools reach more children with high quality, accessible educational opportunities in the early years.

Importantly, this study supports integrating these elements into the school setting and suggests that doing so remains advantageous for leaders and educators. Future research should explore whether applying all elements of the PHA is necessary to see improvements in children's development or if simply engaging in some of the practices would be sufficient.

Conclusion

This study has sought to identify how elements of a PHA are integrated within educators' planning, and to outline the barriers, facilitators, and benefits of its use. Twenty semi-structured in-depth interviews with leaders and educators across Jurisdiction A and Jurisdiction B revealed that state and federal policies acted as both barriers and facilitators to implementing the PHA within schools as they provided funding, strategic and practical support, ensured accountability and facilitated collaborations across sites. However, policies in some cases did restrict how sites were able to address the social and emotional needs of children, as their time and subsequent reporting required a focus on literacy and numeracy. Data-informed decisions and priorities, and the work of leaders and educators across jurisdictions, underpinned the application of the PHA in schools. A shift toward understanding how early prevention can affect children's later development, and the impact which schools can have as key places of learning for families and the community, remains of critical importance; however, to achieve a more holistic integration of the PHA in the school system, support from state Departments in the form of resourcing and local champions are required as this is more likely to lead to long-lasting results (Rothman, 1996). Future research should consider how best to support the relationship between educators and policy-makers, investigating how educators' voices are considered in policy decisions to support collaboration between the early years sector, families, and communities.

Chapter summary

This chapter has discussed the extent to which the PHA is used education planning across two Australian jurisdictions is variable and haphazard. The barriers and facilitators of each element of the approach have been discussed, alongside a consideration of health promotion and social theories.

The findings presented in this chapter build upon the theoretical understanding of how the PHA could be integrated into education presented in Chapter 2 and Chapter 3, and move to an applied understanding of the approach and its strengths. This research identified key policy supports such as funding and a department-driven priority with clear articulation within educational policy are required for schools to work through a proactive, collaborative approach. Additionally, schools need to be supported to build capacity around data use and collaboration with the community. These findings identify where future research is required to understand how such policies are developed and educators' voices considered.

In the next chapter, the researcher aims to understand how policies are developed across the two jurisdictions and the extent to which educators and families are considered in the process.

CHAPTER 5. PERCEPTIONS OF POLICY ACTORS ON POSITIVELY IMPACTING CHILD DEVELOPMENT THROUGH POLICY AND COLLABORATIVE PARTNERSHIPS

Introduction

Interviews with school staff, presented in Chapter 4, identified that integrating a population health approach (PHA) in education required significant support from state and federal policies and strategic support and resources. School-based participants articulated a critical consideration in applying the PHA in the school setting through shifting educator mindsets to apply better knowledge of children's early experiences in the many contexts of early childhood to the school setting. Two ways in which schools can be supported to apply PHA principles are through capacity building around data use and collaboration with the community. Interviews with school staff identified that these areas require support and clear articulation within educational policy to be enacted. If these were more broadly applied in schools, they could generate significant gains in financial and social investments (see Chapter 4).

While interviews with school staff identified a potential to shift practices in schools to make active use of a PHA, it should be noted that little is known about the views of policy actors on the PHA and whether they identify a similar need to support schools through this approach. Given that policy actors play a crucial role in developing supports for schools and setting and actioning school planning expectations, it is important to explore these themes from the policy-maker's perspective. As such, this chapter aims to explore the ideas of policy-makers around the PHA, particularly the use of population-level data sets such as the Australian Early Development Census (AEDC). Additionally, this chapter explores how policy priorities are determined, how these are communicated to the public education sector, and how collective action by policy-makers can generate change.

Aims

This chapter presents the findings from a study that sought to explore policy actors' perceptions in two Australian education departments on the importance of improving child development and the factors influencing the development and uptake of initiatives.

Methods

Theoretical framework

Grounded in a constructivist paradigm (Crotty, 1998), the chapter will challenge the current reality and assumptions, and the power relations, within society, specifically of those in policy-maker positions in two jurisdictions in Australia. The constructivist approach was considered the most appropriate as it seeks to understand and interpret what the subject is thinking (Kivunja & Kuyini, 2017). In this study, the approach seeks to understand how policy-makers interpret developing policies and allocating resources for the education sector, which ultimately support children's early development.

The interview questions used in this study were developed based on the Advocacy Coalition Framework (ACF) (Sabatier, 1988). The ACF was considered an appropriate framework to guide the work because it was developed to analyse the complexities of public policy-making and how policy agendas change over time (Sabatier, 1988). The framework discusses interactions across policy sub-systems, including how external events affect policy change, short-term constraints and resources, long-term coalition opportunities, and stable parameters (Sabatier, 1988). In the context of school systems, this can assist with understanding the interplay between priority issues and the development of policies and programs that address the issue. The ACF assumes that people actively involved in policy-making are politically oriented and have a set of beliefs they seek to convert into policy action (Sabatier, 1988, p. 131). They also hold a core set of beliefs shaped by research and professional experience that align with one or more coalition groups, including deep core beliefs, policy core beliefs, and secondary aspects. Coalitions contain actors from many levels and types of government, each with competing and cooperating sub-systems (Cairney et al., 2021). The framework assumes that sub-systems can be disrupted by external events such as demographic change, a global recession, or an environmental crisis (Sabatier & Weible, 2007). The framework describes and explains the complexities of the policy-making environment. It may also assist with understanding and determining how changes in policy and planning documents can occur, ultimately resulting in research that provides more relevant suggestions for government practice.

Recruitment

Participants were selected using purposive sampling methods as it was essential to identify those who were working on and had influence over the development of policy and planning documents for education (Palinkas et al., 2013). These individuals were identified through the PhD researcher’s known networks within the South Australian Department for Education and the Queensland Department for Education until data saturation was reached. These networks were formed during the researcher’s work as a research assistant in a not-for-profit team in South Australia and were maintained throughout the candidature because of successful working relationships. Participants were initially approached via email with an invitation to participate and followed-up via a phone call to determine a suitable time for the interview.

In all, 24 individuals representing the total number of potential participants were invited to participate in the study, with 11 from central offices choosing to proceed with the interview. Reasons for non- participation included, being too busy (n=3); did not feel they were able to provide suitable insight (n=3), and no response to follow-up (n=7). Interviews were conducted with 11 individuals across South Australia (n=4) and Queensland (n=7) who could speak to policy development within education departments to investigate the potential to integrate successful PHA factors into system- level supports. Due to the number of participants in each jurisdiction, a summary of participant characteristics, such as gender and position, was deemed inappropriate as it may risk re- identification.

Ethics approval was obtained from the Flinders University Social and Behavioural Research Centre (#8470), the South Australian Department for Education (#2019-0048), and the Queensland Department for Education (#550/27/2282).

Development of interview questions

Interviews followed an open-ended question framework based on the elements determined by the author in Chapter 2 and Chapter 4, which have been established as required for implementing a PHA using population-level data and improving children's developmental trajectories. These included state and federal policies acting as both barriers and facilitators to implementing the PHA within the school; data-informed decisions, priorities, and work of leaders and educators across jurisdictions; schools acting as critical places of learning for families and the community; and system support from state departments in the form of resourcing and local champions. In addition, the ACF was used to guide the development of the interview framework (Sabatier, 1988). ACF constructs of coalition beliefs, policy sub-systems, external events, and policy outputs and impacts were captured in the interview framework to understand policy-makers' perceptions. A copy of the interview questions can be found in Appendix Q.

Data collection

The interviews were solely conducted by the PhD researcher between November 2020 and January 2021. To minimise the burden on participants' time, all interviews were conducted using video-conferencing software familiar to the participant, such as Zoom, Microsoft Teams, or Skype. Before the interview, informed written consent was obtained from each participant. Interviews lasted from 36 to 64 minutes, with most taking approximately 1 hour. Interviews were audio-recorded using the in-built recording feature of the chosen software. An additional recording was made using the researcher’s phone in case the original recording failed. Detailed field notes were also made during the interview. The audio was transcribed verbatim after the interviews using Otter AI software and Rev Transcription services. Transcriptions were checked for quality, and adjustments were made where required.

Analysis

The first stage of the analysis involved becoming familiar with the transcript before commencing the formal analysis (Ritchie, 2002). This process involved the researcher reading the transcripts and taking detailed notes. NVivo 12 software was then used to analyse the data thematically following an inductive approach. The researcher developed themes (nodes), drawing links between the data (Clarke & Braun, 2017; Crotty, 1998). From this, patterns across the codes and interviews were identified and reviewed, which ultimately made up the key findings of the research. Validity was improved through the process of coding, as the results were grounded in the data through quotes from the participants. To improve the reliability of the results, the coding framework was shared and discussed with the supervisory team as multiple stages throughout the analysis.

Transcripts were not provided to the participants to review, as the researcher believed that this might lead participants to change their responses, resulting in valuable data being lost (Mero-Jaffe, 2011). Participants were invited to contact the researcher if they wished to alter or retract any of their responses following the interview; however, no participants chose to do so at the time of submission.

Results

During the analysis, codes were generated based on the data derived from the participant interviews. Upon further consideration, it appeared as though the emerging themes aligned more closely with Shiffman's and Smith's framework for policy development than the ACF. Shiffman's and Smith's (2007) framework focuses on why particular global initiatives receive more traction and priority over others. When applied to this research, Shiffman's and Smith's framework assisted with an understanding of why some policy decisions received more attention and were subsequently implemented into the education system. Similarly, this framework led to a consideration of how educators' and communities' voices were incorporated into the planning process, and the influence policy actors had over departmental change. Therefore, the results presented herein are provided using the Shiffman and Smith headings:

- Actor power – This element addresses the force of the 'individuals' and 'organisations' concerned with addressing children's development at a policy level. Key factors include policy actors who are linked by their concern for the issue (policy community cohesion); specifically leaders who act as champions for the cause and have credibility within the collective (leadership), and institutions (guiding institutions) and 'civil society mobilisation' that add strength to policy efforts (Littleton et al., 2021; Shiffman & Smith, 2007).
- Ideas – This element describes how those involved in education policy development understand and portray the importance of early intervention for children's development. It includes factors of 'internal frame' and 'external frame'. These relates to how policy actors frame the issue to gain support, how these ideas resonate with those who make decisions,

the included content, and how resources are allocated (Littleton et al., 2021; Shiffman & Smith, 2007).

- Political context – This element refers to the environments in which actors operate, including moments when political conditions and public opinion align favourably (policy window) for a holistic, early intervention and collaborative approach, presenting opportunities for advocates to influence decision-makers. This also allows federal and state governance structures operating in the education policy space to provide a platform for effective collective action on children's development (global governance structure) (Littleton et al., 2021; Shiffman & Smith, 2007). For this chapter, the Shiffman and Smith framework was adapted to focus more on state and federal policy agendas, but also included global initiatives where relevant (Littleton et al., 2021; Shiffman & Smith, 2007).
- Issue Characteristics – This element refers to the features of the problem. It includes assessing the severity of the issue compared to other issues (severity), ascertaining the scale of the problem, and identifying the existence of effective interventions acceptable to government (credible indicators) (Littleton et al., 2021; Shiffman & Smith, 2007).

Each of these factors contains sub-factors that shape the political priorities. These factors will be discussed alongside the results below to provide context and additional meaning to the results.

Actor power

Policy community cohesion

The first factor of the Shiffman and Smith (2007) framework, *Policy community cohesion,* discusses how communities that can agree on issues such as 'how the problem should be solved' are more likely to acquire political support. This results from political leaders being more likely to recognise and listen to voices in agreement, as these signal authoritative sources of knowledge (Shiffman & Smith, 2007), than voices in disagreement that provide less certainty for those shaping policy.

These communities can include prominent leaders in government, non-government groups, academics, and international organisations. However, one participant discussed the role of national organisations in driving policy agendas in education, and the emerging importance of using evidence in practice. In the quote below, the participant describes the role of national education groups in informing policy discussions:

> We now have a national evidence institute, which is called the Australian Educational Research Organisation, So that's a fifth piece of national education architecture. Their policy brief is around evidence. So we are having lots of conversations with them … (Participant H)

The same participant discussed how these conversations had been driven by federal investigations and reports, which have forced them to collaborate with other sectors in their work:

> Through the Alice Springs declaration, and also by both the Gonski report and the Early Years equivalent … cross-sectoral collaboration and cooperation [is now] firmly on the agenda. (Participant H)

These comments reflect an alternative view of how organisations mobilise the necessary support from national political authorities and how these practices may translate to work with grassroots organisations.

Leadership

Factor 2, *leadership* refers to the presence of individuals capable of raising awareness and mobilising resources, and who are widely acknowledged by the community (Shiffman & Smith, 2007). Few such individuals were discussed in this chapter, with actors focused more on the attributes which were common to those who had shifted their mindsets and were able to see the importance of early investments for children's later development, as outlined by the policy actor below:

> It's probably really their why, like why they're in that position. And that's where you see, their why is grounded in children, in their students and in that wellbeing, that's probably the common thread. Where it's not just about the academics and the results. And then understanding that for children to succeed, it's that holistic development and it doesn't just start day one of prep. It starts so much more than that. (Participant B)

However, one participant noted the influence of principals in their community, as shown in the quote below. The participant reflected upon the challenge in shifting the thinking of existing organisations in vulnerable communities to implement place-based approaches, and instead, described efforts to work with principals who could initiate such an approach.

> To try and get [organisations] to shift their thinking, actually was too hard. So we then pulled back and went back to the people that we knew we could influence most and that was our principals in those schools. (Participant D)

The recognition of school principals as respected leaders within the community, able to provide strategic direction for initiatives, is important in considering how policies are developed and enacted in the future to ensure a suitable approach for addressing the community's issues.

Guiding institutions

Strong guiding institutions are recognised as organisations or coordinating mechanisms with a mandate to lead on the issue (Shiffman & Smith, 2007). Typically, these are organisations with a focus on the issue, such as the United Nations Children's Fund (UNICEF) or the Children and Young People's Commissioner (Baum et al., 2018). However, within this chapter, schools were considered to be these strong guiding institutions, as their sphere of influence was both families and other schools. Families recognised them as being the leading organisation in their community, focused on supporting children's holistic development. The quote below demonstrates how schools provide advice to, and are seen to have a strong influence on, families:

> It's about who do families trust and go to for advice … And I know it's all at different levels of influence, but I think [schools] have a stronger influence - The next strongest influence outside of family and their networks. (Participant F)

In addition, schools that have successfully integrated alternative approaches to address children's vulnerabilities have been used to support and encourage other sites in their initiatives. As shown in the quote below, policy initiatives can be better received when a school has already observed the effects in a site similar to their own:

> I think if I can see a similar school down the road where it's worked well, then they're more likely to take it on board, then for me [as a policy actor] to go out and go, "This will work." It's that peer [model]. (Participant D)

Although this may not align with the traditional concept of what constitutes a guiding institution, Shiffman and Smith (2007) outlined that it would be short-sighted to discount the influence that schools have on families and their communities regarding children and their development.

Civil society mobilisation

Factor 4, *Civil society mobilisation*, refers to how organisations have mobilised the necessary support from national and international political authorities (Shiffman & Smith, 2007). Linking to grassroots organisations in civil society is more likely to generate political support than if such activities are confined to the members of a policy community (Shiffman & Smith, 2007). Participants did not explicitly discuss grassroots organisations; however, they did discuss strategies to improve child development and that the strength of addressing the issues was based on the community's needs, as shown by the quote below.

> What we're finding is that the ones where the strategy emerges from the ground up are stronger than the ones where it's superimposed on. (Participant D)

Generally, stakeholders included school leaders, families, local and state governments, and local organisations who came together to advocate for and address a need within the community. The idea that everyone in the community is responsible for the children who live there motivated this collective action and facilitated the work on the ground, as discussed by the following two participants:

> If everyone in their community believes in the children, this work becomes almost seamless. It's just like waving a magic wand. It's just amazing watching people come together. (Participant D)

> I think that perspective that these are our kids is really important. So that shared responsibility, not only from a science perspective, but from a community perspective that, you know, the village raising the children sort of idea that we all have a part to play in that. (Participant A)

Despite participants in this study being employed only by state government agencies, it was clear that they identified a priority of improving children's academic and wellbeing outcomes through working with communities. These comments reflect an alternative view of how organisations mobilise the necessary support from national political authorities and how these practices may translate to work with grassroots organisations as a result.

Ideas

Internal frame

The internal frame, is how the policy community agrees on the definition and causes of, and solutions to, the issue (Shiffman & Smith, 2007). In this chapter, participants generally spoke of their understanding of the issues as a collective government unit rather than as individuals, reflecting the clarity of purpose in the Department for Education. Overall, they reflected a high understanding of the importance of early investments to address children's vulnerabilities. As shown in the quote below, there has been a shift within the Department to engage families in their children's learning journey to increase their access to high-quality early childhood education.

> I think the influence of Government has really strongly driven some of our shift in the way we're responding to developmental vulnerability of really highlighting pathways, learning pathways. And for that to be about opportunities for families to engage in early learning in ways that they're engaging with their children. It's about access to formal approved services. It's about quality of those services and then it's about what that looks like in schooling. (Participant F)

An understanding of need was discussed as being driven by systems, such as their early childhood data sets, which measure early literacy development, which then supported their attempts for funding within the Department:

> [Our work] would be mostly driven by a systems-identified need. [Such as the data provided by our state assessment tool allows us] to monitor children's literacy development in those early years, because it's a very important aspect of their ongoing success and learning. So as a system, we would put that up [in a meeting] and go "with the funding that we have available to us we think this is an important piece of work." So we would fund that piece of work. (Participant E)

Overall, it appeared that the participants were in agreement that systems and early investments could drive potential solutions for improving children's development and learning. This demonstrates a shift in internal frames. Children's early development prior to school was discussed as a priority area within an education system that has been historically focused on children once they start formal schooling at age five rather than in the early years. This revised internal frame makes it possible to shift focus, investments, and monitoring of impact.

External frame

With a sturdy internal frame established, effective policy communities are united through an *external frame*, which portrays the issue in a way that results in action by essential individuals, organisations, and political leaders (Shiffman & Smith, 2007). One approach discussed by the participant below was the use of data to tell the story of the issue that positioned the problem as one that needed to be addressed by policy-makers and was experienced by those living in the community.

> We've worked a lot with [two professors] in the region, and our big thing is always data, but it needs to be contextualised down through the voice of children, families, educators, the people with the lived experience. (Participant E)

It was important, however, to link this work back to policies that were easy to understand and which would demonstrate the impact of the work on the issue as a whole. The participant below described how their state had linked the work to federal initiatives in promoting the importance of the work and generating support from schools:

> A lot of what we've been doing is actually bringing that link back to the bigger picture policy for [the state] or the declarations, such as Melbourne Declaration or Alice Springs … And bringing it back to some of that higher arching policy, to try and get that buy-in and that through line. So they understand, "Well actually this piece here links to these next two pieces of the policy line." (Participant C)

Once the policy was developed, using appropriate terminology in messaging was regarded as particularly important to ensure that schools understood the policy and its implications, as outlined below:

> But that terminology … really resonated with schools. I know a lot of people in early childhood research or outside of the Department go, "Oh, that's a terrible term." And they don't love it, but for some reason it really connected with the schools. So it's been great. (Participant F)

It is essential to recognise that not all approaches will resonate with the intended audience; however, connecting through various strategies may allow policy actors to reach communities in a way that aligns with the strategic priorities and actions of their context.

Policy environment

Policy window

Policy windows provide opportunities for political momentum when a global community favourably aligns with an issue. These moments present advocates with opportunities to reach national and international political leaders (Shiffman & Smith, 2007). Although policy actors may not have much control over these factors, Shiffman and Smith (2007) suggest they should still be considered if they wish to develop effective strategies to address the issue. Participants in this chapter did not mention any national or global policy windows.

Global governance structure

Global governance structure, discusses how norms and institutions operating in a sector provide a platform for effective collective action. This usually includes laws, declarations and treaties, and the institutions that negotiate and enforce them (Shiffman & Smith, 2007). Within this chapter, this included the policy actors themselves as employees of their state education department.

Several national priority areas that supported the departments to align their programs to address the issue of children's developmental vulnerability emerged during the interviews. One participant spoke of how there had not been any recent political agendas that had influenced their work between 2008 and 2019 when the Alice Springs Declaration (2019) was released:

> The last significant impact I think was 2008 with the Melbourne Declaration, the National Curriculum, John Howard, the National Reporting Guidelines, that kind of thing that was a big

> change. But since then, they've had The Melbourne Declaration, that there was a big one, through to the Alice Springs Declaration last year, but [aside from that] not a lot of big policy change. (Participant K)

Another participant focused instead on federal priorities, noting the AEDC, universal access to early childhood education, and the Australian Curriculum as areas that influenced their work at all times:

> We also clearly participate as a jurisdiction in federal priorities, like AEDC, like universal access, like anything that happens, Australian curriculum implementation. All those national priorities as well influence what we do. (Participant E)

Participants discussed several ways in which the Government, its agencies, and the education sector worked collaboratively to generate change for the issue of child development. One such example is from a participant who described a systematic approach that stemmed from a state policy to support community partnerships. The strategy was facilitated by Department employees, which supported sites to understand their AEDC data and develop a response suitable for their community:

> We have also with the Department of Education partnership facilitators, and their work predominantly is to work with the [state strategies] [which] come from policy, and to be able to support community partnerships, basically, to drive that work forward. They do a lot of work with clusters unpacking the AEDC data, which I've been involved in, and in the partnership between the schools and the community. (Participant C)

The same participant described the shared responsibility of the partnership between a school and their community in department-led networks to generate action:

> We have got health and early years services and other community organisations nested in those networks. So it doesn't necessarily have to be the responsibility of the school to lead that network. (Participant C)

Although no global initiatives were discussed, it is clear that the work of these policy actors was closely aligned to federal policies and was likely to be significantly influenced by any changes in these priorities. There is evidence of a shared focus on children's development by participating policy actors to enact policies at a local level in the conversations.

Issue characteristics - Characteristics of the issue

Credible indicators

Credible indicators are clear and measurable and can trace the severity of, and the process involved in, and are thus more likely to generate political support, as policy actors can obtain more information about the progress of the issue (Shiffman & Smith, 2007). In this chapter, children's holistic development in Australia is discussed as a clear priority and has been informed by various data sets, including the AEDC. The participant below describes the breadth of data available to policy-makers to inform their understanding of child development in the state:

> Our data sets are broad, so we have data that we can pull directly from ACECQA, and so we've pulled that data in together. We pull in our [school data] … we pulled together then our population data, and that's at the moment where we pull it from, different sources. So, we pull, obviously, AEDC, we pull ABS census data … (Participant F)

The AEDC was mentioned as providing a set of significant indicators for informing policy as it allowed governments to identify vulnerabilities and monitor changes over time. These data have also supported education departments on the ground to understand needs and to shift their mindsets to a more proactive approach, as outlined by the quote below:

> From when I started to now, [I've seen] a significant change in the mindsets of our schools and in our early childhood services around early childhood development. I think the AEDC has contributed to that significantly. It's highlighted the importance of early childhood but it's also given a lot of robustness behind that research to say, "well, actually this is what's happening within your community, this is the data." (Participant B)

Furthermore, the data set has allowed department staff to work with schools to understand how the vulnerabilities of the children will affect their learning trajectories and, as a result, improve their transition practices:

> We've been really working with schools around putting the face on the data. That these are actually children. And these children will potentially transition to your school. We then worked with them to understand the impact of that. If children don't successfully transition to the school, children start school developmentally vulnerable, that learning trajectory. So I think AEDC, we have used it as a school, to really advocate and raise awareness of early childhood development. (Participant B)

From these interviews, there are clear, credible indicators used with the policy departments to understand areas where vulnerabilities in children's development need to be addressed to generate political change in response.

Severity

Severity described how problems with a large burden relative to other issues are more likely to generate political support, as policy-makers perceive them as being more serious and requiring attention (Shiffman & Smith, 2007). The importance of child development and early investment was already well established as a priority area prior to commencing the interviews, and this was reflected by each participant in the results already discussed.

One participant did, however, discuss how their Department focused their action on improving children's wellbeing based on their AEDC data and a high level of vulnerability compared to other states:

> We were in the situation of looking at our AEDC data. And then, going as a state, we have, I think, the second highest percentage of vulnerable children and families. So the Government was keen to reduce that vulnerability, or we spin it around and say improve wellbeing prior to school. (Participant E)

This quote demonstrates an additional way in which policy actors understand the severity of an issue and how their situation compares to other states. High levels of vulnerability in relation to other states appear to be a significant motivator for addressing the issue.

Effective interventions

Effective interventions refer to the extent to which the proposed means of addressing the problem were clearly explained, cost-effective, backed by scientific evidence, simple to implement, and inexpensive. Interventions that addressed issues and met these criteria were more likely to receive political support as they were seen as simpler to address to achieve targets (Shiffman & Smith, 2007). The factors affecting child development are complex and interconnected, and as such, addressing these issues is challenging (Bronfenbrenner, 1986). However, as discussed in the results already reported, the need and will of governments to shift children's outcomes have already been established. Therefore, discussions around effective interventions focused more on what could be done to shift outcomes rather than whether this was an issue worth addressing.

Participants spoke of how the most successful approaches involved drawing on the influence of the school to support families and their children. The strategy, outlined in the quote below, requires a sound understanding of the needs of the children, a collaborative approach, and a shift in mindsets of the school beyond their usual work:

> I think I've seen the most successful kids when it's been a whole site relationship right through who have wrapped around a family, wrapped around a young person, that's where I've seen the most success. Sometimes it is wider community stuff. One of the schools here very much embraces that community mindset, where they have bit of a community hub of a school. (Participant G)

Actors discussed how they identified potentially useful approaches through collaborations with other states and adapting existing models for their context:

> It came as a result of a visit by senior officers to [another jurisdiction]. [The jurisdiction] had made significant gains [in addressing their AEDC vulnerability levels], so senior officers went over, had a look at what programs were on offer, and one of them was [redacted]. So then the officers came back and said, "Well, let's do a pilot of a similar program [in our state]." So we basically adopted the [jurisdiction's] model in terms of its allocative model, its intent, things like staffing hours, that sort of thing. But I suppose what we did was we fleshed out a lot more in terms of the support for schools. (Participant E)

One key challenge associated with shifting children's outcomes using evidence-based practices is that these often take longer than what is funded for by government departments. The participant below described how this created tension and discussion with their Department:

> [The program is] funded for two years, but we know that all research shows us place-based approaches take 10 years. So that's one example and that is a bit of a tension in the team and we have quite a fair bit of discussion around that. (Participant B)

Similar challenges were faced when working with schools. Several participants spoke of how they understood the importance of early investments and recognised that it might take time for schools

to see the impact of their investments. The participant below described how recognising the short-term effects of family engagement can be encouraging for schools:

> There's so much research behind [community collaborative action], that show that evidence is, that there is a lot of value to that. But I think the schools, and again, you may not necessarily see the actual impact of that for a number of years, but in terms of the short term, I think schools are seeing that they have more family engagement, which is big for a lot of schools. (Participant B)

Overall, the investment was supported by policy actors who understood the longevity of early childhood experiences and the impact the support would have later in life. Several participants recognised the significance of positive early learning experiences and the protective factors of community collaboration, as described in the quote below:

> So that's where I think you see that connection with community and the community seeing it as their school, particularly in an area where some parents might not have had good experiences at school in the past themselves and may have a negative mindset around school. That I think helps to bridge that gap and bridge that negativity, and bring them to the school and bring them closer, which we know is a really big protective factor for our kids as well. (Participant G)

Finally, the importance of evidence-based interventions was discussed, as actors considered the role of policy in maintaining accountability within communities. In the quote below, the participant described how community engagement practices needed to be supported by Department policies to ensure they were evidence-based and would improve outcomes for children in the long-term:

> But then there's a part where sometimes [community engagement] can go on forever without any outcomes. And I think sometimes then a little bit of balance of a bit of top-down and a bit of bottom-up does come together quite nicely. Community-based driven and ground up, but actually at some point has to meet a bit of top-down that there's some accountability built into that. There's some evidence-based built into that because otherwise we might just have fishing clubs everywhere on a hope and a dream that that'll make a difference for children. (Participant F)

Overall, there was a resounding understanding of the importance of evidence-based practices in developing effective interventions for improving children's development. Policy actors drew on existing programs and community collaborations to shift outcomes, although they recognised that these approaches require long-term investment and tracking to see improvements.

Discussion

Major findings

This chapter has explored policy actors' perceptions of the importance of improving child development and the factors influencing the development and uptake of initiatives. Overall, there was resounding support for early investments in child development, with all participants understanding the impacts of policies on educators' practices and children's developmental trajectories. Furthermore, the findings show that schools can play an essential role in supporting families holistically, and principals can act as influential leaders within the community.

Schools can act as community hubs

Schools were identified as influential places which could be used as hubs to encourage families to engage with children's learning. Recent research supports the concept of using schools as community hubs, suggesting that doing so can have a positive impact on attendance rates and parental engagement and encourage different ways to meet the needs of children (Epstein & Sheldon, 2002). Across Australia, government departments are implementing various strategies that work on the understanding that schools can have a significant influence on families' health and children's learning. In 2014, the South Australia Department for Education committed to government schools acting as hubs for their community to strengthen relationships with community members, families, children, and young people (Press et al., 2015). Within this strategy, the Department suggested that schools consult with their local stakeholders to develop an approach that works best for the needs of the school and the community and shares responsibility for achieving joint goals.

Recently, the Learning Environments Applied Research Network (LEaRN) hosted the Schools as Community Hubs International Conference, formally recognising the significance of the approach and providing researchers and community stakeholders with an opportunity to share their learnings from implementation (The University of Melbourne, 2020). Framing a conference for schools around the concept of community hubs further demonstrates the positive impact this strategy has at the ground level and the opportunity for it to be integrated into more educators' and policy-makers' decisions.

Principals are influential leaders

Additionally, principals were discussed as strong community leaders who can drive initiatives and change for the whole community. Principals have been noted as influential leaders in the community in research by Kladifko (2013), who found that they played an essential role in connecting with families to understand their needs, drive community partnerships, and advocate for government on behalf of families. These findings are supported by Rothman (1996) research which found that work driven by local champions rather than outside organisations, based on the need of those in the community itself, has been shown to be more successful in generating change.

In practice, principals often act as the connection between educators and policy-makers, and therefore play a crucial role in implementing policies, setting strategic goals, and dispersing resources. Therefore, having policies and consistent messaging from the Department, which support principals to act in a way that can address potential developmental vulnerabilities in children at their school, is vital for generating change (Van Engen et al., 2019).

Evidence-informed practices are supported by data

More recently, there has been a push for both government and school sectors to use evidence-informed practices (Clinton et al., 2018). However, research suggests that using research and

evidence to improve practice is complex and skilled work, which requires thoughtful engagement and appropriate evidence (Allen et al., 2021). Schools are also increasingly encouraged to focus on the child's holistic development, resulting in approaches that build social and emotional competencies, positive relationships, and wellbeing alongside literacy and numeracy competencies. This relatively new way of working requires educators to shift their practice and policy development (Kidd, 2020).

Within this work, where educators are using data to consider the holistic development of children, the AEDC is recognised as a valuable data set. The AEDC provides an insight into children's vulnerabilities and potential opportunities for prevention. The longitudinal data also allows for tracking of improvements over time which could be drawn upon to inform future policies and initiatives. This shifting of mindsets plays a critical role in facilitating educators to apply elements of the PHA. It requires many educators to go beyond what they are accustomed to doing to consider how children's past experiences can be supported inside the classroom and outside the school gate.

Missed policy windows

The significance of improving children's development is clear and continues to be a focus locally, nationally, and internationally. However, one aspect of the Shiffman and Smith (2007) framework that the participants did not discuss was 'policy windows', the idea that there are moments when global conditions align favourably for an issue. Addressing inequities is a requirement of governments, as suggested by the Convention on the Rights of the Child (1989) and the WHO Sustainable Development Goals (Lee et al., 2016), and investment in these areas has been committed to by the Australian Government. Although these global frameworks were not explicitly mentioned in this research, it appears as though governments, sites, schools, and communities are working together collaboratively to achieve their goals of reducing inequalities (UNICEF, 2019).

Strengths and limitations

One of the key strengths of this chapter is the unique way in which the voice of policy-makers has been captured and presented using participants' quotes in the results. This provides a transparent account of the interviews and perspectives of policy-makers. Additionally, various policy voices have been captured in this research from multiple levels of government and a range of departments. This cross-section has provided an opportunity to understand the perceptions of the jurisdictions as a whole while also capturing individuals' voices.

A limitation of the research is the modest sample size and the number of participants recruited from each jurisdiction. Recruitment for this study was difficult due to the COVID-19 pandemic, as policy-makers adjusted to working remotely while also responding to swiftly changing educational contexts. It was particularly difficult to recruit suitable participants in one of the participating jurisdictions despite support from the Department for Education. Conversations with potential

participants reflected some hesitation to be interviewed due, in part, to a perceived lack of knowledge about the AEDC. Many declined to participate despite assurances that the questions were not specifically centred around the data set. Further research could investigate perceptions across Australia's jurisdictions to understand how motivations differ based on political priorities or personal backgrounds to understand further how policy decisions are made and priorities decided.

Implications for practice

Upstream investments which address the root cause of the issues have been shown to be more effective in generating a return from investment and preventing further inequities (Braveman et al., 2011). Policy-makers are in the most advantageous position when considering intervening upstream, as they can reach large numbers of educators and, subsequently, children and families with their initiatives and resourcing. This research suggests that the policy-makers interviewed in both jurisdictions were familiar with the body of literature that supports such early investment, and where needed, prevention is likely to shift children's later life outcomes. Although this work is likely to take longer to generate change and is costly to initiate, it is encouraging to see a commitment to these practices concerning children's holistic development. This research has identified useful strategies for enacting policy in practice and has recognised the thought processes which drive policy priorities. As such, it has enabled a greater understanding of how stakeholder voices can influence policy and how schools can collaboratively work with governments to improve academic outcomes for children.

Conclusion

This chapter sought to understand the factors underpinning policy development, the significant initiatives that received attention, and overall, the importance of investing in child development from a policy actors' perspective. Virtual interviews were conducted with government employees in two jurisdictions in Australia. Shiffman’s and Smith's (2007) framework for understanding policy priorities was used to interpret the results, which demonstrated a strong focus on improving children's development through work with schools and principals and supporting the use of evidence-informed practices. The focus on early investments in policy and support for schools on improving later life outcomes is understood to have a significant positive impact on children's academic and social outcomes.

Chapter summary

This chapter has provided an insight into how policy initiatives are developed and given priority and how these were then supported in practice across two jurisdictions. There was a clear understanding of the importance of child development and the Government's support to address vulnerabilities in both jurisdictions.

Although this chapter did not specifically seek to understand policy actors' perceptions of the PHA, many of the items discussed aligned with the approach, further building on the idea that applying a PHA to education would be useful and supported from a policy perspective. These findings have also endorsed the integration of the approach into education. There is clear support for collaboration with families and across sites, evidence-informed practice, monitoring progress over time using data, and planning using population data sets to understand children's past experiences. More explicit links between this research and the PHA elements will be drawn in the discussion in Chapter 8.

However, it is essential to consider whether the PHA would be of benefit to children's academic success and wellbeing. Therefore, the next chapter will use linear regression modelling to apply the PHA to schools identified as performing above or below expectations on the Year 3 NAPLAN, to explore whether schools utilising more elements of the PHA are seeing better academic performance outcomes measured by standardised measures for their children.

CHAPTER 6. EXPLORING HOW SCHOOLS CAN INFLUENCE CHILDREN'S ACADEMIC ACHIEVEMENT IN THE EARLY YEARS – A SECONDARY ANALYSIS TO IDENTIFY SCHOOL SITES FOR FURTHER INVESTIGATION

Shift in terminology

During the interviews with policymakers in Chapter 5, there was some confusion around the term ‘health’ in the PHA as there were few links to health. As such, the candidate determined it was most appropriate to adjust the phrasing used in subsequent studies to Population Approach (PA).

Introduction

This chapter reports on Study 6, where a linear regression was conducted using linked data from 430 schools across South Australia. The aim was to identify schools whose students performed better or worse than expected on NAPLAN in Year 3, based on their Australian Early Development Census (AEDC) results in 2015, which could be used in further exploration in Chapter 7 (Study 7). Firstly, the process of obtaining the data is described, and a brief overview of the data set is provided. In the next section, the choice of quantitative methodology for this study is discussed, followed by an outline of the methods, sampling, and data extraction. Finally, the data analysis process is described, and the findings presented.

Context on school assessments

There has been significant interest and investment in national standardised literacy and numeracy testing over the past decade. The National Assessment Program Literacy and Numeracy (NAPLAN) provides ongoing monitoring of educational attainment for children in Years 3, 5, 7, and 9. NAPLAN consists of a series of child completed tests that assess reading, writing, spelling, grammar and punctuation, and numeracy. NAPLAN is intended to benchmark achievement to ensure all children in Australia have access to education that develops foundational skills for later higher learning and employment. Although NAPLAN is not a holistic assessment of children's educational achievement and success, it is a consistent and reliable national indicator that can identify educational disparities. Funding and enrolment are increasingly linked to school performance, resulting in a larger than ever desire to improve scores. However, despite the increased focus and investment to improve educational attainment, NAPLAN results have shown little change over time (Australian Curriculum Assessment and Reporting Authority, 2018). As such, there is a need for a greater understanding of what might affect academic achievement and the type of activities that might shift children's outcomes.

In Australia, the AEDC provides data on the holistic development of children in their first year of school. It can provide insight into where children in the community face challenges and where they hold strengths. Collected on a 3-yearly basis, the AEDC measures how children have developed in the years prior to starting school (Brinkman et al., 2013). Notably, the AEDC has been shown to predict children's later NAPLAN scores after controlling for demographic covariates (Brinkman et al., 2013). Although not provided at an individual level, the predictive validity of the AEDC demonstrates that schools could use aggregated data to indicate where children may require additional support before they reach their first NAPLAN assessment. This is because the underlying factors influencing children's development in the community are unlikely to change significantly between collection periods. This can provide classroom educators with an opportunity to use these data to identify where children have experienced challenges, identify factors influencing these mechanisms, and plan their supports accordingly.

The AEDC has been shown to predict children's later NAPLAN scores, with children who were ‘vulnerable on one or more’ of the domains of the AEDC being more than twice as likely to be in the bottom 20% of all student scores on NAPLAN assessments at Years 3, 5, and 7 (Brinkman et al., 2013) than a child who was not developmentally vulnerable in any domains. Children who were developmentally vulnerable on 4 or 5 AEDC domains were much more likely to have difficulties in reading and numeracy through primary school than those without vulnerabilities. For each additional domain in which a child was vulnerable in pre-primary, there was an incrementally increased percentage of children with low reading and numeracy scores (Brinkman et al., 2013). Of the five AEDC domains, the ‘language and cognitive development’ and the ‘communication skills and general knowledge’ domains were the best predictors on the NAPLAN assessments (Brinkman et al., 2013).

Currently, investments by schools focus heavily on teaching NAPLAN and other standardised tests to measure students' achievement and learning. However, the predictive validity of the AEDC and research by Brinkman et al. (2013) indicate that developmental trends are already set by the time children enter school, suggesting that much of this work could be wasted. Additionally, an early understanding of where children might need additional support, informed by the AEDC results, can help facilitate educators' planning and direct resources more strategically at the beginning of their schooling, rather than waiting until the first NAPLAN testing in Year 3. With this understanding, an investigation of whether there are schools that have been able to shift children's academic trajectories in the first few years of formal schooling and exceed their predicted academic outcomes, or fail to meet their expected trajectory, was undertaken.

Aim

This study aims to identify South Australian schools that performed either above expectations, below expectations, or as expected on NAPLAN in Year 3 as predicted by their AEDC score upon

school entry. The activities undertaken at these school sites which may have led to improved results will be investigated in a later study.

Methods

Data request

The study aimed to identify South Australian schools that performed either above expectations, below expectations, or as expected in literacy and numeracy in Year 3, given the school-level developmental average of children in their first year of full-time schooling. An existing de-identified linked data set was requested from the South Australian Department for Education. Individual-level data for all children who completed both the AEDC in 2015 and NAPLAN Year 3 in 2018 in South Australian government schools was requested, in addition to demographic and school-level information.

In 2015, 100% of eligible South Australian government schools took part in the AEDC, comprising 443 school sites, 13,942 children (99.1%) and an average of 2.1 teachers per school (Social Research Centre, 2016). Previous data linkage studies using AEDC and NAPLAN data were able to link 70% of cases (Brinkman et al., 2013). 430 school sites were linked in the data set, resulting in a sample representing 97% of schools. Individual data from 13,415 (96.2%) of the children who took part in both the 2015 AEDC and the 2018 NAPLAN was linked from the 430 schools. All NAPLAN tests (aspects) were provided; however, only NAPLAN numeracy and reading were analysed, as these have been shown to be more closely associated with AEDC vulnerability and are stable over time (Brinkman et al., 2013).

Ethics approval was obtained from the Finders University Social & Behavioural Research Committee (#8522) and the South Australian Department for Education (#2019-0043).

Linear regression modelling

Schools were identified via linear regression modelling. This form of predictive modelling allowed for investigating the relationship between the AEDC and NAPLAN scores and was deemed most suitable due to the data distribution and the continuous nature of the variables (Neter et al., 1989). AEDC school profiles from the 2015 collection were compared to expected scores observed in NAPLAN data for Year 3 in 2018 to identify schools whose students either performed as expected, above expectations, or below expectations. The regression analyses controlled for community and school level demographic factors such as the proportion of male students, the proportion of Aboriginal and Torres Strait Islander students, the proportion of students with English as a second language, and the Index of Relative Socio-Economic Disadvantage (SEIFA IRSD) (Australian Bureau of Statistics, 2022), to ensure that any differences in school trajectories were likely to be related to differences in school practices rather than children's contexts.

NAPLAN scores were used to determine whether each student met the national minimum standard for that aspect. For students in Year 3, the national minimum standard is categorised as band 2, with those in band 3 classified as 'above the national minimum standard'.

Linear regression modelling was used to determine the relationship between the percentage of students identified as not meeting the national minimum standards on NAPLAN and developmental vulnerability on one or more domains of the AEDC. The residual means for each school site were obtained, controlling for potential confounders known to have an impact on child development. Schools with less than 10 students were excluded from the analysis to reduce the impact of small schools on the results. Analysis was repeated for NAPLAN numeracy and NAPLAN literacy aspects.

NAPLAN numeracy

A scatter plot (shown in Figure 6.1 below) was generated to visually represent the school sites and the relationship between AEDC score and NAPLAN numeracy results. After generating the scatter plot, the regression line equation was generated and can be expressed by the equation below.

$$Y = 0.311\ (DV1) - 0.096\ (Gender) + 0.526\ (ATSI) - 0.003\ (ESL) + 0.111\ (SEIFA) + 0.113\ (constant)$$

Y is the proportion of students not meeting national minimum standards on NAPLAN numeracy, gender is the proportion of students who are male, ATSI is the proportion of students who identify as Aboriginal and/or Torres Strait Islander, ESL is the proportion of students with English as a Second Language, and SEIFA is the proportion of students living in the most disadvantaged communities.

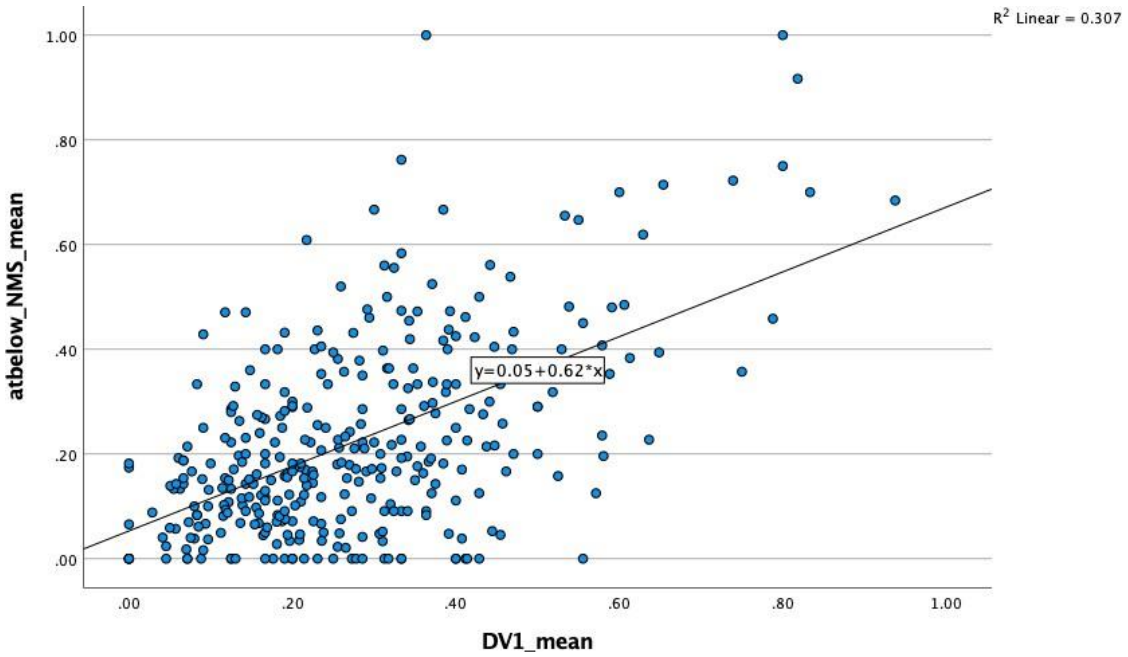

Figure 6.1: Scatter plot showing the relationship between the percentage of children not meeting the national minimum standards on NAPLAN Numeracy and AEDC Developmental vulnerability on one or more domains

NAPLAN Reading

Following the same method described above on page 100, a scatter plot was generated to visually represent the school sites and the relationship between AEDC score and NAPLAN reading results. The regression line equation was generated and can be expressed by the equation below.

$$Y = 0.330\ (DV1) + 0.063\ (Gender) + 0.465\ (ATSI) - 0.067\ (ESL) + 0.060\ (SEIFA) + 0.027\ (constant)$$

Here, Y is the proportion of students not meeting national minimum standards on NAPLAN reading, gender is the proportion of students who are male, ATSI is the proportion of students who identify as Aboriginal or Torres Strait Islander, ESL is the proportion of students with English as a Second Language, and SEIFA is the proportion of students living in the most disadvantaged communities.

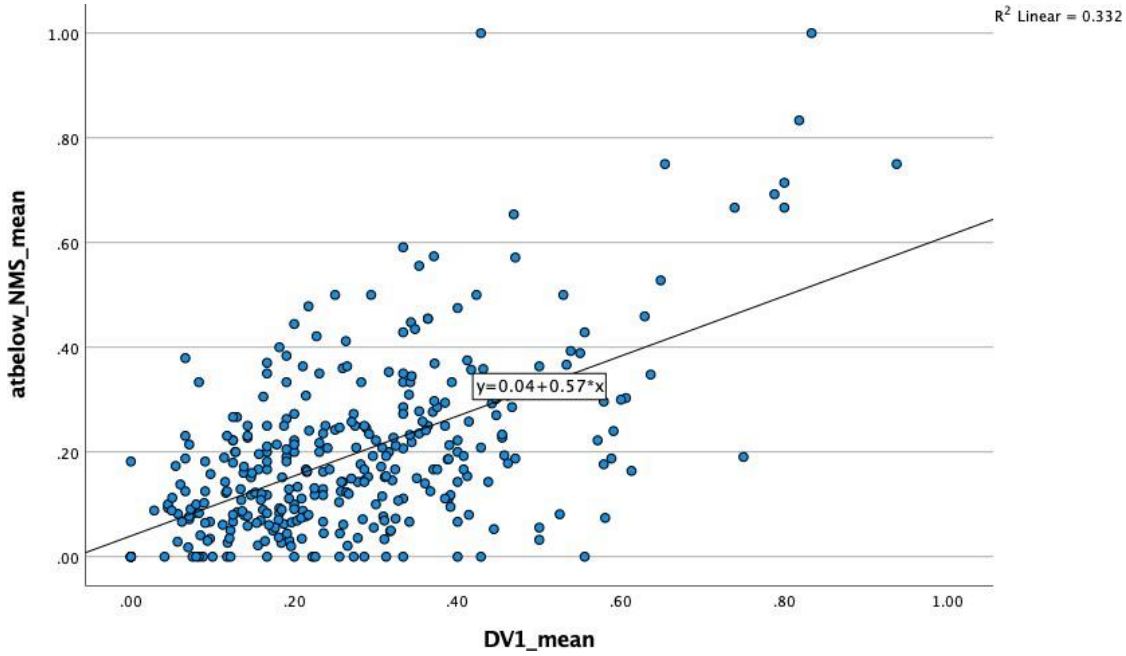

Figure 6.2: Scatter plot showing the relationship between the percentage of children not meeting the national minimum standards on NAPLAN Reading and AEDC Developmental vulnerability on one or more domains

Comparison of school sites across NAPLAN aspects

From this, the researcher identified the sites that were the furthest off-diagonal and closest on-diagonal (e.g., sites with their observed values closest or furthest away from their predicted values) to identify schools that performed significantly above expectations, below expectations, or as expected. The residual means for each school site across both NAPLAN aspects were extracted and manually compared to identify if any schools consistently performed well, poorly, or as expected across both aspects. Sites were selected for inclusion in the subsequent analysis if they performed above or below expectations on reading and numeracy. The cut-off for off-diagonality was determined as the most extreme 20% of scores (approximately 68 schools).

On-diagonal sites were selected based on those closest to their expected score or the residual mean closest to zero. For schools performing as expected (poorly), these sites had a negative residual means close to zero. Conversely, those performing as expected (well) had a positive residual means close to zero. As with the off-diagonal sites, a cut-off was determined as the closest 10% on either side of zero, totalling the middle 20% of scores.

In order to make the scope of the research feasible for completion within the timeframe of the thesis, arbitrary cut-offs for scores were determined as those with the most extreme residual means. School sites in the top and bottom 20% were extracted, alongside those with scores closest to the means (on-diagonal). As this research is most interested in what schools are doing to shift outcomes, fewer on-diagonal sites were selected for extraction. The arbitrary number of 65 sites was selected as it provided a reasonable number of sites to approach for interviews in the

next phase of the research and allowed for some drop-out while maintaining acceptable numbers for qualitative research. This figure also represents almost one-quarter of the total sites.

Results

Using the 2015 AEDC data from all schools, there were a total of 128 schools that were identified as performing better than expected on either NAPLAN reading or numeracy tests, given their level of socioeconomic disadvantage and demographic characteristics. Of these schools, 22 were identified as performing better than expected on both tests. There were 123 schools that were identified as performing as expected given their level of socioeconomic disadvantage, with 5 of these performing as expected (poorly) on both tests and 8 as expected (well) on both. A total of 136 schools were identified as performing below expectations, given the schools' demographic makeup, with 30 of these performing below expectations on both tests. Table 6.1 below provides a breakdown of the total number of schools identified in each category. It is important to note that the figures will not add up to the total number of schools (n=342) when considering the table. This is because there are two lists (one for numeracy, one for reading), and some schools will demonstrate on/off-diagonality on one list but not the other.

Table 6.1: Number of schools identified in each category and selected for extraction

Schools	Below expectations	As expected, (poorly)	As expected, (well)	Above expectations
	n	***n***	***n***	***n***
Identified in category	136	60	63	128
Extracted for analysis	30	5	8	22

Extracted schools

Table 6.2 below shows the schools selected for extraction based on their 2015 AEDC scores and 2018 NAPLAN results. To ensure the anonymity of the school sites, the data have been presented in the four classification groups: performing below expectations, as expected (poorly and well), and above expectations. The residual means for schools were similar for both NAPLAN aspects. However, there was a slightly larger difference between the reading and numeracy scores for the schools performing above and below expectations (0.02034 and 0.00847, respectively). The inverse can be seen by the schools performing as expected, with NAPLAN reading scores being slightly higher than the numeracy scores.

Table 6.2: Average residual means (*e*) for schools identified as performing as/above or below expectations

NAPLAN aspect	Below expectations	As expected, (poorly)	As expected, (well)	Above expectations
	e	*e*	*e*	*e*
Reading	-0.15383	-0.01301	0.01570	0.18788
Numeracy	-0.16263	-0.01071	0.01246	0.20822

Discussion

This study intended to identify schools for subsequent analysis, of which 65 were identified from the total sample of 342. Within this sample, more schools classified as above or below expectations were selected than those performing as expected for inclusion in additional analyses, as the former were thought to lead to more interesting interview discussions and subsequent findings.

A key strength of this study is that the data were obtained from a jurisdictional data set; therefore, a large amount of data was available. The data were obtained for each child individually and aggregated to the school level, allowing for greater sensitivity within the model. Future research could include more schools in additional quantitative analysis. Although 65 schools were selected as this allowed for a reasonable number to be approached for interviews, quantitative analysis investigating the characteristics of the school could be undertaken on a larger scale as it would not be bound by the same time constraints as qualitative research.

One potential limitation of this study is that the students included in the analysis were from South Australian government schools only. This was due primarily to data sharing laws within the jurisdiction, and subsequent ease of access, with government data stored centrally and available at an individually linked level. Data obtained by the ABS indicated that in 2016, government schools held the most significant share of enrolments (65.4%), followed by Catholic schools (20.2%) and Independent schools (14.4%) (Australian Bureau of Statistics, February 2021). Therefore, including only students from government schools in this analysis still ensured that most South Australian students were captured; although there is a large number who were not included in the analysis. Future research could investigate the difference in performance across the school sectors and whether developmental gains are observed in higher or lower amounts in the Catholic or Independent schools.

Implications for practice

Understanding where schools have shifted outcomes for the children beyond what is expected based on their socioeconomic contexts could have significant implications for policy and practice.

Firstly, the findings from this study could contribute to knowledge of how schools can optimise children's educational trajectories and determine whether common elements between schools that perform better than expected exist. Where schools are consistently performing above or below expectations, they may be prompted to shift their focus or delve deeper into why this may be the case.

At a policy level, the findings may allow for a greater understanding of how schools could improve academic measures in the early years between school entry and Year 3, and where budgets and resources could be focused to replicate these findings across sites. Investments in early childhood have significant and long-lasting impacts on children's academic achievement, health, wellbeing, employment, income, and involvement in the criminal justice system (Currie, 2001; Heckman et al., 2010). In addition, programs aimed at improving development have been shown to have the greatest success if rooted in early childhood (Heckman, 2011). With a historically strong focus on obtaining high NAPLAN results, national resources could instead be focused on holistic development or the years prior to school where children's early development occurs, to see a higher investment return. With the recent focus of the South Australian Department for Education being centred on reading and the importance of early literacy skills, it is timely that there is research investigating whether these efforts are shifting outcomes as hoped (Department for Education South Australia, 2021).

Conclusion

Linear regression modelling was used to identify 65 schools for subsequent analysis, to further understand what elements may lead students within a school to perform above or below expectations in Year 3 NAPLAN reading and numeracy testing, based on their developmental vulnerability at school entry as measured by the AEDC. Comparison sites that performed as expected, based on their socioeconomic disadvantage and school characteristics, were also identified for inclusion in later analysis.

Chapter summary

This chapter has presented the methods and results from a linear regression analysis used to identify schools that performed above or below expectations in the Year 3 NAPLAN. The results demonstrated that some schools are shifting children's developmental trajectories before children sit their first NAPLAN assessment in Year 3. This analysis has provided the basis for further exploration in Study 5. The next chapter explores the elements of these schools which may have led to better outcomes for children and the presence of PA elements within these schools.

CHAPTER 7. A QUANTITATIVE METHODS ANALYSIS OF ON/OFF-DIAGONAL SCHOOL PLANNING DOCUMENTS TO IDENTIFY HOW CHILDREN'S DEVELOPMENT IS SUPPORTED AND TRAJECTORIES CAN BE SHIFTED

COVID-19 implications

Due to COVID-19 restrictions and pressures faced by schools in 2020, the researcher chose to adjust the methods in this study from interviews with school staff working at the site between 2015 and 2018 to a review of historical planning documents. Initial requests to participate in interviews were emailed to school principals in August 2020. A small number responded that they could not participate due to their current workload (n=4), and only one site indicated that they were happy to participate. As such, the researcher discussed with the supervisory team the importance of reducing the time burden on schools during this difficult period and decided that adjusting the study methods would be the most appropriate response. While it is acknowledged that site documents cannot reflect all the work undertaken by schools, the findings from the research undertaken in Chapter 4 indicate that they typically contain an overview of the sites' most significant work and goals.

Introduction

This study builds on the critical interpretive synthesis presented in Chapter 2, which reviewed how educational planning reflects a population approach (PA). By taking a population approach to planning and considering population-level data such as the AEDC, classroom educators could improve children's outcomes through a range of factors, including improved planning, identifying resourcing needs, and promoting inter-agency collaboration. Through a sound, evidence-based understanding of the challenges children face and their potential mechanisms, classroom educators will be better placed to address their needs appropriately and are ultimately more likely to achieve change. Currently, no research exists into whether applying the population approach to education planning can have an impact on children's later academic achievement.

This study investigated 65 schools across South Australia whose students were identified as performing above expectations, below expectations, or as expected on the Year 3 NAPLAN, based on the level of developmental vulnerability measured at school entry by the AEDC, in order to explore whether including elements of the PA within planning can be advantageous for academic achievement.

Aim

This study explored whether schools that performed above expectations included more PA elements in their planning and activities than those that performed below or as expected.

Methods

Document search

Planning documents from 2015 to 2017, inclusive, were obtained for 65 sites across South Australia, to understand the school planning and programs, which may have led to differing outcomes. Sites were identified using linear regression modelling, the details of which can be found in Chapter 6. Research undertaken in Chapter 4 indicated that the school's annual reports, site improvement plans, and external reviews would hold the most accurate and rich depictions of the work undertaken at the school during this time and would also provide insight into the strategies and goals of each site.

An initial search of school web pages revealed that only the most recent documents were generally available. Although this was not true for all schools, with some choosing to host documents for up to eight years, alternate methods for obtaining the documents were explored. Conversations with the South Australian Department for Education indicated that despite being a departmental requirement to submit such documents, they are not held centrally and therefore were inaccessible through data requests. After exhausting alternative methods, the historical planning documents from the pre-identified schools were obtained using a web archive platform, Wayback. This allowed the researcher to obtain documents that had been published on the school’s website but had since been removed or replaced. A total of 317 (63%) of the expected documents were obtained from 46 schools (71%) using this method. The remaining documents were requested from each of the school sites by email, with seven schools returning the documents by the requested date. Several sites (n=3) chose not to provide the documents, sighting reasons such as documents for a particular year not existing, being too busy, or not feeling as though they had intellectual property rights to the document as it was developed by prior leadership. In total, 326 documents were available for inclusion in the analysis from 56 schools (86%).

For annual reports and site improvement plans, all sections of the documents were included for review. However, for external review documents, only the actions undertaken by the school were included. Recommendations were excluded as these did not reflect the work undertaken at the school and were instead suggestions of where improvements could be made within the four-year period before the next review. As reviews were conducted on a four-yearly basis, some sites' reviews were conducted in 2018. These reviews were included as they reflected on the previous year's activities. A review undertaken in the previous cycle (2014) would not have been deemed appropriate for determining what occurred to shift outcomes before the NAPLAN testing in 2018.

Ethics approval was obtained from the Finders University Social & Behavioural Research Committee (#8522) and the South Australian Department for Education (#2019-0043).

Development of document analysis template and rating system

Based on the PA framework developed by the author in Chapter 2, an extraction template was developed to assess how evident each of the elements was in the school planning documents. In addition to the eight PA elements, a ninth element focusing on schools' everyday work of improving literacy and numeracy outcomes was included in the template. This allowed the researchers to compare where schools were working outside of their usual scope, which may have contributed to their shift in student outcomes. A total score was attributed to the school documents by averaging the score across each element in the template for each year to facilitate the comparison of schools.

An accompanying rubric was developed using a five-point scale, outlining examples ranging from poor to exemplary practice to add rigour to the process. As the population approach had not been previously applied to the education setting, it was deemed necessary that this scale could be easily interpreted. Initial testing of a three-point scale proved too rudimentary and did not allow enough sensitivity between the works undertaken. A five-point scale was chosen to allow for some sensitivity in the assessment while remaining easy to interpret. Research indicates that a five-point scale would be suitable for assessing the presence of the PA, as having fewer than 7 points on the scale would be less confusing for the rater, and little variation exists between scales of 5 or 7 points (Joshi et al., 2015). Members of the supervisory team tested both the extraction document and the rubric to ensure they were transparent and reliable for testing. A copy of the extraction template and the rubric can be found in Appendix V and Appendix W.

The template was refined through several courses of review with the supervisory team, as follows:

1. The researcher developed an extraction template.
2. Three members of the supervisory team reviewed and suggested the addition of a ninth element, 'focus on literacy and numeracy', and the inclusion of details about what each PA element covered to allow for a more transparent analysis.
3. The researcher and one supervisory team member tested the extraction process and discussed the challenges, including explicitly detailing what each of the PA elements measured and what might be considered good practice. The researcher decided to develop a rubric to accurately capture each of the elements.
4. The researcher developed the initial rubric.
5. One member of the supervisory team reviewed the rubric and provided feedback to promote continuity between the levels.
6. One member of the supervisory team tested one school site's documents with the template.

7. The researcher tested the rubric and compared the results with a supervisory team member. Any differences were discussed.
8. The researcher refined the rubric to clarify intent, removing the term ‘academic’ from PA 1 and adding ‘pro-active data approach’, adding a time scale to PA 9, refining collaboration language in PA 6, and refining PA 3 to include a focus on studies with proven outcomes as an evidence base.
9. The supervisory team reviewed the final rubric and approved it for use in the analysis.
10. The researcher used the template to extract data from the documents.

To minimise the risk of schools with few available documents biasing their scores, only sites with at least 5 documents were included in the first round of analysis and given a valid score (n=35). This cut-off was based on existing validated scales, such as the Early Development Instrument and the AEDC, which indicate that 70% and 75% of responses respectively should be provided to receive a valid score (Janus et al., 2007). This cut-off is not directly comparable to the AEDC as there are significant differences in the underlying methodology. Research by Streiner, Norman & Cairney (2015) supports this cut-off, suggesting the 80% if responses should be provided. Streiner et al. also discuss the potential to impute missing data, however that approach did not seem appropriate given the lack of psychometric testing undertaken for this rating scale. The second round of analysis was undertaken with schools with at least 4 documents (n=47). Although this cut-off was below what is currently used in existing research, this allowed for an analysis of a larger number of sites and a comparison between the groups. This would allow the researcher to determine whether the cut-off of 75% was suitable for this approach. Classification as performing above expectations, as expected, or below expectations was not included in the template to avoid biasing the results. The school classification was also blinded during coding, to minimize bias.

Statistical analysis

The analysis for this study utilised regression modelling to explore the impact of school planning on school NAPLAN scores. The regressions used the school's average PA score, determined by averaging scores across all available documents for each site. This approach was deemed most appropriate as it provided an overview of how well the PA was described in the documents rather than singling out specific PA elements whose utility had not yet been tested. An a priori approach was used throughout to identify any significant findings.

Analyses were run separately for NAPLAN reading and numeracy scores. The data were obtained through prior linear regression modelling in Chapter 6, resulting in separate residual scores for each NAPLAN test. In this analysis, the residual score showed the size of the difference between a school's predicted NAPLAN score and the school’s observed score (i.e., whether they performed better or worse than expected). Therefore, it was not possible to combine both NAPLAN tests into one composite score, as the underlying NAPLAN scores and residuals demonstrating the relationship between the predicted and actual score differ depending on the test. As such,

combining the residuals for both NAPLAN reading and numeracy would result in a loss of meaning from the underlying analysis.

Linear regression modelling

Linear regression was deemed most appropriate for this analysis as it allowed the researcher to assess the strength of the relationship between variables and determine whether a set of variables were predictive of a continuous outcome variable (Montgomery et al., 2021). In terms of this analysis, linear regression modelling was undertaken using the average PA score of each school site (a continuous variable) to determine whether schools that took more of a population approach to their planning and programs were more likely to have children who achieved better than expected NAPLAN scores in Year 3. Elements that may have attributed to a shift in outcomes were controlled for in identifying schools in Chapter 6, and therefore, were not included in this analysis.

Binary regression modelling

A binary logistic regression was conducted to compare: 1) sites that performed as expected (well) to those that exceeded expectations; and 2) sites that performed as expected (poorly) to those that did not meet expectations. Logistic regression is a process of modelling the probability of a discrete outcome given an input variable (Kleinbaum et al., 2002). The outcome was dichotomised into a 0/1 variable rather than the 0-1 outcome provided in linear modelling. The regressions were run separately for the two groups to compare those that challenged expectations, to understand further if the model was predictive of off-diagonal schools. Binary regression was selected for the analysis as it allowed for a comparison between the two discrete groups and to determine their relationship with a dichotomous outcome variable (Hosmer Jr et al., 2013).

My School data extraction

Descriptive data on each school site were obtained using the ACARA My School website. All available data for each eligible school site were extracted for the years 2015-2018. These data were aggregated up to the on-/off-diagonal classification level to minimise the chance of identifying school sites from the data. The results are presented to provide contextual information about the sites included in each category.

Results

In order to maintain the anonymity of the school sites, the results herein are presented in four categories: below expectations, as expected (poorly), as expected (well), and above expectations. A deeper analysis of how these sites were determined and an explanation of the categories can be found in Chapter 6.

Descriptive characteristics

Out of the 65 sites initially identified for inclusion in this analysis, 35 returned sufficient documentation to receive a valid score in the first round of analysis. Sufficient documentation was

defined to be at least 5 of the available documents. Table 7.1 below shows a breakdown of the sites included in the analysis by their on-/off-diagonal classification, the number of documents analysed, and their average PA score for inclusion in the linear regression modelling.

Table 7.1: Average PA score for schools with five or more documents

School classification	Schools with five or more documents	Documents included	Average PA score
	n	*n*	*Score out of 5*
Above expectations	10	56	3.1
As-expected (well)	5	25	2.4
As-expected (poorly)	2	11	2.3
Below expectations	18	104	2.7
Total	35	196	

Linear regression modelling

Before the linear regression analyses were performed, a number of tests were conducted to confirm that the model's assumptions had not been violated (Schmidt & Finan, 2018). Firstly, a scatter plot was generated to determine that the relationship between the variables was visually linear. Second, a test for independence demonstrated that the residuals were independent and that there were no violations; in particular, there was no high-level correlation between the independent variables, representing multi-collinearity. Third, the data were tested for homoscedasticity using a scatterplot which determined that the assumption was met. Finally, the distribution of the residuals was tested using a Q-Q plot, which showed that the residuals were normally distributed, although slightly skewed. The data were not viewed as problematic, as often, violations of this assumption do not noticeably impact the results (Schmidt & Finan, 2018).

8 PA elements

All sites

The rubric used to score the school documents was developed based on the initial interpretation of Health Canada's Population Health Approach (Wilson et al., 2019), applied to education as described in Chapter 2. As these elements had not yet been tested within the education sector, an initial linear regression was conducted to explore whether the eight elements in the approach were predictive of a school's NAPLAN performance.

Linear regression was conducted to estimate the association between a school's PA score and whether the school was performing above expectations on a NAPLAN reading test. The results from the regression analysis indicated that the model had relatively low explanatory power (R^2=

.10). Regression results further indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN reading; this association was non-significant (p=.070).

The linear regression was repeated for the NAPLAN numeracy test. The results, shown in Table 7.2, indicated that the model had low explanatory power (R^2= .06). Regression results further indicated that a one-unit increase in PA scores corresponded to a .07 increase in schools performing above expectations on NAPLAN numeracy; again, this association was non-significant (p=.143).

Table 7.2: Association between NAPLAN scores and PA scores for sites with five or more documents (8 elements)

NAPLAN test variable	Schools (*n*)	*B*	*Std. Error*	*Sig.*
Reading	35	.08	.04	.070
Numeracy	35	.07	.05	.143

The researcher decided to rerun the linear regressions using the categories of high-performing (above expectations and as-expected - well) and low-performing (below expectations and as-expected - poor) based on their original classifications in Study 5. These classifications were explored to determine if the model was more predictive of schools performing better or worse than expected (i.e., Was the model better able to identify high-performing schools?). These categories included schools that performed as expected and those that performed differently, either better or worse.

Following the same regression modelling as above, the first linear regression using high and low-performing categories was conducted for schools with five or more documents, using the eight PA elements initially determined in Chapter 2.

Table 7.3: Association between NAPLAN scores and PA scores for sites with five or more documents (8 elements) – split by high- and low-performing schools

School classification	NAPLAN test	Schools (*n*)	*B*	*Std. Error*	*Sig.*
High-performing	Reading	15	.05	.04	.148
	Numeracy	15	.04	.04	.338
Poor-performing	Reading	20	.02	.04	.609
	Numeracy	20	.01	.03	.812

High-performing schools

The results from the regression analysis, shown in Table 7.3 above, indicated that the model had moderate explanatory power (R^2= .15), suggesting that the model explained 15% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .05 increase in schools performing above expectations on NAPLAN reading; this association was non-significant (p=.148). When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .07), suggesting that the model explained 7% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .04 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.338).

Poor-performing schools

The results from the regression analysis, shown in Table 7.3 above, indicated that the model had very low explanatory power (R^2= .02), suggesting that the model explained 2% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .02 increase in schools performing below expectations on NAPLAN reading; this association was non-significant (p=.609). When repeated for NAPLAN numeracy, the model also had almost no explanatory power (R^2= .003), suggesting that the model explained .3% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .01 increase in schools performing below expectations on NAPLAN numeracy; this association was non-significant (p=.812).

Overall, these results demonstrate a weaker explanatory power than the initial linear regression modelling presented in Table 7.2. The statistical significance of all results could be due to chance. Document scores related to schools in the high-performing category were more predictive of overall NAPLAN performance than those related to low-performing schools, with little association found for these sites. This is likely due to the smaller group size in each sample category creating two distinct categories from the data which minimised the number of schools explored in each regression.

PA: inclusion of a ninth element

As the PA rubric developed by the researcher included an additional element (PA9: focus on improving literacy and numeracy) that had not previously been explored, linear regressions were initially conducted to determine whether the original eight-element model described above was sufficient, or if adding a ninth element increased the predictive nature of the model.

All sites

Linear regression was conducted to estimate the association between a school's PA score and whether the school was performing above expectations on a NAPLAN reading test. The results from the regression, shown in Table 7.4 below, indicated that the model had relatively low

explanatory power (R^2= .12), suggesting that the model explained 12% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .09 increase in schools performing above expectations on NAPLAN reading; this association was significant (p=.047).

When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .08), suggesting that the model explained 8% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.097).

In comparison with the previous results (shown in Table 7.3 above), including the ninth element in the model increased the strength of the association on both NAPLAN tests, representing the relationship between PA scores and expected NAPLAN performance. The model showed that as the PA score increased, the likelihood of a school performing better than expected on NAPLAN tests increased. The relationship was also found for both NAPLAN reading and numeracy; however, with moderate to low significance respectively, suggesting that the relationship may not be due to the presence of PA elements and could be a result of chance.

Table 7.4: Association between NAPLAN scores and PA scores for sites with five or more documents, including element 9 – a focus on literacy and numeracy

NAPLAN test	*n*	*B*	*Std. Error*	*Sig.*
Reading	35	.09	.04	.047*
Numeracy	35	.08	.05	.097

*p < .05

Including element 9 improved the model's significance and ability to predict the relationship between NAPLAN tests and PA scores. Therefore, all subsequent analyses used the school's 9 element PA score.

Following the previous line of inquiry, the researcher again sought to explore whether including the ninth element, 'a focus on literacy and numeracy', would strengthen the predictive nature of the model. Linear regression was conducted to estimate the association between a school's PA score and whether the school was meeting expectations on NAPLAN reading and numeracy tests for high- and low-performing schools.

Table 7.5: Association between NAPLAN scores and PA scores for sites with five or more documents, including element 9 – a focus on literacy and numeracy - split by high- and low-performing schools

School classification	NAPLAN test	Schools (*n*)	*B*	*Std. Error*	*Sig.*
High-performing	Reading	15	.06	.04	.121
	Numeracy	15	.04	.04	.290
Poor-performing	Reading	20	.02	.03	.628
	Numeracy	20	.01	.03	.801

High-performing schools

The results from the regression, shown in Table 7.5 above, indicated the model had moderate explanatory power (R^2= .18), suggesting that the model explained 18% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .06 increase in schools performing above expectations on NAPLAN reading; this association was non-significant (p=.121). When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .09), suggesting that the model explained 9% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .04 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.290).

Poor-performing schools

The results from the regression, shown in Table 7.5 above, indicated the model had very low explanatory power (R^2= .01), suggesting that the model explained 1% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .02 increase in schools performing below expectations on NAPLAN reading; this association was non-significant (p=.609). When repeated for NAPLAN numeracy, the model also had very low explanatory power (R^2= .004), suggesting that the model explained 0.4% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .01 increase in schools performing below expectations on NAPLAN numeracy; this association was non-significant (p=.812).

When compared with the 8-element model, including the ninth element in the model strengthened the model's predictive capabilities. This supports earlier findings from section “PA: inclusion of a ninth element,” in which adding the ninth element to the original linear regression also strengthened the model. As a result of these findings, all subsequent analyses will include the ninth element, which “focuses on improving literacy & numeracy.”

Addition of the student-teacher ratio as a confounder

Recent literature has discussed the impact of large classrooms on learning environments, with schools pushing for smaller classrooms (Filges et al., 2018). With enrolment and teaching staff data available, a decision was made to include the student-teacher ratio in the model, to explore whether this affected how schools performed. It should be noted that the data extracted through My Schools is not provided at a classroom level, and therefore, differences in staffing allocation between primary and high schools, known to impact day-to-day teaching, could not be accounted for. However, it was decided that this factor would still be included, as discussions with school staff provided in Chapter 4 outlined how leaders working within a combined primary and high school often had additional resources (funding and staffing) available to them, which they would subsequently allocate to the early years.

All sites

Linear regression was conducted to estimate the association between a school's PA score and whether a school was performing above expectations on the NAPLAN reading test. The results from the regression, shown in Table 7.6 below, indicated that the model had relatively low explanatory power (R^2=.14), suggesting that the model explained 14% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .10 increase in schools performing above expectations on NAPLAN reading; this association was moderately significant (p=.039).

When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .09), suggesting that the model explained 9% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.089).

Compared to the original PA model presented in Table 7.2 and Table 7.3 above, adjusting for student-teacher ratio in the model further improved the ability to predict NAPLAN scores. As such, the student-teacher ratio was adjusted for in all subsequent analyses.

Table 7.6: Association between NAPLAN scores and PA scores for sites with five or more documents, controlling for student-teacher ratio (9 elements)

NAPLAN test	*n*	*B*	*Std. Error*	*Sig.*
Reading	35	.10	.04	.039*
Numeracy	35	.08	.05	.089

*p < .05

Next, the researcher decided to re-run the linear regressions using the categories of high-performing and low-performing to determine if the model was more predictive of schools that were performing better or worse than expected, including the ninth element in the model.

Table 7.7: Association between NAPLAN scores and PA scores for sites with five or more documents, controlling for student-teacher ratio (9 elements) - split by high- and low-performing schools

School classification	NAPLAN test	Schools (*n*)	*B*	*Std. Error*	*Sig.*
High-performing	Reading	15	.07	.04	.117
	Numeracy	15	.04	.04	.343
Poor-performing	Reading	20	.00	.01	.649
	Numeracy	20	.00	.01	.975

High-performing schools

The results from the regression, shown in Table 7.7 above, indicated that the model had good explanatory power (R^2= .20), suggesting that the model explained 20% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .07 increase in schools performing above expectations on NAPLAN reading; this association was non-significant (p=.117). When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .09), suggesting that the model explained 9% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA score corresponded to a .04 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.343).

Poor-performing schools

The results from the regression, shown in Table 7.7 above, indicated the model had very low explanatory power (R^2= .03), suggesting that the model explained 3% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .02 increase in schools performing below expectations on NAPLAN reading; this association was non-significant (p=.609). When repeated for NAPLAN numeracy, the model also had very low explanatory power (R^2= .004), suggesting that the model explained 0.4% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .01 increase in schools performing below expectations on NAPLAN numeracy; this association was non-significant (p=.812).

Adding the student-teacher ratio to the model resulted in a higher predictive capability; however, it reduced statistical significance, suggesting that the likelihood of being high-performing due to

chance could not be ruled out. As the results were already non-significant, the researcher determined that retaining the student-teacher ratio in the model was appropriate and in line with the results presented in the earlier linear regressions, which would result in more easily comparable data.

Testing the model on sites with fewer documents

In order to explore whether the initially determined cut-off of 5 or more documents was applicable for this analysis, additional analyses were conducted for all sites that had 4 or more documents available. This increased the sample size from 35 to 47 sites and the number of documents overall to 244, the breakdown of which is shown in Table 7.8 below. Overall, many more documents were available for sites classified as performing above or below expectations compared to those meeting expectations (71 & 128, compared to 29 & 19). The average PA score was observed to be higher for those exceeding expectations but also for those not meeting expectations, which could be a result of the sample size skewing the data.

Table 7.8: Average PA for schools with four or more documents

School classification	Schools with four or more documents included in the analysis	Documents included in the analysis	Average PA score
	n	*n*	*Score out of 5*
Above expectations	13	71	3.0
As-expected (well)	6	29	2.5
As-expected (poorly)	4	19	2.4
Below expectations	24	128	2.6
Total	47	244	

All sites

Building on the lessons learned from the model, a linear regression was conducted to estimate the association between a school's PA score and whether a school is performing above expectations on a NAPLAN reading test for all sites with four or more documents available. The results from the regression, shown in Table 7.9 below, indicated that our model had relatively low explanatory power (R^2= .13), suggesting that the model explained 13% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .10 increase in schools performing above expectations on NAPLAN reading; this association was moderately significant (p=.015).

When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .08), suggesting that the model explained 8% of the variation in the outcome variable. The regression

results indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN numeracy; this association was of low significance (p=.057).

Table 7.9: Association between NAPLAN scores and PA scores for sites with four or more documents, adjusting for teacher-student ratio

NAPLAN test	*n*	*B*	*Std. Error*	*Sig.*
Reading	47	.10	.04	.015**
Numeracy	47	.08	.04	.057

**p < .01

Including sites with four or more documents significantly improved the model, with increases in the magnitude of the beta coefficient and reductions in the observed p-values on both NAPLAN tests observed compared to those sites with five or more documents, presented in the section 'Addition of the student-teacher ratio as a confounder' above. Adding the additional documents to the analysis improved the model notably for NAPLAN reading tests, with only minor improvements noted for NAPLAN numeracy. Using these results, the researcher determined that the lower cut-off provided more statistical power to the model and is to be used for all subsequent analyses.

The researcher decided to re-run the linear regressions using the categories of high-performing and low-performing to determine if the model was more predictive of schools that were performing better or worse than expected for sites with four or more documents and whether the existing relationships persisted.

Table 7.10: Association between NAPLAN scores and PA scores for sites with five or more documents, controlling for student-teacher ratio (9 elements) for sites with four or more documents - split by high- and low-performing schools

School classification	NAPLAN test	Schools (*n*)	*B*	*Std. Error*	*Sig.*
High-performing	Reading	19	.07	.03	.042*
	Numeracy	19	.04	.27	.326
Poor-performing	Reading	28	.03	.03	.326
	Numeracy	28	.02	.03	.551

*p < .05

High-performing schools

The results from the regression, shown in Table 7.10 above, indicated that the model had good explanatory power (R^2= .24), suggesting that the model explained 24% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .07 increase in schools performing above expectations on NAPLAN reading;

this association was moderately significant (p=.042). When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .06), suggesting that the model explained 6% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .04 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.312).

Poor-performing schools

The results from the regression, shown in Table 7.10 above, indicated that the model had very low explanatory power (R^2= .12), suggesting that the model explained 12% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .03 increase in schools performing below expectations on NAPLAN reading; this association was non-significant (p=.326). When repeated for NAPLAN numeracy, the model also had very low explanatory power (R^2= .07), suggesting that the model explained 7% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .02 increase in schools performing below expectations on NAPLAN numeracy; this association was non-significant (p=.551). This suggests that the model was somewhat able to predict whether schools who reported on more PA elements were more likely to be classified as poor-performing, though this relationship could be due to chance.

Exploration of individual PA elements

As the PA had not previously been applied to this education system, linear regressions were undertaken to explore whether individual elements were stronger predictors of a school performing better or worse than expected on NAPLAN reading or numeracy tests. The researcher did not adjust for multiple hypothesis testing in any way.

All sites

Linear regression was conducted to explore the relationship between the PA elements and the NAPLAN reading and numeracy tests. Table 7.11 below shows each of the PA elements and their associated regression results.

Table 7.11: Association between individual elements of the PA and NAPLAN scores for sites with four or more documents, controlling for teacher-student ratio

Population approach element	NAPLAN test	*n*	R^2	*B*	*Std. Error*	*Sig.*
1. Focuses on children's developmental and learning progress	Reading	47	.14	.08	.03	.014**
	Numeracy	47	.06	.07	.03	.052*

Population approach element	NAPLAN test	*n*	R^2	*B*	*Std. Error*	*Sig.*
2. Addresses the determinants of children's progress by exploring the contextual and operational factors at play	Reading	47	.11	.07	.03	.031*
	Numeracy	47	.06	.05	.03	.104
3. Uses evidence/ outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities	Reading	47	.10	.08	.04	.038*
	Numeracy	47	.06	.06	.04	.122
4. Concerned with the impact of studies to inform the direction and/or to improve educational outcomes. Investments are both short- and long-term	Reading	47	.05	.05	.03	.150
	Numeracy	47	.04	.04	.03	.215
5. Applies concepts from other disciplines, such as health and wellbeing, to education settings	Reading	47	.13	.07	.03	.019**
	Numeracy	47	.08	.06	.03	.057*
6. Collaboration occurs with other leaders, educators, and community partnerships	Reading	47	.05	.04	.03	.174
	Numeracy	47	.02	.03	.03	.379
7. Employs mechanisms for public movement to promote family and community engagement and the value of education	Reading	47	.12	.09	.04	.024*
	Numeracy	47	.07	.07	.03	.073

8. Demonstrates accountability for education outcomes to ensure they are evidence-informed over time	Reading	47	.10	.09	.04	.040*
	Numeracy	47	.06	.06	.04	.120
9. Focuses on improving literacy and numeracy	Reading	47	.07	.05	.03	.103
	Numeracy	47	.05	.05	.03	.141

*p < .05 **p < .01 ***p < .001

PA element 1 – Focuses on children's developmental and learning progress

The results from the regression indicated that the model had moderate explanatory power (R^2= .14), suggesting that the model explained 14% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN reading; this association was moderately significant (p=.014). When repeated for NAPLAN numeracy, the model also had relatively small explanatory power (R^2= .09), suggesting that the model explained 9% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .07 increase in schools performing above expectations on NAPLAN numeracy; this association was of low significance (p=.052). This suggests that reporting of PA element 1 was somewhat able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests, and that the relationship was unlikely due to chance.

PA element 2 – Addresses the determinants of children's progress by exploring the contextual and operational factors at play

The results from the regression indicated that the model had relatively low explanatory power (R^2= .11), suggesting that the model explained 11% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .07 increase in schools performing above expectations on NAPLAN reading; this association was moderately significant (p=.031). When repeated for NAPLAN numeracy, the model also had low explanatory power (R^2= .06), suggesting that the model explained 6% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .05 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.104). This suggests that reporting of PA element 2 was somewhat able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests, and that the relationship was unlikely due to chance.

PA element 3 – Uses evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities

The results from the regression indicated the model had relatively low explanatory power (R^2= .10), suggesting that the model explained 10% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN reading; this association was moderately significant (p=.038). When repeated for NAPLAN numeracy, the model also had low explanatory power (R^2= .06), suggesting that the model explained 6% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .06 increase in schools performing above expectations on NAPLAN numeracy; this association was

non-significant (p=.112). This suggests that reporting of PA element 3 was somewhat able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests, and that the relationship was unlikely due to chance.

PA element 4 – Concerned with the impact of studies to inform the direction or, and to improve educational outcomes. Investments are both short- and long-term

The results from the regression indicated that the model had low explanatory power (R^2= .05), suggesting that the model explained 5% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .05 increase in schools performing above expectations on NAPLAN reading; this association was non-significant (p=.150). When repeated for NAPLAN numeracy, the model also had very low explanatory power (R^2= .04), suggesting that the model explained 4% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .04 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.215). This suggests that reporting of PA element 4 was not able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests. Any relationship presented may be due to chance.

PA element 5 – Applies concepts from other disciplines, such as health and wellbeing, to education settings

The results from the regression indicated the model had relatively low explanatory power (R^2= .13), suggesting that the model explained 13% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .07 increase in schools performing above expectations on NAPLAN reading; this association was moderately significant (p=.019). When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .08), suggesting that the model explained 8% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .06 increase in schools performing above expectations on NAPLAN numeracy. This association was found to be of low significance (p=.057). This suggests that reporting of PA element 5 was somewhat able to predict whether schools would perform better than expected on NAPLAN reading tests, and that the relationship was unlikely due to chance. For NAPLAN reading, PA element 5 was not able to predict whether schools would perform better, with the relationship likely due to chance.

PA element 6 – Collaborated with other leaders, educators, and community partnerships

The results from the regression indicated that the model had very low explanatory power (R^2= .05), suggesting that the model explained 5% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .04 increase in schools performing above expectations on NAPLAN reading; this association was not significant

(p=.174). When repeated for NAPLAN numeracy, the model also had a very low explanatory power (R^2= .02), suggesting that the model explained 2% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .03 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.379). This suggests that reporting of PA element 6 was not able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests, and that the relationship was likely due to chance.

PA element 7 – Employs mechanisms for public movement to promote family and community engagement and the value of education

The results from the regression indicated that the model had relatively low explanatory power (R^2= .12), suggesting that the model explained 12% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .09 increase in schools performing above expectations on NAPLAN reading; this association was moderately significant (p=.024). When repeated for NAPLAN numeracy, the model also had low explanatory power (R^2= .07), suggesting that the model explained 7% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .07 increase in schools performing above expectations on NAPLAN numeracy; this association was of low significance (p=.073). This suggests that reporting of PA element 7 was somewhat able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests, and that the relationship was unlikely due to chance.

PA element 8 – Demonstrates accountability for education outcomes to ensure they are evidence-informed over time

The results from the regression indicated that the model had relatively low explanatory power (R^2= .1), suggesting that the model explained 10% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .09 increase in schools performing above expectations on NAPLAN reading, this association was moderately significant (p=.040). When repeated for NAPLAN numeracy, the model also had low explanatory power (R^2= .06), suggesting that the model explained 6% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .06 increase in schools performing above expectations on NAPLAN numeracy. This association was found to be non-significant (p=.120). This suggests that reporting of PA element 8 was somewhat able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests, and that the relationship was unlikely due to chance.

PA element 9 – Focuses on improving literacy and numeracy

The results from the regression indicated that the model had relatively low explanatory power (R^2=

.07), suggesting that the model explained 7% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .05 increase in schools performing above expectations on NAPLAN reading; this association was not significant (p=.103). When repeated for NAPLAN numeracy, the model also had low explanatory power (R^2= .05), suggesting that the model explained 5 % of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .05 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.141). This suggests that reporting of PA element 9 was not able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests, and that the relationship was likely due to chance.

Overall, the model followed similar patterns to results presented previously, and was more predictive of NAPLAN reading than numeracy scores. The only element to predict reading and numeracy tests with statistical significance was PA element 1, which 'Focuses on children's developmental and learning progress'. Elements 2, 3, 5, 7, and 8 also demonstrated some predictive capabilities, though only on NAPLAN reading tests and with varied statistical significance. Elements 4, 6, and 9 were the only elements with results that were not statistically significant across either test, suggesting that their ability to predict NAPLAN performance independently could not be confirmed.

High- & poor-performing sites

To explore whether the same relationships presented above persisted for both high- and poor-performing schools, the linear regression was repeated with sites categorised as high-performing: at and above expectations, and poor-performing: at and above expectations. Due to a large number of elements and for ease of comparison, the results are presented for the elements overall. Details can be found in Table 7.12 below.

Table 7.12: Association between individual elements of the PA and NAPLAN scores, for sites with four or more documents, controlling for teacher-student ratio, with schools classified as high- or poor-performing

Population approach element	Diagonal classification	NAPLAN test	*n*	R^2	*B*	*Std. Error*	*Sig.*
1. Focuses on children's developmental and learning progress	High-performing	Reading	19	.25	.07	0.03	.039*
		Numeracy	19	.02	.02	0.04	.549
	Poor-performing	Reading	28	.10	.02	0.02	.433
		Numeracy	28	.07	.02	0.02	.465
2. Addresses the determinants of children's progress by exploring the contextual and operational factors at play	High-performing	Reading	19	.34	.08	0.03	.012**
		Numeracy	19	.09	.04	0.03	.227
	Poor-performing	Reading	28	.09	.01	0.02	.544
		Numeracy	28	.05	.00	0.02	.847
3. Uses evidence/ outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities	High-performing	Reading	19	.12	.05	0.03	.183
		Numeracy	19	.01	.02	0.04	.653
	Poor-performing	Reading	28	.18	.05	.03	.094
		Numeracy	28	.10	.04	.03	.254
4. Concerned with the impact of studies to inform the direction and/or to improve educational outcomes. Investments are both short- and long-term	High-performing	Reading	19	.12	.04	.03	.182
		Numeracy	19	.03	.02	.03	.500
	Poor-performing	Reading	28	.08	.01	.02	.805
		Numeracy	28	.06	.01	.02	.758
5. Applies concepts from other disciplines, such as health and wellbeing, to	High-performing	Reading	19	.09	.04	.03	.246
		Numeracy	19	.01	.02	.03	.661

Population approach element	Diagonal classification	NAPLAN test	*n*	R^2	*B*	*Std. Error*	*Sig.*
education settings.	Poor-performing	Reading	28	.16	.03	.02	.134
		Numeracy	28	.09	.02	.02	.303
6. Collaboration occurs with other leaders, educators, and community partnerships	High-performing	Reading	19	.19	.05	.03	.079
		Numeracy	19	.06	.03	.03	.328
	Poor-performing	Reading	28	.11	.02	.02	.347
		Numeracy	28	.06	.01	.02	.689
7. Employs mechanisms for public movement to promote family and community engagement and the value of education	High-performing	Reading	19	.19	.06	.03	.081
		Numeracy	19	.03	.02	.03	.519
	Poor-performing	Reading	28	.08	.01	.03	.792
		Numeracy	28	.06	.01	.03	.673
8. Demonstrates accountability for education outcomes to ensure they are evidence-informed over time	High-performing	Reading	19	.25	.08	.03	.038*
		Numeracy	19	.12	.06	.04	.164
	Poor-performing	Reading	28	.23	.06	.03	.036*
		Numeracy	28	.12	.04	.03	.187
9. Focuses on improving literacy and numeracy	High-performing	Reading	19	.20	.05	.03	.069
		Numeracy	19	.10	.04	.03	.208
	Poor-performing	Reading	28	.10	-.01	.01	.521
		Numeracy	28	.06	-.01	.02	.652

*p < .05 **p < .01 ***p < .001

Summary

Overall, the results presented in Table 7.12 above followed similar patterns to the original regression. Several elements demonstrated good explanatory power: element 1 (R^2=.25), element 2 (R^2=.34), and element 8 (R^2=.25 reading), R^2=.23) with statistical significance.

Comparison across different document types

As three different documents were used in the analyses, the next set of linear regression modelling sought to explore whether any school documents were more predictive of NAPLAN performance above expectations.

All sites

Table 7.13 below shows the analysis results across the annual reports, site improvement plans, and external reviews for all sites with at least four documents overall.

Table 7.13: Association between PA elements and NAPLAN tests for different document types

Document type	NAPLAN test	School sites (*n*)	Documents (*n*)	R^2	*B*	*Std. Error*	*Sig.*
Annual report	Reading	47	114	.21	.10	.03	.002**
	Numeracy	47	114	.16	.09	.03	.006**
Site improvement	Reading	45	89	.02	.01	.04	.801
plan	Numeracy	45	89	.01	-.01	.04	.792
External review	Reading	41	41	.11	.08	.04	.055*
	Numeracy	41	41	.06	.06	.04	.158

*p < .05 **p < .01 ***p < .001

Annual report

Linear regression was conducted to estimate the association between a school's PA score on its annual report documents and whether it was performing above expectations on NAPLAN reading and numeracy tests.

The results from the regression, shown in Table 7.13 above, indicated that the model had moderate explanatory power (R^2= .21), suggesting that the model explained 21% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .10 increase in schools performing above expectations on NAPLAN reading; this association was of strong significance (p=.002). When repeated for NAPLAN numeracy, the model had slightly lower explanatory power (R^2= .16), suggesting that the model explained 16% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .09 increase in schools performing above expectations on NAPLAN numeracy; this association was of strong significance (p=.006). This suggests reporting a school's

PA score on its annual report documents was able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests in 21% and 16% of cases, and that the relationship was not due to chance.

Site improvement plan

Next, a linear regression was conducted to estimate the association between a school's PA score on their site improvement plans and whether the school was performing above expectations on NAPLAN reading and numeracy tests.

The results from the regression indicated that the model had low explanatory power (R^2= .02), suggesting that the model explained 2% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA score corresponded to a .04 increase in schools performing above expectations on NAPLAN reading; this association was non-significant (p=.801). When repeated for NAPLAN numeracy, the model had even lower explanatory power (R^2= .01), suggesting that the model explained 1% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA score corresponded to a .01 decrease in schools performing above expectations on NAPLAN numeracy, which could be interpreted as a 0.01 increase in schools performing below expectations. This association was found to be non-significant (p=.792). This suggests that a school's PA score on its site improvement plans was not able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests, and that any relationship is due to chance.

External review

Finally, a linear regression was conducted to estimate the association between a school's PA score on their external review report and whether the school was performing above expectations on NAPLAN reading and numeracy tests.

The results from the regression indicated that the model had relatively low explanatory power (R^2= .11), suggesting that the model explained 11% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN reading; this association was of low significance (p=.055). When repeated for NAPLAN numeracy, the model had lower explanatory power (R^2= .06), suggesting that the model explained 6% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .06 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.158). This suggests that a school's PA score on its external review documents was somewhat able to predict whether schools would perform better than expected on NAPLAN

reading and numeracy tests in 11% and 6% of cases, though this relationship could be due to chance.

Overall, these results indicate that the school's PA score on the annual reports is the best indicator of whether they will perform above expectations on either NAPLAN test, with the relationship being stronger for NAPLAN reading. The PA score given based on the school's site improvement plan did not predict whether they would perform above expectations on NAPLAN numeracy or reading. As the focus of site improvement plans is determined by the Department's priorities, and generally focuses heavily on literacy and numeracy, the absence of PA elements is unsurprising. The PA score given on external reviews had a low relationship with whether the school would exceed expectations on NAPLAN reading, but had low statistical significance. No relationship was found for NAPLAN numeracy. This low level of predictability may be due to the focus and alignment with the Department's priorities.

As the annual reports were the only documents with a moderate level of predictability and statistical significance, the researcher determined that additional analysis should be undertaken to explore all sites with an annual report, and determine whether a PA score on a single annual report was enough to predict NAPLAN performance.

Regression for document types, categorised as high- or poor-performing

The researcher undertook a linear regression analysis before exploring whether scores on a single annual report would be sufficient to predict NAPLAN performance. This analysis explored whether the same patterns would be found across document types for schools classified as either high-performing or poor-performing.

Table 7.14: Association between PA elements and NAPLAN tests for different document types, with schools categorised as high- or poor-performing

Document type	School classification	NAPLAN test	School sites (*n*)	Docs. (*n*)	R^2	*B*	*Std. Error*	*Sig.*
Annual report	High-performing	Reading	19	47	.43	.08	.02	.003**
		Numeracy	19	47	.18	.05	.03	.078
	Poor-performing	Reading	28	67	.09	.01	.03	.668
		Numeracy	28	67	.07	.02	.03	.533
Site improvement plan	High-performing	Reading	18	31	.00	.01	.03	.827
		Numeracy	18	31	.06	-.02	.03	.570
	Poor-performing	Reading	27	57	.11	.03	.02	.281
		Numeracy	27	57	.04	.01	.02	.736

Document type	School classification	NAPLAN test	School sites (*n*)	Docs. (*n*)	R^2	*B*	*Std. Error*	*Sig.*
External review	High-performing	Reading	18	18	.05	.03	.04	.432
		Numeracy	18	18	.01	-.01	.04	.882
	Poor-performing	Reading	23	23	.14	.02	.03	.458
		Numeracy	23	23	.78	.02	.03	.569

**p < .01

High-performing schools

The results from the regression, shown in Table 7.14 above, indicated that the model had varied explanatory power for high-performing schools. When exploring the annual reports, the model had high exploratory power (R^2= .43), suggesting that the model explained 43% of the results for NAPLAN reading. Regression results further indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN reading; this association was significant (p=.003). When repeated for NAPLAN numeracy, the model had lower explanatory power (R^2= .18), suggesting that the model explained 18 % of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .05 increase in schools performing above expectations on NAPLAN numeracy; this association was not significant (p=.078).

When repeated for school site improvement plans, the model had low explanatory power for NAPLAN reading (R^2= .003) and NAPLAN numeracy (R^2= .06). Finally, when repeated for the school external review documents, the model also had low explanatory power for NAPLAN reading (R^2= .05) and NAPLAN numeracy (R^2= .01). The results were not statistically significant.

Poor-performing schools

The results from the regression, shown in Table 7.14 above, indicated that the model had varied explanatory power for poor-performing schools. When exploring the annual reports, the model had low explanatory power (R^2= .09), suggesting that the model explained 9% of the results for NAPLAN reading. Regression results further indicated that a one-unit increase in PA scores corresponded to a .01 increase in schools performing above expectations on NAPLAN reading; this association was not significant (p=.668). When repeated for NAPLAN numeracy, the model had lower explanatory power (R^2= .07), suggesting that the model explained 7% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .02 increase in schools performing above expectations on NAPLAN numeracy; this association was not significant (p=.533).

When repeated for school site improvement plans, the model had low explanatory power for both NAPLAN reading (R^2= .12) and NAPLAN numeracy (R^2= .04). Finally, when repeated for the school external review documents, the model also had low explanatory power for NAPLAN reading (R^2= .14) and NAPLAN numeracy (R^2= .08). The results were not statistically significant.

All sites with an annual report

As the PA score given to annual reports proved to be the strongest predictor of schools that performed better than expected, all sites with at least one annual report were included in an additional analysis, increasing the school sample size to 59.

All sites

Linear regression was conducted to estimate the association between a school's PA score on its annual report documents and whether it was performing above expectations on NAPLAN reading and numeracy tests.

The results from the regression, shown in Table 7.15 below, indicated that the model had moderate explanatory power (R^2= .17), suggesting that the model explained 17% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .09 increase in schools performing above expectations on NAPLAN reading; this association was highly significant (p=.001). When repeated for NAPLAN numeracy, the model had slightly lower explanatory power (R^2= .13), suggesting that the model explained 13% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .09 increase in schools performing above expectations on NAPLAN numeracy; this association was of strong significance (p=.006). This suggests that a school's PA score on its annual report documents was able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests in 17% and 13% of cases, and that the relationship was not due to chance even if the school only had one report available.

Table 7.15: Association between PA and NAPLAN tests for all schools with at least one annual report (n=130 documents)

NAPLAN test	Schools (*n*)	*B*	*Std. Error*	*Sig.*
Reading	59	.09	.03	.001***
Numeracy	59	.09	.03	.006**

*p < .05 **p < .01 ***p < .001

The linear regression analysis in Table 7.15 demonstrates that having a PA score on even one annual report was more predictive of schools performing above expectations on both NAPLAN tests. However, these results should be interpreted with caution as more off-diagonal schools were added to the sample, which had only one report available, which could have biased the results.

At least one annual report by high- or poor-performing

Logistic regression was undertaken to explore whether the patterns in seen in Table 7.15 above were true for schools when categorised as either high-performing or poor-performing.

Table 7.16: Association between PA elements and NAPLAN tests for all schools with at least one annual report, with schools categorised as high- or poor-performing

	NAPLAN test	Schools (*n*)	r^2	*B*	*Std. Error*	*Sig.*
High-performing	Reading	26	.17	.05	.02	.041*
	Numeracy	26	.04	.03	.03	.386
Poor-performing	Reading	33	.11	.00	.02	.932
	Numeracy	33	.08	.00	.03	.935

*p < .05 **p < .01 ***p < .001

High-performing schools

The results from the regression, shown in Table 7.16 above, indicated that the model had varied explanatory power. When exploring the NAPLAN reading tests, the model had moderate explanatory power (R^2= .17), suggesting that the model explained 17% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .05 increase in schools performing above expectations on NAPLAN reading; this association was of moderate significance (p=.041). When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .04), suggesting that the model explained 4% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .03 increase in schools performing above expectations on NAPLAN numeracy; this association was non-significant (p=.386). This suggests that a school's PA score on its annual report documents was able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests in 17% and 4% of cases, and that the relationship was unlikely to be due to chance.

Poor-performing schools

The results from the regression, shown in Table 7.16 above, indicated that the model had varied explanatory power for poor-performing schools. When exploring the NAPLAN reading tests, the model had moderate explanatory power (R^2= .11), suggesting that the model explained 11% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .002 increase in schools performing below expectations on NAPLAN reading; this association was not significant (p=.932). When repeated for NAPLAN numeracy, the model had low explanatory power (R^2= .08), suggesting that the model explains 8% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores

corresponded to a .002 increase in schools performing below expectations on NAPLAN numeracy; this association was not significant (p=.935). This suggests that a school's PA score on its annual report documents was able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests in 11% and 8% of cases, and though this relationship is likely due to chance.

Comparison of annual reports across reporting years

When completing the data extraction, the researcher noted that reports from 2015 tended to include far more information, as they were based on a more flexible Department template. However, in 2016, the Department of Education introduced a new template that focused more heavily on literacy and numeracy. As the content of these reports and reporting varied significantly between 2015 and 2016, the researcher decided to explore if there was a difference between the annual reports for each year to determine if longer reports include more information and therefore were better at reporting PA activities.

All sites

Linear regression was conducted to estimate the association between a school's PA score on their annual report documents in a single year and whether the school was performing above expectations on NAPLAN reading and numeracy tests.

Table 7.17: Annual reports across the years

Year	NAPLAN test	*n*	r^2	*B*	*Std. Error*	*Sig.*
2015	Reading	43	.172	.08	.03	.007**
	Numeracy	43	.136	.08	.03	.019**
2016	Reading	33	.180	.08	.03	.015**
	Numeracy	33	.133	.07	.03	.042*
2017	Reading	37	.255	.11	.03	.002**
	Numeracy	37	.211	.10	.04	.005**

*p < .05 **p < .01 ***p < .001

Annual reports from 2015

The results from the regression, shown in Table 7.17 above, indicated that the model had moderate explanatory power (R^2= .17), suggesting that the model explained 17% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN reading; this association was of strong significance (p=.007).

When repeated for NAPLAN numeracy, the model had slightly lower explanatory power (R^2= .14), suggesting that the model explained 14% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN numeracy; this association was found to be of moderate significance (p=.019). This suggests that a school's PA score on its 2015 annual report documents was able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests in 17% and 14% of cases, and that the relationship was unlikely to be due to chance.

Annual reports from 2016

The results from the regression, shown in Table 7.17 above, indicated that the model had moderate explanatory power (R^2= .18), suggesting that the model explained 18% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .08 increase in schools performing above expectations on NAPLAN reading; this association was of moderate significance (p=.015).

When repeated for NAPLAN numeracy, the model had slightly lower explanatory power (R^2= .13), suggesting that the model explained 13% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .07 increase in schools performing above expectations on NAPLAN numeracy; this association was of moderate significance (p=.042). This suggests that a school's PA score on its 2016 annual report documents was able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests in 18% and 13% of cases, and that the relationship was unlikely to be due to chance.

Annual reports from 2017

The results from the regression, shown in Table 7.17 above, indicated that the model had good explanatory power (R^2= .26), suggesting that the model explained 26% of the variation in the outcome variable. Regression results further indicated that a one-unit increase in PA scores corresponded to a .12 increase in schools performing above expectations on NAPLAN reading; this association was of very strong significance (p=.002).

When repeated for NAPLAN numeracy, the model also had good explanatory power (R^2= .21), suggesting that the model explained 21% of the variation in the outcome variable. The regression results indicated that a one-unit increase in PA scores corresponded to a .10 increase in schools performing above expectations on NAPLAN numeracy; this association was of strong significance (p=.005). This suggests that a school's PA score on its 2017 annual report documents was able to

predict whether schools would perform better than expected on NAPLAN reading and numeracy tests in 26% and 21% of cases, and that the relationship was not likely to be due to chance.

Overall, these results indicated that PA scores based on annual reports from 2017 were the most predictive of whether a school would exceed expectations on NAPLAN tests. This relationship was significantly predicted for both the reading and numeracy tests, and therefore, was unlikely to be due to chance. PA scores based on annual reports from 2015 were also moderately predictive of whether a school would exceed expectations, but only on NAPLAN reading tests, and not to the same degree as the 2017 reports.

Annual report years, by high- or poor-performing

The previous analyses were repeated using the two distinct categories to determine if there were any differences between high- and poor-performing schools, and to explore the ability of the model to differentiate between the two using annual reports.

Table 7.18: Annual reports across the years by high- or poor-performing

Year	School classification	NAPLAN test	*n*	r^2	*B*	*Std. Error*	*Sig.*
2015	High-performing	Reading	18	.53	.09	.02	<.001***
		Numeracy	18	.32	.07	.03	.018**
	Poor-performing	Reading	25	.08	-.01	.02	.843
		Numeracy	25	.05	.00	.02	.931
2016	High-performing	Reading	15	.34	.06	.03	.032*
		Numeracy	15	.21	.04	.03	.175
	Poor-performing	Reading	18	.02	.01	.03	.821
		Numeracy	18	.00	.00	.03	.849
2017	High-performing	Reading	14	.55	.08	.02	.005**
		Numeracy	14	.24	.06	.03	.090
	Poor-performing	Reading	23	.15	.04	.03	.286
		Numeracy	23	.13	.04	.03	.314

*p < .05 **p < .01 ***p < .001

High-performing schools

The results from the regression, shown in Table 7.18 above, indicated that the model had reasonable explanatory power for high-performing schools, particularly for NAPLAN reading across 2015 (R^2= .53) and 2016 (R^2= .34) and 2017 (R^2= .55). This suggests that 53%, 34% and 55% respectively of the variation in the outcome variable was explained by the model. These results were also statistically significant, indicating that the relationship between PA scores on annual reports and performing above expectations was unlikely due to chance. When repeated for

NAPLAN numeracy, the model also had moderate explanatory power across 2015 (R^2= .32), 2016 (R^2= .21) and 2017 (R^2= .24). This suggests that the model explained 32%, 21%, and 24% respectively of the variation in the outcome variable. Using the model to explore the association between PA scores on the 2015 annual reports and NAPLAN numeracy scores was also of moderate statistical significance, which was unlikely to be due to chance (p=0.18). This suggests that a school's PA score on its annual report documents was able to predict whether schools would perform better than expected on NAPLAN reading and numeracy tests in the majority of cases in 2015 and 2017.

Poor-performing schools

The results from the regression, shown in Table 7.18 above, indicated that the model had low explanatory power for poor-performing schools, particularly for NAPLAN reading across 2015 (R^2= .08), 2016 (R^2= .02), and 2017 (R^2= .15). This suggests that 8%, 2%, and 15% respectively of the variation in the outcome variable was explained by the model. These results were not statistically significant. When repeated for NAPLAN numeracy, the model also had very low explanatory power across 2015 (R^2= .05), 2016 (R^2= .003), and 2017 (R^2= .13) suggesting that 5%, 0.3%, and 13% respectively of the variation in the outcome variable was explained by the model. These results were also not statistically significant. This suggests that a school's PA score on its annual report documents was only able to predict whether schools would perform below than expected on NAPLAN reading and numeracy tests in a small number of cases.

Binary logistic regression

Initial tests to ensure the model did not violate the assumptions were conducted (Peng et al., 2002). First, the researcher confirmed that the outcome was discrete, i.e., the dependant variable (off-diagonal) was dichotomous (yes or no). Second, there were no outliers in the data, as determined by the Mahalanobis distance. Third, there were no high intercorrelations. Finally, the continuous variables were related to the log odds; therefore, the relationship between the logit of the outcome and each continuous independent variable was linear. However, it is important to note that the sample size for these data was very small, which can be problematic when conducting logistic regressions (Nemes et al., 2009). The implications of this sample size are discussed in the discussion section of this chapter.

For sites with four or more docs

A logistic regression analysis was conducted to investigate whether a higher PA score was associated with performing above expectations on NAPLAN reading and numeracy for sites with four or more documents. The cut off for schools with '4 or more documents' was used as it was determined to be the most predictive in the analyses presented in the Section 'Testing the model on sites with fewer documents'.

In the logistic regression analysis, the predictor variable, total PA score, was found to contribute to the model; however, the effect was not significant (p=.237), as shown in Table 7.19 below. A one-unit increase in PA score was associated with 2.6 times higher odds of being off-diagonal positive (95% confidence interval [CI] = .53, 13.25). The logistic regression was repeated for poor-performing sites. Total PA was found again to contribute to the model; however, the effect was not significant (p=.509). A one-unit increase in PA score was associated with 2.3 times higher odds of being off-diagonal negative (performing worse than expected) (95% confidence interval [CI] = .20, 26.17).

Table 7.19: Odds of performing better or worse than expected based on the site PA scores (n=57)

Diagonal classification	Source	*B*	*SE B*	*Wald*	*P*	*OR*	95% CI OR	
							LL	*UL*
Off-diagonal positive	Total PA score	.97	.82	1.40	.237	2.65	.53	13.25
Off-diagonal negative	Total PA score	.82	1.25	.44	.509	2.28	.20	26.17

Overall, the model shows that schools that performed better than expected had 2.65 times greater odds of having higher PA scores across their site documents. This analysis indicated an association; however, this could not be confirmed statistically due to the small sample size.

For sites with four or more docs, including student-teacher ratio

Building on the previous analysis, the logistic regression was repeated; however, this time including the student-teacher ratio as a potential confounder. As the student-teacher ratio had an impact on the results presented in Table 7.6 and Table 7.7, the researcher sought to determine whether the same relationship would be seen in a binary classification of sites that performed better or worse than expected. As shown in Table 7.20 below, the odds ratios were reduced once the student-teacher ratio was added to the model. This did not significantly influence the likelihood of a school being off-diagonal.

Table 7.20: Odds of performing better or worse than expected based on the site PA scores, including the interaction of student-teacher ratio

Diagonal classification	Source	*B*	*SE B*	*Wald*	*P*	*OR*	95% CI OR	
							LL	*UL*
Off-diagonal positive	Student teacher ratio by Total PA score	.15	.09	2.64	.104	1.16	.97	1.38
Off-diagonal negative	Student-teacher ratio by Total PA score	-.00	.06	.00	.948	0.99	.89	1.12

The model shows that schools that performed better than expected were 1.16 times more likely to have higher PA scores across their site documents after adjusting for student-teacher ratio. For sites that performed worse than expected, the model shows that they were .9 times more likely to have higher PA scores across their site documents.

For sites with one or more docs

As the small sample size may reduce the ability to detect effects, the researcher decided to explore whether adding all schools with at least one document available to the model would improve the model's power. As shown in Table 7.21, schools that performed better than expected were 2.04 times more likely to have higher PA scores across their site documents. For sites that performed worse than expected, the model shows that they were 3.2 times more likely to have higher PA scores across their site documents.

Table 7.21: Odds of performing better or worse than expected based on the site PA scores (n=63)

Diagonal classification	Source	*B*	*SE B*	*Wald*	*P*	*OR*	95% CI OR	
							LL	*UL*
Off-diagonal positive	Total PA score	.71	.72	.98	.322	2.04	.50	8.35
Off-diagonal negative	Total PA score	1.16	1.17	.99	.319	3.20	.33	31.3

Compared to the previous results in Table 7.19, this model demonstrated reduced odds for high-performing schools (from 2.65 to 2.04, respectively). However, the explanatory nature of the model for poor-performing schools increased (from 2.28 to 3.20 respectively), demonstrating higher odds ratios. This improvement was likely due to the increase in sample size. This suggests that the model was better than the previous model at predicting whether a school would be poor-performing, than if it were to be high-performing based on its total PA score.

Logistic regressions with alternate classifications: high-/low-performing

Finally, the researcher explored whether using alternate cut-offs for high- or low-performing would increase the predictive nature of the model. These categories differed from those presented previously. Instead of using four classifications (high-performing as expected, high-performing better than expected, poor-performing as expected, and poor-performing lower than expected), there were only two, high-performing and low-performing. These classifications would hopefully provide an insight into high- and poor-performing school characteristics overall, rather than differentiating between those that had performed differently than expected. Schools with at least one site document were included, as previous analyses in Table 7.21 indicated that an increased sample size would improve the model.

Table 7.22: Likelihood of being a high-performing school based on the site PA scores (n=63)

Diagonal classification	Source	*B*	*SE B*	*Wald*	*P*	*OR*	95% CI OR	
							LL	*UL*
High-performing schools	Total PA score	1.02	.49	4.29	.038*	2.77	1.06	7.24

*p < .05

The model presented in Table 7.22 shows that high-performing sites were 2.77 times more likely to have a higher total PA score across their site documents (95% confidence interval [CI] = 1.06, 7.24). The results were moderately statistically significant (p=.038).

My Schools supplementary data

In order to gain a deeper understanding of the characteristics of school sites included in the analysis, additional data on their location, staff, socio-economic status, attendance and funding as provided by My Schools, is provided in Table 7.23 and Table 7.24 below. The sites included in this data were those with 4 or more documents available, and therefore were used in the majority of the regression analyses above.

As shown below, the sites were generally located in major cities, although a few inner regional and outer regional sites were included. This skew in location is likely due to the original controls, in which small schools with fewer than 10 children were excluded from the analysis (more information is available in Chapter 8). Additionally, there were fewer on-diagonal schools that performed as expected. This was a deliberate decision made prior to analysis, as initial plans to interview at school sites focused on schools doing something different to shift children's outcomes, and through this, classifying the sites as performing better or worse than expected.

Table 7.23: Location of sites included in the analysis (with four or more documents) based on their on/off-diagonal classification

Location	Worse than expected	As expected, (poorly)	As expected, (well)	Better than expected
	n	*n*	*n*	*n*
Major cities	13	3	3	8
Inner regional	5	0	1	3
Outer regional	6	1	1	2
Remote	0	0	1	0
Total	24	4	6	13

To minimise the likelihood of sites being identified, Table 7.23 presents contextual data for the schools included in the analysis based on their classification as poor-performing or high-performing. Most of these items were not included in the statistical models presented earlier in this

chapter, except for 'Number of teaching staff'. As described earlier, this item was included in the model as interview participants in Chapter 4 described it has having an impact on staffing and resourcing allocation. In addition, several items were not included in the model as they were already included in Chapter 6, where the sites were identified for further analysis. Therefore, these variables were not adjusted in our subsequent analysis. This included ICSEA[3], the percentage of male students, and the percentage of students who identified as Indigenous or with a language background other than English. The remaining factors, FTE teaching staff, non-teaching staff, attendance level, and total income were not included in the model as there was no way to differentiate the items for the students in the analysis, and there had not been prior results to indicate that including them would be beneficial, as there had been for the inclusion of teaching staff.

Table 7.24: Characteristics of school sites included in the analysis based on their diagonal classification

School characteristics	Poor-performing	High-performing
	Mean (range)	*Mean (range)*
Teaching staff (n)	23 (4-48)	28 (6-96)
FTE Teaching staff (n)	20 (3-41)	24 (6-89)
Non- teaching staff (n)	12 (2-26)	15 (5-38)
ICSEA (value)	1017 (824-1147)	972 (853-1138)
Enrolments (n=male)	168 (13-393)	185 (42-723)
Indigenous (% yes)	5.315 (0-36)	6.66 (0-17)
LBOTE (% yes)	18.855 (0-32)	13.125 (0-59)
Attendance level (proportion of students attending 90% or more of the time)	75.02 (41-86)	72.135 (54-85)

[3] ICSEA values are calculated on a scale which has a median of 1000 and a standard deviation of 100. ICSEA values typically range from approximately 500 (representing schools with extremely disadvantaged student backgrounds) to about 1300 (representing schools with extremely advantaged student backgrounds). In broad terms, the ICSEA model is based on the following formula: ICSEA = SEA + Remoteness + Percent Indigenous student enrolment Assessment, A. C., & Reporting Authority. (2016). *Guide to understanding the Index of Community Socio-educational Advantage (ICSEA)*. https://docs.acara.edu.au/resources/Guide_to_understanding_icsea_values.pdf

Total income (Net recurrent income after deductions per student, $)	14,019.164 (10,086 – 29,001)	13,660.825 (10,245 – 18,691)

The figures presented in Table 7.24 above demonstrate the variation in school resources and students across the sites classified as poor-performing or high-performing. Overall, the data shows that high-performing sites had a greater number of teaching staff on average (28 compared to 23), more full-time teaching staff (24 compared to 20), and more non-teaching staff (15 compared to 12). The sites also had a lower Index of Community Socio-Educational Advantage (ICSEA) score, a higher number of male students (185 compared to 168), and a lower percentage of students with a language background other than English (LBOTE) (13.125% compared to 18.855%). High-performing sites had a higher percentage of students who identified as Indigenous (6.66% compared to 5.315%), a lower proportion of students attending 90% or more of the time (72.135% compared to 75.02%), and a lower total income ($13,660.825 compared to $14,019.164).

Discussion

The Federal Government sees NAPLAN as a critical program for promoting quality education in Australia, and for promoting accountability and transparency (Thompson, 2014). However, one common criticism of NAPLAN is that it does not map student engagement, learning, and achievement outside of narrow benchmarks (Ragusa & Bousfield, 2017; Rose et al., 2020; Tan, 2013). Some critics believe that NAPLAN is not an accurate measure of students' abilities and contains a degree of measurement error (Holmes-Smith, 2005; Rogers et al., 2016; Rose et al., 2020). It is also worth noting that NAPLAN results give schools an idea of students who may need extra support and where cohorts can be supported. The results presented in this chapter should be interpreted to understand that NAPLAN presents a snapshot of children's development at a point in time and may be more helpful for understanding the school as a whole.

Summary of results

This study used regression analyses to explore the relationship between PA scores on school documents and school performance (classified as performing better, worse, or as expected) on Year 3 NAPLAN reading and numeracy tests. As this research has been the first to convert the PA to a quantifiable framework for education in Australia, it was essential to test as many factors as possible to fully understand its potential utility. Overall, the results indicated that the model had varied predictive capabilities depending on the NAPLAN test, the site document used, and the publication year of the document. The model was highly predictive of schools that performed above expectations on NAPLAN reading. Out of the school documents analysed, the results indicated that the PA score given to school annual reports was the most predictive of whether a school performed better than expected, particularly in NAPLAN reading. The results suggested that

schools should have at least four of the seven possible documents to allow for the most accurate analysis; however, where schools only provided one document, the model was still valuable. Finally, the teacher-student ratio was included in some models as it was thought to have an impact on NAPLAN results; however, this was only true in some cases.

The PA scores given to annual reports held the most predictive capabilities of children's NAPLAN performance. This is likely due to the high level of detail provided in the documents compared to the site improvement plans and external reviews. The annual reports from 2015 demonstrated the highest level of predictability compared to 2016 and 2017. One explanation may be the shift to a standard template in 2016. In 2016, the South Australian Department for Education required schools to use a standard template to present their annual report. For some schools, this shift provided a more precise structure of the type of activities to report on and resulted in higher quality output. However, for others, this shift resulted in a significantly shorter report than in previous years, and the detail of some activities was lost. Overall, the shift to a standard template is viewed within this research as beneficial, as it allowed for easier comparison across school sites over the years and ensured that a minimum level of quality was maintained regardless of the school staff member tasked with writing the report.

Site improvement plans may not be useful for tracking the presence of PA elements within schools, as current Department priorities drive their content. For example, the plans included in this analysis were heavily focused on literacy and numeracy activities to align with the current priorities (Department for Education South Australia, 2021). While the plans still provide useful insight into how the school is acting to achieve their benchmarks and targets, they do not appear to provide any use for assessing PA activities.

The external review documents were included in the analysis as schools viewed them as essential documents for assessing their work by the Department for Education. However, when analysing the documents, it became clear that the documents only focused on specific areas linked to the previous review and the school site priorities. Therefore, the presence of PA elements in the reports was highly varied, with some schools reporting significantly on activities that reflected the PA and others not reporting any. While the external reviews are essential for the school and Department processes, the documents do not appear to have much use in assessing the presence of PA activities within the school and should not be included in future analyses.

One suggestion for why the model may be more helpful in predicting reading scores is that NAPLAN numeracy outcomes may be more difficult to shift (Braeuning et al., 2020; Meiers et al., 2006; Weekes & Jones, 2021). Research by Braeuning et al. (2020) demonstrated that children's numeracy outcomes are more likely to remain stable over time. Additionally, interventions to improve numeracy capabilities have had varied success (Nelson & McMaster, 2019) compared to interventions targeting children's reading (Dietrichson et al., 2020; Gersten et al., 2020; Meiers et

al., 2013). This may be because of the intentional strategies used to teach reading skills, which are more accessible for parents within the home, leading to more practice and better results (Dietrichson et al., 2020; Dowker, 2016; Sloat et al., 2015).

Significance

The results in this chapter support previous research, which suggests that intervening to improve children's learning and development early is beneficial for later academic outcomes (Abrahamse et al., 2018; Diamond et al., 2013). NAPLAN testing represents a considerable investment by the Australian Government and schools to identify where students may need additional support (Wyatt-Smith & Jackson, 2016). However, by the time children sit their first NAPLAN assessment, they have already received three years of formal schooling at a time in their lives when their brain is developing through critical periods of growth (Bronson, 1962; Halfon et al., 2001; Shayer & Adhami, 2010). Therefore, understanding where children could be supported earlier and intervening to address vulnerabilities represent a critical opportunity.

This concept is further recognised by the Capability Approach, which understands that an individual's ability to engage in economic transactions, make the most of educational opportunities, and live to old age are considered substantive freedoms and are influenced by their capabilities (Chiappero-Martinetti & Venkatapuram, 2014; Sen, 1992). Sen's approach (1992) considers how education sites and settings affect children's abilities to reach their full developmental potential. Within this study, the results suggest that schools employing aspects of the PA can have a significant positive impact on improving children's academic achievement. Educators are more likely to see greater and long-lasting results by intervening early in children's lives. In addition, as NAPLAN achievement tends to remain stable for children between Year 3 and Year 9, intervening to alter these outcomes before their first assessment presents a unique opportunity to shift their academic trajectory (Manning & Patterson, 2005). Ultimately, this approach is likely to improve outcomes for all children as the activities require a whole of school approach to development, reaching beyond those who need additional support (Lewallen et al., 2015).

Strengths and limitations

A key strength of this research is that it is the first of its kind to provide a clear outline of what the PA looks like in the school setting in Australia along with a rating system demonstrating what a high-quality application of the approach might look like. This allows schools to consider whether integrating elements of the approach might be beneficial for them, and enables tracking and evaluation of how well the elements have been incorporated. The results show that integrating a PA into planning is beneficial for students' outcomes in Year 3 on NAPLAN reading tests.

As mentioned at the beginning of this chapter, this study was initially intended to involve schools in in-person interviews, to understand the type of activities that had occurred at the school between

2015 and 2017, which may be attributed to a shift in children's academic outcomes from what could be predicted. Due to COVID-19, the study was adjusted to minimise the stress and burden placed on educators during an unprecedented time. Therefore, it is important to recognise that the sample analysed in this research is small, and the methods undertaken may not be ideal for developing and testing of an instrument. Should this approach be considered for integration within the school system, additional testing with a larger sample size would be required to test the validity of the instrument.

Assessment through rubrics is associated with some level of subjectivity and may be influenced by the assessors' understanding or opinion of the document (Jonsson & Svingby, 2007). Although the rubric was tested before use, and multiple assessors were involved in ensuring there was a level of agreement on what constitutes the achievement of each level, there remains a chance that the researcher's assessment influenced the results.

Implications for policy

This research may help inform policy suggestions on best practices for shifting outcomes through educational planning processes. Short-term benefits associated with the work include an increased understanding of the practices in schools that may influence greater than expected gains in children's academic achievement, and a deeper consideration of how these practices relate to the aforementioned PA. In the longer term, the results could be used to inform future supports and resources for schools to ensure that children can achieve academic success and areas that require improvement are identified during the critical early development years. Knowledge of the activities, combined with the barriers and enablers for effectively shifting developmental outcomes at an early age, could have a significant impact on how schools, communities, and governments focus their time and efforts. Improving outcomes in the education sector could contribute to reducing later educational inequities by acting on and minimising the achievement gap for children in the early years.

Generally, the PA is proactive in catering for children's needs. It requires schools to use data to identify needs before children enter the classroom, and to work with families and the community before the first NAPLAN assessment to shift outcomes. This is a different approach for some schools that work by understanding children's individual needs and personalising for each child through differentiated teaching. However, this shift could result in a less reactive planning and classroom management approach. Through collaborations and partnerships with other schools and community groups, the distribution of resources could result in a shared financial investment, ultimately lowering costs over time. Moreover, it would mean a reduction in the duplication of services across sites.

The results from this chapter could have utility within policy, as the PA could provide a framework for the Department for Education to assess how well schools are working with the community to

shift outcomes. Similarly, schools could use the approach to determine whether their programs and interventions are underpinned by evidence, collaboration, and an understanding of needs. This could mean an advanced monitoring approach for schools, including additional elements in school review documents. This approach could see schools working to address children's holistic development through evidence-informed practices.

Future research

Future research should explore the utility of the PA testing rubric further to determine whether greater sensitivity between the categories would be beneficial, assess the validity of the rubric, and increase the number of schools assessed to confirm the measure's reliability. Additionally, the findings from this study did not demonstrate a strong relationship between the presence of PA elements and NAPLAN reading scores. This may have been due to the small sample size of school sites and should be investigated further in future research. Additionally, it may be interesting to consider whether the PA is associated with wellbeing outcomes, such as that measured by the Wellbeing and Engagement Collection (WEC) (Gregory et al., 2021). Future research should also investigate the applicability of the approach for Catholic and Independent schools to determine whether it is appropriate for use. Students attending non-government schools are more likely to live outside of the school suburb, and therefore, applying the PA elements that centre around working with the community may not have the same effect.

Conclusion

This chapter used linear and logistic regressions to explore whether schools that performed above expectations included more PA elements in their planning and activities than those that performed below expectations or as expected. The results showed that to varying degrees, schools whose site documents included more PA elements were more likely to be high-performing and performing better than expected. For the most accurate results, schools should be assessed on at least 4 of the site documents, with preference given to annual reports. Future research should explore the validity and reliability of the instrument, its applicability for non-government schools, and its links to student wellbeing.

Chapter summary

In this chapter statistical methods were used to examine the content of school-level education documents reflective of PA. . A large number of analyses were undertaken to explore the utility of various elements, site documents, and publication years to determine if there were differences between them. This research is the first to convert the PA to a quantifiable framework for education in Australia and test the predictive capability of the scores. These findings are of great significance to this thesis, as they demonstrate that schools that undertake more elements of the PA in their work, as reported in their site documents, are more likely to shift student outcomes

between the first year of full-time school and their NAPLAN reading and numeracy tests in Year 3. The results further endorse the integration of PA elements in schools, as doing so appears to be beneficial for student outcomes.

CHAPTER 8. DISCUSSION

Introduction

This chapter discusses the findings from each of the studies within this body of research in relation to the elements of the population approach (PA). The research question and aims are revisited, and an evaluation of the findings will assist with conceptualising the PA for education. First, the researcher will present each of the PA elements proposed in Study 1, the findings from each of the studies, and how these relate to broader existing research. Within this, a model of the PA will be proposed which encompasses the theoretical framework initially proposed, and includes additional details from the empirical research which contextualise the model for practical use. Next, the chapter discusses the overall cultural, social, economic, and policy implications of the thesis and suggests where additional research may be required. Finally, the challenges associated with the research will be discussed, particularly regarding conducting fieldwork during a global pandemic, and the strengths and limitations of the thesis.

This PhD thesis explores the question: *Why, how, and in which contexts can a population health approach be applied to school planning to support children's early development?* The studies within the thesis investigate the presence and applicability of the PA to the education system, schools, and cohorts in Australia by addressing the following aims:

1. Investigate what is currently known about the applicability of PAs to planning in school settings, and the extent to which applying relevant concepts such as collaboration, data use, and the consideration of risk and protective factors are likely to improve children's outcomes.
2. Investigate the presence of elements of a PA in national frameworks to better understand educator motivations, their ability to integrate the approach into their planning, and agencies that play a role in supporting school planning.
3. Identify to what extent elements of a PA are evident in educators' planning, the barriers and facilitators to working in this way, and the benefits these practices have for children's learning, development.
4. Understand the perceptions of policy actors of the factors which facilitate or constrain the development of planning practices.
5. Identify South Australian schools that performed either above expectations, below expectations, or as expected on the Year 3 NAPLAN as predicted by the students' AEDC score at school entry.
6. Explore whether schools whose children performed above expectations on NAPLAN Year 3 assessments, as predicted by their early functioning, included more PA elements in their planning and activities than those that performed below expectations or as expected.

In order to meet these aims, 6 studies were conducted: a critical interpretive synthesis of all available literature on PAs in education (Study 1); a document analysis of 6 Australian education planning and curriculum frameworks (Study 2); 20 interviews with school leaders and educators across 2 Australian jurisdictions (Study 3); 11 interviews with policy-makers across 2 Australian jurisdictions (Study 4); a linear regression analysis which identified schools that performed as expected, as well as above and below expectations on NAPLAN Year 3 reading and numeracy tests, as predicted by their AEDC scores (Study 5); and a mixed-methods analysis of school planning documents for the previously identified schools (Study 6).

Population approach elements

The PA approach described initially by Health Canada (2001) is recognised for reducing healthcare demand and contributing to health system sustainability, aiming to improve the health of entire populations and reduce health inequities among population groups by considering the risk factors and conditions that influence health. Adapted for use by educators, the model proposed by the researcher in Study 1 presented a concept that could support children's development and improve outcomes for more children. The concept promotes interdisciplinary collaboration and partnerships, working at various levels to understand the risk factors that have an impact on children's development, and working at various levels to modify and reduce the extent to which these cause later issues. Each of the elements included in the approach already existed to some degree within leader and educator practices and planning. For some, the elements and a general understanding of the socioecological model and its impact on children's learning and development were at the core of their work; therefore, integrating the approach may not have been different from their already existing work. However, the elements represented a significant shift in understanding and existing practice for others. System change also requires a range of drivers and supports. As presented in the section below, elements of the approach already exist within education; however, application of the approach in its entirety is lacking. The results also indicate that applying the approach as a whole would be more likely to generate improved outcomes for children. The PA elements and the findings from each of the studies within this thesis are presented below to demonstrate the use and suitability of the items for education.

Focus on children's developmental and learning progress

The first element of the PA, 'focus on children's developmental and learning progress' emerged from a comparison of the health concept, which focuses on the health of populations using indicators for measuring health status (Health Canada, 2001; Wilson et al., 2019). The element is driven by understanding what affects children's academic development and learning, informed by the use of individual and community data, to understand where children may face challenges and could benefit from additional support. The findings in this thesis resonated with PA element 1 most strongly in Studies 2, 3, 4, and 6. Examples of this element were present across four frameworks in

Study 2 (see Chapter 3), demonstrating how educators were expected to incorporate various strategies to respond to children's needs and promote success, including scaffolding their teaching.

As demonstrated by the analysis in Study 6 (Chapter 7), schools that engaged and reported on how they focused on children's developmental and learning progress were more likely to positively shift children's Year 3 NAPLAN scores in literacy and numeracy. Sites that did this well focused on academic learning and development progress, used data to understand needs, and incorporated this data into planning at a site level. Results from the quantitative analysis suggested that schools whose site documents included examples of this PA element that were considered and with a well-articulated application were more likely to have higher than expected NAPLAN reading and numeracy scores.

Leaders' and educators' use of data was facilitated by an expectation set by the jurisdiction's education department. This encouraged schools to interrogate the data and contextualise it by applying it at the child, cohort, and school levels to better inform the narrative and responsive learning and teaching (see Study 4 in Chapter 5). This was further supported by school policies which allowed sufficient time to interrogate its meaning and apply it to the school context, such as additional planning time and staff meetings. During interviews with educators in Study 3 (see Chapter 4), they discussed how data describing the community's level of disadvantage could be used to support their planning by providing a deeper understanding of both the needs of the children and families and the services they may have access to. This was understood to be evident in the intentionality of planning at the school and child level, identifying the underlying needs of the children, and providing 'wraparound supports' at a school level (Bartlett & Freeze, 2018; Newman et al., 2022). Data such as the AEDC were used by those in leadership positions within the school, although with a limited understanding of its value at a population level. There was, however, a sound understanding by policy-makers of the value of the data set in understanding the needs of children in the jurisdiction and identifying patterns in development.

PA element one resonates strongly with the existing literature on children's developmental and learning progress (Health Canada, 2001; Wilson et al., 2019). This is particularly relevant when considering how effective early identification and prevention of children experiencing developmental vulnerabilities can have a positive impact on children's experience and engagement in short-, medium- and longer-term timeframes. Insufficient understanding or acquisition of foundational concepts and skills can impede children's participation and progress, resulting in children who can become less motivated with compounding challenges. 'Matthew effects' traditionally describe a pattern in which those who begin with advantage accumulate more advantage over time, and those who begin with disadvantage become more disadvantaged over time (Crystal et al., 2017). Students' early success in acquiring skills usually leads to later success

in reading, while those struggling in the early years may indicate lifelong problems in learning new skills (Kempe et al., 2011; Skibbe et al., 2019). Emergent literacy and early reading are highly topical, with jurisdictions, systems, and schools seeking to strengthen practice, even initiating changes to Initial Teacher Education (ITE) in response to national priorities in this space (Department of Education Employment and Workplace Relations (DEEWR), 2022). It is widely understood that children who commence school behind often stay behind, and children from lower SES backgrounds are more likely than their more advantaged peers to experience continued difficulties even where early prevention has occurred (Teager et al., 2019). However, raising the mean achievement and reducing variance in achievement are two problems that require different types of interventions. Larsen and Little (2021) suggest that raising the achievement of high achieving children may come at the expense of children at the lower end. Therefore, improving the fundamental skills attainment of all children across the achievement spectrum should be a central concern of both governments and schools (Larsen, 2021). All children participate in Tier 1 instruction, with Tier 2 reserved for children whose needs may be addressed through small group intervention, and then Tier 3, with children whose needs are best addressed on a one-on-one basis (Atkin & Foster, 2008). All children benefit when Tier 1 instruction is high quality, sustained, and evidence-informed (Atkin & Foster, 2008). This multi-tiered approach aligns with another health concept 'propionate universalism', an approach that balances targeted and universal intervention at a scale and intensity proportionate to the degree of need (Carey, Crammond & De Leeuw, 2015).

Address the determinants of children's progress by exploring the contextual and operational factors at play

PA element 2 addresses the determinants of children's progress by exploring the contextual and operational factors at play, and is supported by the findings in Studies 2, 3, and 6. It was derived from the health element, which addresses the determinants of health and their interactions by analysing and measuring their relationships (Health Canada, 2001; Wilson et al., 2019). Understanding of risk factors is what underpins this element; how they are determined, which approaches are taken to modify the conditions, and the extent to which action reduces later issues. Educators frequently use knowledge of children and their families to positively impact children's learning and development, and seek to connect families to services such as government or other agencies (e.g., allied health professionals) when needed. Where educators develop an understanding of their communities and children's past experiences, which may contribute to their learning experience, this is likely to improve the conditions in which children can develop and grow. Educators may also advocate to leaders of the systems to which they belong for broader, impactful system change, particularly for the most vulnerable families. Examples of this element occurred 44 times across 7 documents (see Study 2 in Chapter 3), often asking educators to recognise the potential barriers to success and to plan appropriately within the curriculum offered to children. This PA element has a strong focus on inclusion and responding to the needs of children with

diverse backgrounds, encouraging educators to facilitate learning through building on children's strengths, prior knowledge, and experience, and supporting children at the point of need.

Schools that engaged and reported on how they addressed the determinants of children's progress were more likely to positively shift children's NAPLAN scores in literacy and numeracy, as demonstrated in Study 6 (see Chapter 7). Sites that did this well, articulated coherently how children's past experiences affect progress and were able to illustrate with evidence to support this position. As measured by NAPLAN performance, schools creating positive impacts on children's achievement by addressing determinants also described how they work with families and the community to address disadvantage. The quantitative analysis suggested that schools whose site documents included examples of this PA that were considered and had effective application were more likely to have higher than expected NAPLAN reading and numeracy scores at Year 3.

In practice, interviews with educators (see Study 3 in Chapter 4) demonstrated clear links to PA element 2, whereby children's past experiences were understood through transition statements, alongside considering the needs of the whole community, which were informed by population data. Where this was done well, schools used this information to inform induction programs and training for all staff members to proactively support children's learning. Additionally, schools were able to set practical goals and adjust their teaching to the areas of need based on the children's existing needs as a whole cohort, ultimately allowing them to plan for children more and effectively, implement intentionally, and reduce time spent addressing a diversity of needs on an ad hoc basis. Interviews with educators indicated that the importance of early childhood and parents as children's first educators was well understood, and that addressing the determinants of children's progress requires a shift in mindset and practices for many educators. Therefore, operational support, funding, and leaders in the space are required to undertake this work at the school, system, state, and national levels.

In 2020, the Queensland Department for Education added the AEDC to their agenda under the Our Future State commitment, priority area 2, 'Give all our children a great start', formally recognising the importance of the census in tracking children's holistic development. The priority aims for the state to have less than 22% of children developmentally vulnerable in one or more domains by 2025, a reduction from 25.9% in 2018 (Queensland Government, 2020). Work towards this target was facilitated through the Connect 4 Children Strategy, whereby funding was provided to a selection of schools across the region that had the largest number of children developmentally vulnerable on one or more domains to assist schools in improving the wellbeing of children prior to school (Kidd, 2020). Through the strategy, partnerships are supported to identify what matters most for their children in the early years from birth to 5 years old. This strategy is a prime example of how jurisdictions can be led by their state government to work in collaboration with families, services, and schools to identify and address the strengths, barriers, and enablers of child development for their local community while also building capacity and greater organisation between services to the benefit of children and families.

Base decisions in evidence: Use evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities

Element 3 asks educators to 'base their decisions on evidence, using evidence or outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities'. Support for its use is evident in Studies 2, 3, and 6. Compared with the health version of the concept, where the emphasis is on the robustness of evidence often through randomised control trials (Health Canada, 2001; Wilson et al., 2019), this concept for education is underpinned by national frameworks which prompt educators to evaluate learning and teaching strategies employed to ensure children's progress as they access the prescribed curriculum. Codes for the element 'base decisions in evidence' occurred across just two documents, the Australian Professional Standards for Teachers (Australian Institute for Teaching and School Leadership, 2014) and the NQS (Australian Children's Education & Care Quality Authority (ACEQUA), 2017) with a total of five references (see Study 2, in Chapter 3). There were few references to the use of data or descriptive studies; however, some referred to using child-level data to improve learning and assessment. Where educators are using data to consider the holistic development of children, the AEDC was recognised as a useful data set, providing an insight into children's vulnerabilities and potential opportunities for prevention. The reports provided also showed the percentage of children who are developmentally 'on track', representing the children above the 25th percentile (in the top 75%) (Social Research Centre, 2016). Furthermore, the reports provided information from the Multiple Strengths Indicator (Social Research Centre, 2016) perspective, revealing further information on children's strengths.

Key themes from the interviews with educators in Study 3 (see Chapter 4), such as 'data use was a common thread and drove decision-making', 'Socioecological model informed understandings', and 'policy impacted on school directions', resonate with the PA concept of 'base decisions on evidence'. Schools described how they are increasingly encouraged to focus on the whole child's development, resulting in approaches that build social and emotional competencies, positive relationships, and wellbeing, alongside literacy and numeracy competencies. Leaders and educators discussed the wide range of programs they were currently implementing and how these aligned with the state's priority areas for children. The use of data was discussed as a way of understanding where the school should focus its initiatives, providing focus areas that leaders could then use to base their decisions around funding and programs. Evaluation was also recognised as a necessary component of all learning and teaching programs in that it was important to understand and demonstrate whether educational goals were being met.

Schools that engaged and reported on how they used evidence to make decisions about educational goals and improvements for learning communities were more likely to positively shift children's NAPLAN scores in literacy and numeracy (see Study 6 in Chapter 7). Sites that did this well, articulated how they use the best available evidence in their decision-making. Their goals

were articulated clearly and linked to evaluation methods. Results from the quantitative analysis suggested that schools whose site documents included examples of this PA element that were considered and with a well-articulated application were more likely to have higher than expected NAPLAN reading and slightly higher numeracy scores.

These findings resonate with a systematic review by Grabarek and Kallemeyn (2020), which explored the relationship between data use and student achievement. The study found mixed results, where 15 studies identified positive relationships (38%), 10 had mixed relationships (26%), and 14 shared no relationships (36%). The authors reported that studies that had positive impacts on student achievement incorporated elements such as 'ongoing professional development, comprehensive data use interventions targeting multiple leverage points, multiple types of data, and intentions to use data for continuous improvements for all children" (Grabarek & Kallemeyn, 2020). These findings support the use of the PA element of 'basing decisions in evidence', but also of the approach in its entirety.

Increase upstream investments: concerned with the impact of studies to inform the direction of, and to improve educational outcomes. Investments are both short- and long-term

PA element 4, 'increase upstream investments', described how educators are concerned with the impact of studies to inform the direction of, and to improve, educational outcomes. Its value is clearly described in Studies 2, 3, and 6, suggesting that investments are both short- and long-term. This element is derived from the idea that in health, the sector is concerned with the impact of interventions on health outcomes, with criteria being applied to select priorities for investment; there is a balance of short- and long-term investments, and an aim to influence investments in other sectors. The element 'increase upstream investments' occurred nine times across two frameworks: the Australian Professional Standards for Teachers and the Standard for Principals (2014) (see Study 2 in Chapter 3). Investments, as described in the documents, are the development of relationships with those in the community to ensure long-term engagement. The documents also described how staff drew on the experiences of others more than the research evidence, and used student data to understand needs and modify teaching practices.

Transition programs and playgroups were the most frequent long-term investments discussed by school sites across both jurisdictions in Study 3 (see Chapter 4). These were viewed as a non-confrontational way of getting to know families and instilling the importance of early childhood development prior to the children commencing school. Data such as the AEDC were used to inform these investments and to track how the program was working to improve development prior to school commencement. This aligns with a recently published cross-sectional population-level study by Sincovich et al. (2020), which explored the association between playgroup attendance and child development using the AEDC. The study found that children who attended playgroup had better development at school entry than those who had not attended playgroup (Sincovich et al.,

2020). An earlier study by Hancock et al. (2012) found similar associations whereby children from disadvantaged families scored three to four per cent higher on learning competence measures if they attended playgroup at ages birth-one year and two-three years. This is likely due to the experiences had by the children as well as the impact of engaging with families. These findings support using playgroups as an informal way of providing early childhood education to improve children's later development and using the AEDC as a success measure. The findings in this thesis indicate that schools understood the impact of playgroups in their decision-making, and chose to implement programs to reach families who might otherwise not engage.

School leaders understood that driving any approach without embedding it into the whole school planning process often results in short-lived benefits. However, funding was frequently mentioned as a barrier to investing in long-term programs, as budgets did not allow for work that would allow them to address the root causes of the issues. There is a need for embedded ways of working to address population needs and drivers of outcomes, demonstrating an approach to reducing inequities rather than focusing on improving an outcome with intensive targeted and sustained intervention (Hancock et al., 2012; Sincovich et al., 2020). An analysis of school site documents in Study 6 (see Chapter 7) demonstrated that schools that engaged and reported on how they used studies to inform the direction of, and to improve, educational outcomes (PA4) were more likely to positively shift children's NAPLAN scores in literacy and numeracy. Sites that did this well, articulated both short- and long-term investments based on documented needs within the school and the community. The works were underpinned by evidence and evaluation practices. The quantitative analysis suggested that schools whose site documents included examples of this PA element that were considered and had a well-articulated application were more likely to have higher than expected NAPLAN reading and numeracy scores.

Apply multiple strategies: Applying concepts from other disciplines, such as health and wellbeing, to education settings. Strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges

Element 5 suggests that the education sector should apply multiple strategies and concepts from other disciplines such as health and wellbeing to the education setting. It suggests that strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges. The health counterpart suggests that the sector take action on the determinants of health and their interactions to reduce inequities between population groups, with preventions being integrated and improving health over the lifespan, often across multiple settings and layers of health (Health Canada, 2001). In an analysis of school site documents in Study 2 (see Chapter 3), the PA element 'apply multiple strategies' was coded 17 times across 4 documents, primarily focusing on health and nutrition within the school. There was also a strong focus on children's wellbeing, which was described as an integral part of children's learning and development. Investments into children's wellbeing were discussed as schools developed their understanding of

how supporting holistic development can be beneficial for academic achievement. These findings are consistent with previous research which examined approaches to bullying, whereby the authors found that a more holistic approach that involved multiple strategies at the same time was more likely to be successful at shifting behaviours (Burger et al., 2015). However, similar to the current research, Burger et al. (2015) study showed that only a few educators applied multiple strategies, indicating that challenges to applying multiple strategies have been consistent over time.

Schools that engaged and reported on applying multiple strategies across the whole school, and targeting those facing challenges were more likely to positively shift children's NAPLAN scores in literacy and numeracy (see Study 6 in Chapter 7). Sites that did this well, applied strategies focused on the holistic development of children, including their wellbeing, which were applied at multiple levels, including outside of the school, such as with families or in the community. The quantitative analysis suggested that schools whose site documents included examples of this PA element that were considered and had a well-articulated application were more likely to have higher than expected NAPLAN reading and numeracy scores.

Embedding an approach that recognises and addresses the barriers some children face to engaging in learning because of issues outside of their cognitive capacities is vital (Darling-Hammond et al., 2020). This element resonated strongly during the interviews with policy-makers in Study 5 (see Chapter 6). Some sites had a sound understanding of community needs and how outreach could foster relationships with families, improve access to health services, and provide opportunities for richer conversations around their children's academic achievement when required. In interviews with policy-makers in Study 5 (see Chapter 6), schools were identified as influential places which could be used as hubs to encourage families to engage with their children's learning. Additionally, principals were discussed as strong community leaders who can drive initiatives and change for the whole community. The concept of schools as hubs has been considered heavily in the literature, with the benefits clearly described from a population health perspective (Arimura et al., 2011; McShane & Coffey, 2022; Regan et al., 2020). The findings from this thesis further support the use of schools as hubs that can be used as universal supports for all children and their families, rather than just offering programs targeted at at-risk groups. However, achieving the appropriate balance of traditional academic development alongside social and emotional learning remains a challenge for educators.

Collaborate: Occurs with other leaders, educators, and community partnerships

The sixth element of the PA, 'collaborate', suggests that collaboration occurs with other leaders, educators, and community partnerships, compared with health, where collaboration occurs across sectors and levels with partners who share values and a vision early in the process with a focus on visible results; leadership, accountability, and rewards are shared.

Collaboration was coded heavily throughout the documents, totalling 47 occurrences across 6 frameworks (see Study 2). References to collaboration were strongly linked to community engagement, particularly with families who were considered difficult to engage due to their social circumstances, characteristics, and behaviours, or their institutional relationships. Collaborating with other leaders and educators to improve learning and teaching practices was frequently encouraged through principal networks and educator networks engaging with the community and families.

Discussions with educators in Study 3 on collaboration resonated strongly with PA element 6 and reflected activities at 5 distinct levels: between educators at the school site; between educators across school sites; with early childhood education and care centres; with community organisations; and with the education department. These relationships were valued by all participants, and the work undertaken as a result was highly regarded. Collaboration frequently occurred between educators and across year levels within schools to plan for assessments, undertake moderation, and discuss strategies to support specific children. Connections with early childhood education and care providers generally occurred to identify children with additional needs prior to them entering the classroom. However, they also assisted in developing an understanding of the learning that takes place in these early years and setting expectations between school and prior-to-school sites. Occasionally, schools invested beyond transitions to engage more meaningfully with the ECEC sector. This was often facilitated by Department priorities, whereby schools were supported to work beyond their school grounds.

Furthermore, Department staff were discussed as a source of helpful supports who could be drawn upon to assist with strategic and practical matters. Connect 4 Children is one example of collaborative work between those working in the early years. The initiative is underpinned by a social capital approach, which suggests that improving multilayered connectivity between the community, families, and services can create positive experiences for children in the early years, leading to positive outcomes (Guhn & Goelman, 2011). The approach was developed in line with the Queensland Government Framework for Place-Based Approaches and in recognition of evidence-informed frameworks, including the socioecological model, program logic, theory of change, the National Quality Standards, Supporting Successful Transitions, and K-2 Continuity and Alignment, further supporting the likelihood of success (Kidd, 2020).

Schools that engaged and reported on how they collaborated with other leaders, educators, and community partnerships were slightly more likely to positively shift children's NAPLAN scores in literacy and numeracy (see Study 6). Sites that did this well, articulated how they frequently collaborated over an extended period in partnership with the community, families, and other education providers. The quantitative analysis suggested that schools whose site documents included examples of this PA that were considered and with a well-articulated application were

slightly more likely to have higher than expected NAPLAN reading and numeracy scores. It is evident from the data presented in this thesis that by adding the AEDC to the Department agenda, the focus of schools has simultaneously shifted to understanding the importance of the census and how they can work with communities to influence children's development in the time before they enter school. Without this priority and subsequent support from the Department, both financial and practical, it appears unlikely that schools would consider working so extensively in the early years. It is important to consider how policies are developed to address the needs of both children and educators. As many participants spoke of both the benefits and challenges that policy decisions brought to their work and their ability to support children's academic development, future research should consider how best to support this relationship, ensure it is sustained with quality and purpose, and how educators' voices are considered in policy decisions.

Employ mechanisms for public movement: To promote family and community engagement and the value of education

Element 7 states that educators 'employ mechanisms for public movement, to promote family and community engagement and the value of education'. These mechanisms capture the public interest and contribute to health literacy in health. This element was underpinned by concepts of inclusion, whereby schools acted as centres of the community to facilitate family engagement in learning, and develop a deeper understanding of their needs. There was a particular focus on building relationships to promote family and community engagement for Aboriginal and Torres Strait Islander groups. The element 'employ mechanisms for public involvement' was coded 56 times across 6 files (see Study 2).

Schools that engaged and reported on how they employ mechanisms for public involvement to promote engagement and the value of education were more likely to positively shift children's NAPLAN scores in literacy and numeracy (see Study 6). Sites that did this well, used mechanisms employed at multiple levels to engage families and the community in the value of education, reaching into the wider community and expected enrolments. The quantitative analysis suggested that schools whose site documents included examples of this PA that were considered with well-articulated application were slightly more likely to have higher than expected NAPLAN reading and numeracy scores.

In interviews with school staff in Study 3 (see Chapter 4), leaders and educators discussed the many ways in which they worked to promote both family and community engagement. This was mainly to promote the value of education to families, but also to support their current cohorts in accessing services that would ultimately benefit children's development. This work was understood as a necessary step in addressing the underlying mechanisms that impact children's learning and development. Participants spoke of how they connected with families through education sessions, which would increase the skills of parents and foster learning for the children at home. Research shows that parenting education programs that occur only as a single session, or do not allow for

practical modelling or practice have been shown to have little to no impact on children's cognitive or pre-academic skills (O'Connor et al., 2017). Nevertheless, although these programs may not impact children's development, they can be useful for engaging families and promoting activities within the school.

Successful transitions were another critical element discussed in the frameworks, as educators were prompted to consider how these transitions support children's learning and development. Transition visits were highly valued and facilitated engagement with both families and the community as a whole. Visits that included information sessions for families were discussed as having a positive and long-lasting impact on how families connected with the school and its staff. These sessions, however, were usually attended by families who were likely already highly engaged in their children's learning journey and unlikely to require additional support. Several leaders noted how they were unsure of how to reach the less engaged families beyond the work they were already undertaking. This remained a barrier for them in promoting the importance of education. Additionally, educators called for a more collaborative response to promote the importance of education for families and the community. However, data sharing restrictions presented barriers and resulted in difficulty collaborating with other sectors.

Demonstrate accountability: For education outcomes to ensure they are evidence-informed over time; and include all involved in the learning community as a part of a process of continuous quality improvement and reflexive practice

The eighth element of the PA, 'demonstrate accountability', suggests to ensure that education outcomes are evidence-informed over time, and that all involved in the learning community need to be included as a part of a process of continuing quality improvement and reflexive practice. Within health, this reflects an understanding that health outcomes are recognised through a results-based accountability framework. Measures and targets are set to demonstrate improvement, and evaluation processes are implemented. In the data, this element was underpinned by collaborations, site improvement plans, data, and Department processes. The 'Demonstrate accountability' element was coded heavily across the Australian Professional Standards for Teachers and APS frameworks, with references occurring 47 times across 6 documents (see Study 2). References varied in context, and referred frequently to engaging in reflection on educators' practice to improve teaching.

During interviews with educators in Study 4 (see Chapter 5), participants discussed the various ways in which they remained accountable for education outcomes over time, both through collaborations and as a way of meeting their reporting obligations. Leaders spoke of how programs promoted and supported by government priorities often received a larger buy-in from schools and were embedded in their reporting processes at a deeper level. School site improvement plans were discussed to track achievement towards goals and to reflect on the work over time. Accountability processes were further facilitated by Department policies, which ensured that educators were

maintaining high-quality learning environments. Data were viewed as a valuable tool for maintaining high-quality evidence-informed processes as it was used to inform funding applications, and assisted educators in ensuring their practices were supported by an evidenced need.

Schools that engaged and reported on how they demonstrate accountability for education outcomes to ensure they are evidence-informed over time were slightly more likely to positively shift children's NAPLAN scores in literacy and numeracy (see Study 6 in Chapter 7). Sites that did this well, reported clearly on education outcomes from high-quality evidence, and embedded and included evaluation methods in the accountability progress. The quantitative analysis suggested that schools whose site documents included examples of this PA that were considered with a well-articulated application were slightly more likely to have higher than expected NAPLAN reading and numeracy scores. These findings are supported by numerous studies that found that schools with accountability processes driven by data and embedded into the work of educators were more likely to generate change over time (Datnow & Hubbard, 2016; Fernandes, 2020, 2021; Jackson, 2022). Smeed et al. (2011) argued that leaders need to provide learning opportunities for educators to understand and interpret data as part of an ongoing data-driven accountability process. Effective use of the data was enhanced by educator collaboration. Additionally, the authors discussed how leadership plays a critical role in creating an ethos of continuous improvement, which is needed to drive accountability. Within this environment, data were used as a resource for making improvements (Smeed et al., 2011).

Focus on improving children's literacy and numeracy development

The ninth element is a new addition to the PA for education proposed in Study 1. The element was added to the approach in the final study (Study 6) and recognised the significant focus on improving literacy and numeracy skills within the school and how they are reported in school planning documents. Schools that engaged and reported on how they focused explicitly on improving children's literacy and numeracy skills were more likely to positively shift children's NAPLAN scores in literacy and numeracy (see Chapter 7). These findings were consistent with existing research by Graham et al. (2018) which reinforces the importance of intervening early and with a sustained focus on high-quality learning experiences.

Sites that did this well, articulated a focus on improving literacy and numeracy outcomes based on evidence embedded in planning and accompanied by a regular, high-quality assessment of progress and achievement over three or more years. The quantitative analysis suggested that schools whose site documents included examples of this PA that were considered with a well-articulated application were slightly more likely to have higher than expected NAPLAN reading and numeracy scores. Including the ninth element in the model increased the statistical significance of both NAPLAN tests. However, this modest improvement in NAPLAN scores with the inclusion of

the ninth element suggests that while focusing on literacy and numeracy will ultimately improve outcomes, there is more than this that underpins children's development.

Conceptual model

This section provides a conceptual and potential framework to understand how the PA can be applied to education to improve children's development. Several elements of the PA demonstrated good explanatory power, particularly elements 1, 2, and 8. However, the model was most predictive of schools performing better than expected when the elements were considered as a whole.

The figure below depicts the PA adapted for education, as outlined in this thesis. Due to the complex nature of the PA, the researcher determined that a visual model would better demonstrate the intersection of the elements and visually present how the elements feed into each other in a reciprocal relationship. The model was deductively derived from the data gathered across the six studies. After reviewing each of the studies and the overarching findings for the individual elements, the components were manipulated using PowerPoint until the model accurately depicted the findings in the thesis.

Overall, this model illustrates the intercept between education, policy, community, and families to improve children's academic and wellbeing outcomes. It shows the PA elements ranging from upstream (policy-focused) to downstream (school practices). This depicts the varying levels at which the PA acts within the education system. Where possible, the individual PA elements were broken down into minor elements which better represented the practice of leaders, educators, and policy-makers. For example, population health approach element 3 (PAE3), 'base decisions in evidence', was separated into minor elements of 'understand and predict need', 'incorporated into planning', and 'evaluation'. Additionally, the analysis presented in this thesis showed that PAE6, 'collaboration', represented relationships with many different layers of the actors involved (state education departments, federal education departments, families, and other educators). It was also informed by global initiatives that influenced policy and ultimately drove school collaboration.

A vital strength of the model is that it assists with visualising how cross-disciplinary collaboration between local organisations and schools can improve conversations and provide opportunities to proactively plan for children's needs through developing a sound understanding of their past experiences and challenges. Additionally, it demonstrates how families can support and provide feedback within this process. Importantly, data are integrated into multiple elements of the approach that underwrite all conversations and provide a constant feedback loop through collection, utilisation, and evaluation for schools and policy-makers.

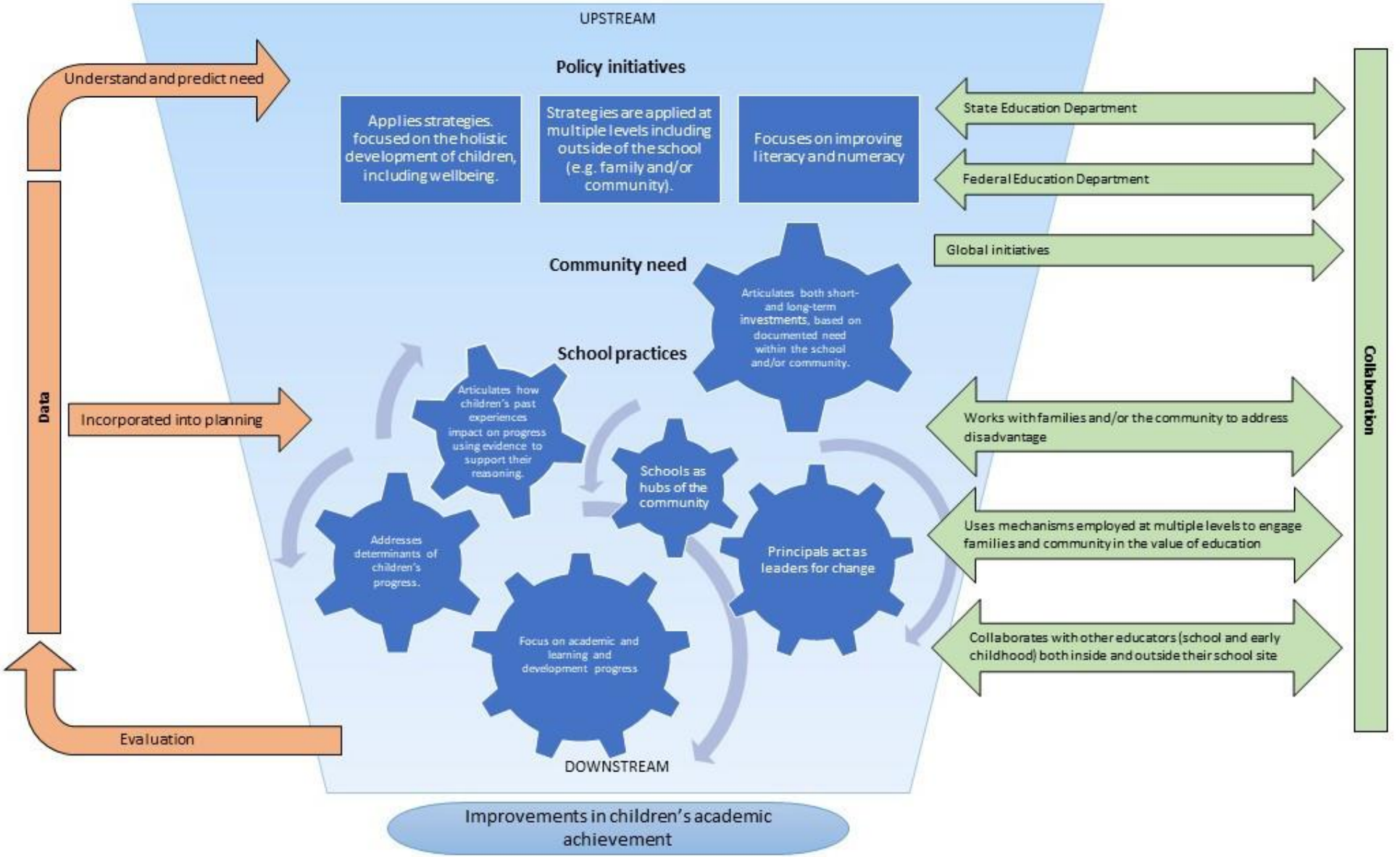

Figure 8.1: Population Approach for Education

Risk and protective factors

Research suggests that educators frequently implement programs within the school context that aim to address gaps in children's learning and/or development. However, this approach often overlooks the impact of embedding an approach that influences children's underlying risk factors. Implementing the PA in education has proven beneficial, perhaps because the root of the approach is an understanding of the social determinants of health, the risk and protective factors that affect children's development, and a recognition of how these factors can be influenced through collaborative partnerships.

Risk factors are broadly described as characteristics that increase the likelihood that a problem will be formed, maintained, or exacerbated (Jenson & Fraser, 2015). While some children will develop along typical trajectories despite the risk factors, this capacity is often the result of resilience (Winslow et al., 2013). Children from disadvantaged households are more likely to have poorer development trajectories, with outcomes worsening as socio-economic status decreases (Grace et al., 2016; Maggi et al., 2010; Moore et al., 2015). Disadvantage itself does not cause poorer developmental outcomes, rather it creates the material, psychological, and social conditions which translate poverty into everyday experiences. This can result in chronic stress which adversely affects the developing brain, limits the caregiver's ability to provide supportive interactions, and decreases opportunities to learn (Felner & DeVries, 2013; Ferguson et al., 2013; Maggi et al., 2010).

An ecological perspective of early childhood development underscores the critical impact of various environmental contexts on children's outcomes (Bronfenbrenner, 1986). Characteristics of the environments in which a child develops can shape their development by increasing their risk of experiencing poor developmental outcomes or building protection from the impact of adversity. Research suggests that positive and negative experiences can accumulate, resulting in implications for children's developmental trajectories. Early SES disparities appear to widen over the life course, with children from low SES backgrounds not showing the same developmental mobility as those from high SES backgrounds in the first few years of school (Australian Early Development Census, 2014). During early childhood, children go through critical periods of development, where they are particularly sensitive to environmental stimuli. Therefore, appropriate experiences at this time are critical and can have significant impacts on their developmental trajectories and progress. PAE1 is supported by this idea. It focuses on children's developmental and learning progress using data to understand needs and then incorporates it into planning at a site level. Educators can intervene early and shift trajectories by continuously monitoring progress and drawing on data rather than assumptions. In addition, PAE3 suggests that educators use the best available evidence in their decision-making and link their goals to evaluation methods. Through this, schools can track the impact of their work during these critical development periods and ensure they are working in a way that benefits all children's development.

There are many risk factors that schools cannot influence, such as neighbourhood economic disadvantage, housing, and parent work conditions. However, by understanding the determinants of children's progress by exploring the contextual and operational factors at play (PAE2), they can support all children, families, and the community to address factors early. The potential for risk and protective factors to influence early childhood development should be considered in child-environment interactions and the ongoing reciprocal relationship between individuals and their environment (Krishnan, 2010; Sanders & Kirby, 2014). Understanding that children are not exposed to single risks in isolation, but rather experience clusters of risk and protective factors that comprise developmental trajectories is critical for generating change. Understanding the impact of these factors can be beneficial as it allows educators to target resources towards preventative interventions, and to address potential issues at the child and community level before they result. Utilising a combination of short-term and long-term investments based on need is a critical element of the PA, described by element 5.

As leaders and educators recognise risk factors that can be influenced, they can balance investments that address short-term needs with those likely to generate change with sustained investment. Research suggests that early childhood interventions need to address the impact that wider-reaching systems have on children's development and should focus on family and community engagement and collaboration among service providers and educators (Britto et al., 2017; Bronfenbrenner, 1986; Christensen et al., 2017; Goldfeld et al., 2016; Jenson & Fraser, 2015). This supports the integration of PAE6, which suggests that collaboration should frequently occur in partnership with the community, families, and other education providers. Initiatives can target resources towards enhancing protective factors and mitigating risk factors to improve developmental outcomes in early childhood.

Social determinants of health

The social determinants of health include upstream factors that comprise social-structural influences on health and health systems, government policies, and the social, physical, economic, and environmental factors which determine health. These include social disadvantage, risk exposure, and social inequities which play a fundamental causal role in poor health and academic outcomes (Bharmal et al., 2015). Interventions that work upstream to address the social determinants of health improve health and reduce disparities. Additionally, they are more likely to result in long-lasting change as they work to address the issue's root causes rather than the downstream symptoms (Williams et al., 2008). This understanding of multiple levels of influence supports the integration of PAE5, which recognises that strategies should be applied at multiple levels and should focus on the holistic development of children. Importantly, work that acts only to address the symptoms rather than the causes is unlikely to reduce disparities and shift trajectories. Reducing disparities requires a combination of targeted efforts and universal approaches across the entire continuum of socio-economic status (Williams et al., 2008).

The social disadvantage approach connects educational attainment, reading level, and income with health outcomes, suggesting that greater social disadvantage is associated with poorer health. Based on this understanding, PAE7 suggests that educators employ mechanisms for public movement to promote family and community engagement, and the value of education. Education is one of the key factors represented in the social disadvantage approach, which associates educational attainment with health. This occurs through increased knowledge of healthy behaviours due to increased literacy, greater employment opportunities resulting in economic resources, and social and psychological factors, which are linked to greater perceived personal control (Berkman et al., 2011; DeWalt & Hink, 2009).

The life-course approach focuses on the link between health and critical or sensitive periods in exposure and cumulative exposures to risk (Bharmal et al., 2015). This approach comprises three models: the latency period in which early childhood exposures shape subsequent outcomes; the life course model where exposures throughout life have a cumulative effect; and the social trajectory where early exposures may create opportunities or barriers to critical exposures later in life (Berkman et al., 2011; Karoly et al., 2006). PAE8 is underpinned by this understanding, as it recognises the importance of remaining accountable for educational outcomes to ensure they are evidence-informed over time. Schools play a crucial role in preparing children for their future and are uniquely placed to shift outcomes.

The health equity approach suggests that social inequities which stem from socio-demographic factors also have an impact on health and health inequities. The approach recognises that policies and regulations from corporations, government agencies, schools, and non-profit organisations can exacerbate or improve social inequities (Rudolph et al., 2013). One possible way of improving health equity is through education policies, such as focusing on addressing developmental vulnerabilities or aspects recognised as key determinants of learning. This is incorporated in the new element, PAE9, which recognises the current focus on literacy and numeracy within schools to meet Department targets and set children up for later academic success.

Methodological reflections

Conducting research in schools in Australia remains a significant challenge. Researchers have continued to note how bureaucracy and complicated procedures create a slow process for approvals and, at times, even prevent research from going ahead (Kenway, 2013; Stevens et al., 2012). Initially, the lengthy ethics requirements for conducting research in Department sites meant that approval was slow and involved additional conversations with Department staff prior to commencing the research. This added significant time to the initial stages of the project. However, upon completing these requirements, the Department was quick to support recruitment efforts and connect the researcher to suitable participants. Notably, the individuals recommended for

participation were knowledgeable and appropriate for the studies. This may reflect the jurisdiction's Department structure and a keen awareness of others' roles and whom to refer to.

Despite support from schools and the key Department staff who believed the research was exciting and would add value to their work, recruitment of participants was a key challenge. In addition to the usual constraints, conducting research during the COVID-19 pandemic was particularly challenging (DeMatthews et al., 2020). The impacts of COVID-19 on the researcher, this body of research, and the decisions made in this thesis are evident from Study 3 onwards.

Study 3 involved interviews with school staff in two Australian jurisdictions. Data collection for this study was significantly delayed as schools and Departments were more protective of their staff time than previously, resulting in significant delays in receiving approval and total bans on conducting research in schools for six months in 2020. This restriction began just as the researcher was completing Study 2 and was ready to commence with the next phase of work, the recruitment of school staff. A decision was made to conduct all interviews online rather than attempt international travel and face-to-face discussions during the pandemic and place further strain on educators. This decision proved successful, as it allowed for interviews with staff who may not have been available due to time constraints or location, and gained back some lost time by allowing for multiple interviews to take place on a single day. While the researcher notes the importance of protecting schools from being continuously approached for research, a task outside of their key interest of teaching children, it is important to recognise that schools are being increasingly asked to use data and consider children's backgrounds in their work. As such, research such as that presented in this thesis is needed to assist with identifying where educators may need additional support and what the benefits to the work could be. The pandemic impacted on the interviews with policy staff in Study 4 (see Chapter 5) due to significant delays from the original schedule. However, like the interviews with school staff, conducting the interviews online rather than face-to-face allowed the researcher to make up this time quickly and speak to multiple participants in one day.

The methods used in Study 6 were the most impacted by the pandemic, as the researcher shifted from interviews with school staff to an analysis of school documents (see Chapter 7 for details of the change). This change also presented the opportunity to develop the PA into the assessment rubric seen in Study 6, which otherwise would not have been considered. The development of this rubric allowed for a more consistent application of the PA model in future research, as it could be used by school staff or policy-makers to evaluate their use of the approach.

Completing this thesis during a global pandemic has indeed been challenging. However, despite the challenges encountered, the quality of the data presented in this thesis remains strong. The researcher's respectful interactions with the education sector throughout the research revealed

sensitivity and responsiveness to the impacts of the pandemic. As a result, the researcher has developed enduring skills and understandings.

Strengths and limitations

The strengths and limitations of each study have been presented in the individual chapters; as such, only the overall considerations are presented here. Firstly, the research in this thesis presents a unique approach to school planning for learning and teaching, which draws on knowledge from the health sector to describe how a cross-disciplinary approach could also be beneficial in schools. The approach incorporates a robust understanding of the influences of children's development at multiple levels and draws on recognised approaches to address risk factors to reduce later issues. The approach applies multiple connected strategies to address barriers to engagement, addresses underlying mechanisms, and reduces the barriers some children face to engaging in learning because of issues outside of their cognitive capabilities.

This research presents the views and voices of various leaders, educators, and policy-makers who are presently employed in roles working with children and families in Early Childhood to understand how the PA may benefit their work and planning. However, the research presented in this study, particularly the interviews with school staff (Study 3) and policy-makers (Study 4), and the mixed-methods analysis of school planning documents (Study 6), does not cover the complexity of all Australian jurisdictions. This limitation is recognised as one that could be addressed in further research to determine if the different policies in each state and territory impact children's academic results, and if they result in an ability and willingness to apply elements of the PA to the school sector.

As previously mentioned, difficulty recruiting participants during the COVID-19 pandemic resulted in smaller than expected sample sizes across multiple studies. Fortunately, advances in technology made it possible for the researcher to conduct interviews online, reducing travel for both the researcher and the participants (Howlett, 2021). It did, however, result in a change of methods for Study 6 due to difficulties in recruiting participants. It would be remiss to ignore the impact that modest sample size could have on the results of this study. However, the results still appear to have some significance and would suggest that the PA is, in fact, beneficial for shifting children's outcomes and integrating the elements into leaders' and educators' work at multiple levels. Therefore, future research should include a larger sample size of interviews, and quantitative analysis, to determine if the patterns found in this thesis are true across all Australian jurisdictions (Fowler & Lapp, 2019; Malterud et al., 2016).

Significance of the PhD

This research has identified a number of implications and recommendations for the education sector, policy-makers, educational leaders, and educators. Currently, there is no research on how

the PA could be applied to education in Australia, except for the researcher's published literature review and the works comprising this thesis. As such, the findings presented in each chapter represent a unique contribution to knowledge. The specific implications of each study are discussed in the individual chapters, with the overall implications of the thesis presented below.

Practice

This thesis is significant for informing practice as it proposes how a PA could be intentionally implemented in schools, promoting intersectoral partnerships and improved development for all children. Planning for children's learning using population data is a relatively new practice for educators, and the usefulness of the practice had not been explored prior to this PhD. Using PAs, educators working closely with children and families could apply a different lens to their work and how they work with families and the community to better understand children's contexts. If successful, this could reduce the duplication of services across early childhood education settings, improve networks, and share resources. In addition, the results of this thesis suggest that schools should act as the hub of the community, providing families with open space and reducing barriers for families who might have had previously poor experiences with schools. Ultimately, this could promote social cohesion by ensuring all families feel welcome and included in their child's education.

Policy

Prior to this thesis, little was known about how schools, system leaders, and educators use population-level data to inform planning and the potential benefit of taking a PA to their planning on reducing inequities in children's educational, health, and wellbeing outcomes. The results from this thesis are significant for policy as they can inform the way governments support education providers to plan and deliver services to children, families, and communities. The research findings can also inform the development of planning documents that can be drawn upon to improve children's developmental trajectories at an early age, thus reducing inequity in educational attainment, wellbeing, and health.

One of the most significant implications of this thesis is that children's academic trajectories can, in fact, be shifted before their first NAPLAN assessment in Year 3. This presents a unique opportunity for policy-makers to shift investments from NAPLAN to the early years. However, a recent report by the Organisation for Economic Co-operation and Development (OECD) showed Australia as the ninth worst of 77 countries for the equitable allocation of resources between advantaged and disadvantaged schools (OECD, 2020). Australia was also noted as 15th in the OECD in spending per student, despite having a high GDP per capita and position as one of the world's most advanced economies (OECD, 2020). The findings from this thesis further support the economic benefits of investing in education in the early years and of increased overall investment to reflect that of other OECD countries (Heckman, 2011; Magnuson & Duncan, 2016).

Additionally, the findings demonstrated the importance of well-connected networks and coordinated services within each jurisdiction. The Department and its policies can support collaboration between early childhood leaders and educators. Better information sharing between agencies can ensure that all children and families receive the support they need when they need it, further reducing the likelihood that children will go without support (Belle-Isle et al., 2014; Donkin et al., 2018).

Conclusion

The findings from this PhD provide a clear understanding of how the PA could be applied to education settings to improve children's academic development. In this chapter, the researcher has presented the findings from each study in relation to the PA elements, summarising the key aspects of each element and how they would be applied to school planning and, consequently, implementation of practices that positively impact outcomes for children. Furthermore, the researcher has presented a conceptual model of the PA for education, showing how each element fits together in policy and practice. The implications for this work are discussed, whereby the approach could reduce inequities and support leaders and educators at a local and state level to plan for children's needs. Importantly, this PhD thesis has demonstrated that applying the PA to education is feasible. Doing so would benefit all children's academic development, particularly children and families who are most vulnerable and marginalised in Australian society.

Chapter summary

In this chapter, the findings from each of the six studies are discussed, describing how each of them contributes to an understanding of how the PA could be applied to education, the benefits and implications of doing so, and how these findings relate to existing research. The researcher has reflected on the methods, discussed the strengths and limitations of the thesis, and suggested areas for further investigation. Finally, the original contribution to knowledge in policy and practice has been described.

CHAPTER 9. CONCLUSIONS

The population approach (PA) aims to improve the health of entire populations and reduce health inequities among population groups by considering risk factors and conditions which influence health (Health Canada, 2001). However, the application of a PA to education could also benefit leaders and educators in school settings who already apply some of these concepts in their work, allowing them to ultimately shift the academic trajectories of children to improve their later life outcomes. Prior to this thesis, no research had been conducted applying the PA to the education sector.

In this thesis, the researcher sought to explore: *Why, how and in which contexts can a population health approach be applied to school planning to support children's early development*? The studies within the thesis investigated the presence and applicability of the PA to the education system, schools, and cohorts of children in the early years of school in Australia by addressing the following aims:

Aim 1: Investigate what is currently known about the applicability of population health approaches to planning in prior to school and school settings; and the extent to which applying relevant concepts such as collaboration, data use, and the consideration of risk and protective factors are likely to improve children's learning outcomes

The researcher undertook a systematic review and critical interpretive synthesis (Study 1) of the health and education literature, using a cross-disciplinary approach (public health and education) to explore the first aim. From this, four synthetic constructs emerged: (1) Elements of population health models exist within communities and can help improve outcomes for more children; (2) Inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development; (3) Children's development can be influenced at a variety of levels; and (4) System change requires a range of drivers and supports.

This thesis demonstrates that although a PA to planning does not explicitly exist within education, the results from this review have indicated that it would indeed be possible to adapt the PA to prior-to-school and school educational planning, and that doing so would be likely to be advantageous for children's development. The research demonstrated a benefit to implementing a PA in schools; however, in the future, more work is needed to articulate how it adds value to schools and the extent to which this type of planning improves children's experiences in school and their educational outcomes. The implementation of such an approach will require system changes and supports which enable schools to better connect with and support the communities they serve, and the flexibility to respond to the needs of individual and cohorts of children within each context.

Aim 2: Investigate the presence of elements of a population health approach in national frameworks to better understand educator motivations, their ability to integrate the approach into their planning, and agencies which play a role in supporting school planning

Study 2 presents the findings from a review of six education planning and curriculum frameworks and commitments in Australia, addressing aim 2. The documents were analysed using an a priori coding framework specifically developed to examine the extent to which school leadership and educators were, through these frameworks, supported to undertake the kind of planning required to influence children's development and learning trajectories positively. This research has demonstrated that elements of the PA were present within various educator frameworks; however, their inclusion was often limited and superficial. Integration of elements of the PA into existing frameworks may positively impact the planning of leaders and educators for learning and teaching with young children in the early years of school, and therefore, may translate into improved outcomes during critical developmental stages.

Aim 3: Identify to what extent elements of a population health approach are evident within educators' planning for learning and teaching, the barriers and facilitators to working in this way, and the benefits these practices have for children's learning, development, and wellbeing

The researcher addressed aim 3 in the third research study (Chapter 4), presenting the details of semi-structured interviews with 20 leaders and educators across two Australian jurisdictions. The findings, which emerged through thematically analysing the data using an inductive approach, described how schools engaged in practices encompassed by the PA; how elements of the approach support children's academic and wellbeing outcomes; and the barriers to and facilitators of its use. Several key themes were identified from the analysis, including: accountability for quality improvement, reporting, and funding; collaboration with external providers, between early childhood education and care providers, with the Department and within the school; data use for ensuring decisions were based on evidence; increasing investments; mechanisms for public movement to promote both family and community engagement; planning processes for children's developmental progress and understanding their past experiences; and department policies, curriculum frameworks, and programs across multiple levels and strategies.

Overall, discussions with school leaders and educators across the two jurisdictions demonstrated the significant impact that government policies can have on site practices and children's experiences in the early years of school. While leaders and educators from both jurisdictions were focused on how they could support children's academic development, some interviewees focused more on the importance of holistic development and how data could inform decision-making, partnerships, and funding allocations. A shift toward understanding how early prevention can impact children's later development, and the impact of schools as key places of learning for

families and the community remains of critical importance. However, to achieve a more holistic integration of the PA in the government school system, support from state departments in resourcing and local champions is required.

Aim 4: Understand the perceptions of policy actors of the factors which facilitated or constrained the development of planning practices

The researcher addressed aim 4 in the fourth study by presenting the findings from semi-structured interviews with 11 policy-makers across two Australian jurisdictions. This chapter explored policy actors' perceptions of the importance of improving child development and the factors influencing the development and uptake of initiatives. Shiffman's and Smith's (2010) framework for understanding policy priorities was used to interpret the results, which demonstrated a strong focus on improving children's development through work with schools and school principals and supporting the use of evidence-informed practices. The focus on early investments in policy and support for schools on improving later life outcomes is understood to have a significant positive impact on children's academic and social outcomes (Brinkman et al., 2013; Heckman, 2011).

Overall, there was support for early investments in child development, with all participants understanding the impacts of policies on educators' practices and children's developmental trajectories. Furthermore, the findings showed that schools could play an essential role in supporting families holistically, and school principals can act as influential leaders within the community. These findings demonstrated that PAs in their entirety are not used by leaders or educators in schools across the two selected jurisdictions in Australia. However, individual elements were evident in planning for learning and teaching. These findings also endorsed integrating the approach into education, as there was clear support for collaboration with families and across sites, evidence-informed practice, monitoring of progress over time using data, and planning using population data sets to understand children's past experiences.

Aim 5: Identify South Australian schools who performed either above expectations, below expectations, or as expected on NAPLAN in Year 3 as predicted by their AEDC score at school entry

In Study 5, the researcher used linear regression modelling to explore South Australian schools whose children performed better or worse than expected on NAPLAN, based on the children's developmental vulnerability in the first year of full-time school. The results demonstrated that some schools shifted children's developmental trajectories before children engaged with their first NAPLAN assessment in Year 3. Sixty-five schools were identified for further analysis, which included assessing their previous planning and reporting documents.

In Study 6, the researcher obtained school planning documents from each of the school sites from 2015, 2016, and 2017 to determine whether the activities undertaken at the school during this time could be responsible for the shift in child outcomes and whether these corresponded to elements of the PA. The school planning documents were evaluated using a rating system developed by the researcher, which assessed the presence of PA elements in the documents. Linear and binary regression analyses were then used to explore whether including elements of the PA within planning for children's needs, learning, and teaching could be advantageous for improving children's academic achievement. A large number of analyses were undertaken to explore the utility of various elements, site documents, and publication years to determine if there were differences between the documents which led to alternative outcomes.

The findings showed that schools that reported on a larger number of activities that reflected the PA were more likely to shift children's academic trajectories and improve academic outcomes. The model was highly predictive of schools that performed above expectations on NAPLAN reading. The results of the analysis of school documents indicated that the PA score given to schools' annual reports was the most predictive of whether a school performed better than expected, particularly in NAPLAN reading. The results suggested that at least four of the seven possible school documents were required to allow for the most accurate analysis. However, where only one school document was available, the model was still valuable as it provided some insight into the activities within the school.

Answering the research question

This thesis has demonstrated that incorporating PAs into planning for learning and teaching within school sites can improve children's academic development. Integrating each PA element into school and policy planning allowed for a more coordinated approach to supporting children's needs, sharing resources, and informing decision-making. Using data to inform decision-making and understanding how children's past experiences impact on their progress allowed leaders and educators to develop appropriate approaches and work with families to support their needs. A conceptual model of the approach demonstrated the elements and their intersection. As demonstrated, leaders and educators were better prepared to overcome educational barriers that might impact children's academic success by addressing the factors impacting learning at both the individual and community levels in the early years.

The original contribution to knowledge

Currently, there is no research exploring how the population approach could be applied to education in Australia, except for the researcher's published literature review and the studies comprising this thesis. As such, the findings presented in each chapter represent a unique contribution to knowledge. This thesis demonstrates that applying a PA to education would

improve children's academic performance and improve collaboration and systems for leaders, educators, and policy-makers.

This research is the first to convert a PA to a quantifiable framework for education in Australia and test the predictive capability of the scores. The results showed that children's academic trajectories could be shifted before their first NAPLAN assessment in Year 3, further supporting the economic benefits of investing in education in the early years. These findings are of great significance to the education sector, as they demonstrate that schools that use more elements of the PA in their work, as reported in their site documents, are more likely to shift children's academic outcomes between the first year of full-time school and their NAPLAN reading and numeracy tests in Year 3.

Future research

Future research would be of value to further explore the utility of the PA testing rubric to determine whether greater sensitivity between the categories would be beneficial, assess the validity of the rubric, and increase the number of schools assessed to confirm the reliability of the measure. It might also be interesting to consider whether the PA is associated with wellbeing outcomes, such as those measured by the Wellbeing and Engagement Collection (WEC) (Gregory et al., 2021). Finally, future research should also investigate the applicability of the approach for Catholic and Independent schools to determine whether it is appropriate for use in all education sectors, thereby potentially increasing the applicability of a PA beyond government schools and providing for future cross-sector initiatives with the possibility of positively impacting children's early development across jurisdictions.

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APPENDICES

Chapter 2. Literature review

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Appendix A. Published manuscript

Wilson AL, Jovanovic JM, Harman-Smith YE, Ward PR (2019) A population health approach in education to support children's early development: A Critical Interpretive Synthesis. PLoS ONE 14(6): e0218403. https://doi.org/ 10.1371/journal.pone.0218403

PLOS ONE

RESEARCH ARTICLE

A population health approach in education to support children's early development: A Critical Interpretive Synthesis

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Abstract

The primary objective of this review is to investigate what is currently known about early childhood education planning, population health models and their relation to children's development. A systematic review using the Critical Interpretive Synthesis method was undertaken, guided by a preliminary research question, *"How can a population heath approach be applied to educational planning to support children's early development?"* which acted as a compass and guide throughout the process. The initial search yielded 20,122 results, of which 42 were included in the review. Four synthetic constructs emerged (1) Elements of population health models exist within communities and can help improve outcomes for more children, (2) Inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development, (3) Children's development can be influenced at a variety of levels, and (4) System change requires a range of drivers and supports. Within education, there are several models which are used to improve outcomes for children and families. Although a population health approach to planning does not explicitly exist, the results from this review indicate that it would indeed be plausible to adapt the population health approach to sites and schools, and that doing so would be advantageous for children's development. However, implementing such an approach requires more than desire for change and demands system changes and supports. A protocol for the review was published on the International Prospective Register of Systematic Reviews (PROSPERO), registration number CRD42018098835 on 31st July 2018.

Introduction

Children's early development

Early childhood, defined as birth through age eight, is well recognised as a critical stage of development [1–4]. Children's development in these years in known to have significant and

lasting impacts on their later physical, social and emotional health, as well as academic achievement and employment [5–8].

Children's growth, learning and development are influenced by a number of factors including environmental, familial, geographical and socio-economic, and can often be anticipated early in life [9, 10]. For example, academic achievement and cognitive development can be predicted by children's exposure to socioeconomic disadvantage [11]. Education can help mediate between early life socioeconomic status and adult mortality, however, upon school entry many children have already faced significant adversity [12]. These experiences can present as challenges integrating into the classroom and without intervention children are likely to fall behind their peers as they continue through school [13]. Children who score below the 10th percentile in one or more domains as described by the Australian Early Development Census (AEDC) at age five were more likely to be in the bottom 20% of students' scores on the National Assessment Program–Literacy and Numeracy (NAPLAN) assessments at grade 3,5 and 7 [14]. These children may demonstrate a lower than average ability in one or more of the areas of basic physical health and wellbeing, social competence, emotional maturity, language and cognitive skills or communication skills and general knowledge. An absence of basic competencies in any of these areas, coupled with prior adversities can present in problematic behaviours in the classroom such as poor emotional self-regulation and difficulty interacting with peers, resulting in teachers (educators) spending more time managing their classroom and less time spent supporting learning [15, 16].

Research by McCain, Mustard [17] suggests that policies and programs that aim to reduce inequity are critical to improving outcomes for children. In addition, numerous studies show that investments in the early years are one of the most cost-efficient investments in human capital, leading to a country's sustainable development [18, 19]. These trajectories and predictive models have driven support for intervention in the early years with the view that it will have a lasting impact on later adult health, wellbeing and academic achievement. Population health approaches are present in health, where large population level datasets are regularly relied on for tracking trends and identifying potential areas of need. An opportunity exists for educators in Australia to use this data to similarly track children's development at a higher level.

Educators in both schools and early childhood education and care sites are being increasingly asked to consider different types of data in their planning for children's learning and development; and while on-entry assessments and standardised testing such as NAPLAN are common practice, population level data sets such as the AEDC are often unfamiliar. Population data sets such as the AEDC are fairly new to the education system, and could help provide an insight into children's early experiences and their communities. Adapted for use in Australia from the Canadian version of the Early Development Instrument, the AEDC is a population measure of how young children have developed by the time they enter their first year of full-time school [20, 21]. The census reports on communities, rather than individuals and can help governments, sites, schools and communities to understand the environments and experiences children are exposed to from birth to school age. Australia is currently the only country to regularly collect these data through a national census, making it an invaluable dataset that can be drawn upon for planning and to establish community partnerships while also posing unique challenges for educators who are increasingly expected to integrate the data into their planning.

To adapt to new ways of utilising data, Education might choose to look to other sectors where this has become common practice. Health is one such sector, where a common approach has been developed for using population data sets for tracking trends and identifying potential areas of need. An opportunity exists for educators in Australia to use AEDC data to

similarly track trends in children's development at a population level. The AEDC is a rich data source that could also be drawn upon in education better understand the factors driving children's development, and subsequently inform planning to address underlying factors influencing the learning needs of children in their community.

Construct definitions

Due to the interdisciplinary nature of this work it is important to define some key terms which have been used throughout the paper, to ensure inclusivity of the birth to eight sector, health and education.

Educators—Inclusive of all staff involved in teaching and learning duties in prior-to-school and early years of school sites [22, 23]

Leaders—School principals, early childhood education and care directors and staff involved in educational policy roles such as partnership coordinators.

Learning—"A natural process of exploration that children engage in from birth as they expand their intellectual, physical, social, emotional and creative capacities. Early learning is closely linked to early development" [22]

Development—"Knowledge of age-related characteristics that permits general predictions about what experiences are likely to best promote children's learning and development" [24]

Population data—Data that is not available at the individual level, but is instead aggregated for groups.

Population health approach to planning

The population health approach is becoming increasingly recognised for reducing healthcare demand and contributing to health system sustainability [25]. Despite a lack of an official definition, the population health approach aims to improve the health of entire populations and reduce health inequities among population groups by considering the risk factors and conditions that influence health [26]. Additional key elements and actions that can be used to characterise a population health approach include: a focus on the health of populations, addressing the determinants of health and their interactions, basing decisions on evidence, applying multiple strategies, employing mechanisms for public involvement, collaborating across sectors and levels, increasing upstream investments and demonstrating accountability for health outcomes [26–29] Early childhood educators, in both prior-to-school and school settings, already apply some of these concepts in their work. This paper seeks to draw comparisons between the ways in which education and health use data to inform their planning and the extent to which lessons from a population health approach could be applied to support education to incorporate new population data sets in their planning. In Table 1 below, the key elements of a population health approach have been listed, alongside our interpretation of how these concepts may be applied in both health and education sectors. The descriptions for the health sector have been based on our interpretation of the literature, as well as the table presented by Health Canada [26, 28] on 'key actions' and may help to develop a shared understanding between sectors.

By applying concepts from a population health approach to the education site, educators and leaders (principals and site directors) could leverage the diversity of aptitudes and influence of their transition partners (those who also influence children either before or during their time in school including; family, early childhood education and care service staff, education providers, community organisations and key community individuals) to mitigate risks and develop solutions aimed at improving children's development. This would also help to promote true collaboration between prior-to-school and school settings.

Table 1. Alignment between population health approach elements, in health and education.

Population Health Concepts	Health	Education
Focus on:	The health of populations using indicators for measuring health status	Children's developmental and learning progress.
Address the determinants of:	Health and their interactions by analysing and measuring their relationships	Children's progress by exploring the contextual and operational factors at play.
Base decisions on evidence	Emphasis on the robustness of evidence, often using randomised control trials; and drawing on a variety of data and methods throughout all stages of policy and program development, before disseminating findings.	Uses evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities.
Increase upstream investments	Concerned with impact of interventions on health outcomes. Criteria is applied to select priories for investment. There is a balance of short and long term investments, and an aim to influence investments in other sectors	Concerned with impact of studies to inform the direction of, and to improve educational outcomes. Investments are both short and long term
Apply multiple strategies	Taking action on the determinants of health and their interactions to reduce inequities between population groups. Interventions are integrated and improve health over the lifespan. Approaches are often across multiple settings and layers Across layers of health (primary, secondary, tertiary)	Applying concepts from other disciplines, such as health and wellbeing, to education settings. Strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges.
Collaborate:	Across sectors and levels with partners who share values and vision early in the process, with a focus on visible results. Leadership, accountability and rewards are shared.	Occurs with other educators, leaders and community partnerships.
Employ mechanisms for public movement:	To capture the public's interest and contribute to health literacy	To promote family and community engagement and the value of education.
Demonstrate accountability:	For health outcomes through a results-based accountability framework. Measures and targets are set to demonstrate improvement, and evaluation processes put in place	For education outcomes to ensure they are evidence-informed over time; and include all involved in the learning community, as a part of a process of continuing quality improvement and reflexive practice.

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Supporting developmental trajectories

Children's development and early education is internationally recognised as a significant contributing factor to health. The United Nations has formally recognised this importance through the Sustainable Development Goals. The fourth goal 'ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all' specifically seeks to promote access for all children to quality education [30, 31]. These goals are also reflected in the Convention on the Rights of the Child, which stipulated the right of children to: be afforded opportunities to maximally develop their capabilities, the right to education and to develop their personality and talents through education [32].

Despite the clear impact that the first few years has on a child's trajectory there has been little investigation of the extent to which early childhood experiences are considered and planned for in early childhood education. Additionally, planning for children using population level data and approaches is a relatively new practice within the early childhood education sector, with aggregated population data about children's early development emerging only in the last decade or so. Moreover, little is known about the applicability of aggregated early child development data and processes for its integration into planning, posing questions for educators, leaders and their communities.

Aims

The primary objective of this review is to investigate what is currently known about the applicability of population health approaches to planning in prior-to-school and school settings, and the extent to which applying relevant concepts such as collaboration, data use, and the consideration of risk and protective factors are likely to improve children's outcomes. The

results from this review will form the basis of a larger research project, investigating how a population health approach can be applied to educational planning to support children's early development.

There are large amounts of literature on intradisciplinary teams within health systems, however as the focus of this review is early childhood education these will not be reviewed in detail and will only be referred to where appropriate.

Method

Search method

An initial scoping search using the PICO process was undertaken to identify key words and phrases that would be integral to the success of the search strategy [33, 34]. This scoping search assisted in identifying appropriate parameters, developing the exclusion and inclusion criteria, determining quality filters and refining the scope of the review. A protocol for the review was published on the International Prospective Register of Systematic Reviews (PROSPERO), registration number CRD42018098835 on 31st July 2018.

After significant review, the critical interpretative synthesis (CIS) method was determined as most suitable as it enables researchers to synthesise a diverse body of evidence and enables the generation of theory with strong explanatory power [35]. As population health approaches are common in the health sector, the CIS method allowed the researchers to gather information from a wide range of interdisciplinary research and resources, while still assessing its suitability for integration into the education system. The systematic nature of the review also aims to minimise bias through the use of explicit, systematic methods and transparent explanations and analysis, providing rigour, reliability and validity to the results [36, 37].

A systematic review using the CIS method was undertaken, guided by a preliminary research question, *"How can a population heath approach be applied to educational planning to support children's early development?"* which acted as a compass and guide throughout the process. Primary and secondary outcomes were also determined as a way of adding rigour to the review [38]. *"How is children's holistic development supported throughout the early years?"* was identified as the primary outcome. Secondary outcomes were identified as:

- Do educators employ aspects of population health approaches in routine educational planning?
- How is data used within prior-to-school and school settings to plan educational programs?
- How do prior-to-school education and care services and schools work with their communities to ensure they are more effectively supporting the children and family's needs?

Once the guiding research question and outcomes were identified the systematic literature search was initiated.

Keywords associated with the population health approach, social determinants of health, schools and early childhood education and care, planning and development were established and combined into a search strategy. The search was translated for relevant databases, as determined by the research team and with the assistance of a library liaison. The search strategy was constructed to return results related to the way schools can use data within their planning, rather than current educational quality and curriculum planning documents. Databases searched included: ProQuest, Medline, Emcare, Scopus and Open Grey. An example of the search strategy, as adapted for use in Proquest can be found below.

noft("population health approach" OR "public health approach" OR "population health model" OR "public health model" OR "integrated service approach" OR interdisciplinary

approach OR "critical population health" OR healthy cities OR healthy communit* OR "health in all policies" OR HiALP) AND noft(school* OR "early learning centre" OR ECEC OR pre-school OR child*) AND noft(wellbeing OR well-being OR develop* OR leadership OR planning*) AND stype.exact("Conference Papers & Proceedings" OR "Government & Official Publications" OR "Reports" OR "Books" OR "Scholarly Journals" OR "Dissertations & Theses") AND la.exact("English").

Table 2 displays the number of articles retrieved from each database as of the 13th May 2018. Due to the potential for smaller case studies and reports of sites and schools using population health approaches a wide range of document types were included in the search. English documents: including annual reports, articles, books, case studies, commentaries, dissertations/theses, literature reviews, reports and technical reports were selected.

Search outcome

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram in Fig 1 summarises the process of article selection. The initial search yielded 20,122 results, 1571 of which were identified as duplicates and removed immediately. PRISMA diagrams were used throughout the search to document the process and findings.

The inclusion criteria included any documents discussing multi-disciplinary collaboration and planning to support children's development, public/population health models and examples of sites and schools using data. Exclusion criteria included: university or council-based programs with no collaboration with schools, interdisciplinary curriculum planning within the site or school (including assessment planning), interventions for special groups only, papers not available in English and those without any reported outcomes or recommendations. Studies identified through the literature search were uploaded to a reference manager program, EndNote X7. Study titles, abstracts and full-text were reviewed by a single researcher (AW).

Quality appraisal

After applying the exclusion criteria, 51 articles remained. Methodological quality was based on a critical appraisal using the Joanna Briggs Institute checklists for analytical cross-sectional studies, cohort studies, qualitative research, quasi-experimental studies, systematic reviews and text & opinion pieces [35]. The types of articles included in the review were: analytical cross-sectional, cohort, qualitative, quasi-experimental, systematic reviews and text & opinion. The appraisal was undertaken independently by two researchers (AW and PW) to ensure rigor and reliability. Disagreements were resolved through discussion between the two researchers. Four articles were identified as methodologically weak, though remained in the analyses as they provided theoretical or practical insight. Thirteen papers were excluded based on the

Table 2. Electronic database search results.

Database	Articles retrieved
ProQuest	13,173
Medline	450
EmCare	3446
Scopus	3032
Open grey	21
TOTAL	20,122

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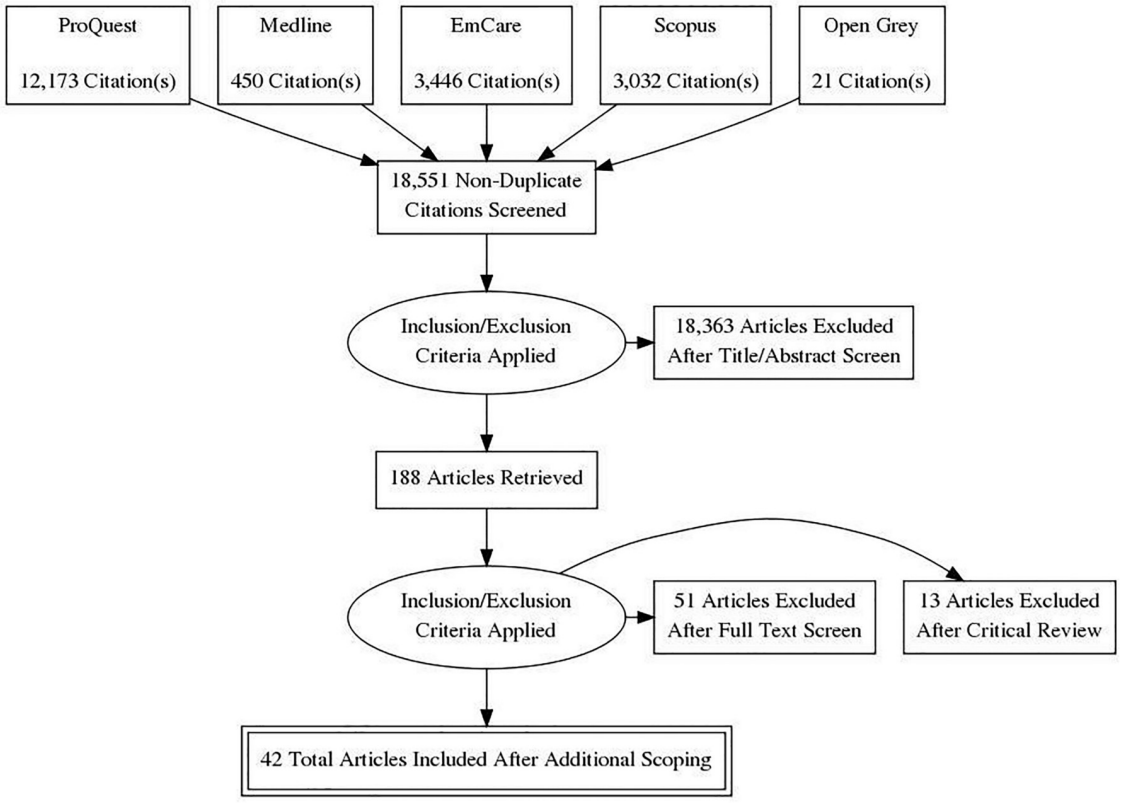

Fig 1. PRISMA diagram outlining the process of electronic database and other searching.

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critical appraisal based on their methodological weaknesses and that they provided little or no additional insights over and above the already included papers.

The CIS approach resulted in an analysis that was iterative, interactive, dynamic and recursive [35]. This resulted in the addition and removal of articles throughout the analysis process. The reference lists of the five most relevant papers were interrogated during the appraisal process to identify any additional research. From this, four additional papers were identified and added for review.

Data extraction

A data extraction form was developed, and extraction performed by the primary researcher (AW). Data were entered on an EXCEL spreadsheet and included the type of paper, methods, summary, key findings and concepts. The data extraction table can be found under supporting documentation 1 (S1). Each concept consisted of one to four key words or phrases that summarised the underlying themes of each article. Twenty-nine individual concepts were identified through data extraction, making up a total of five general themes once consolidated. These themes were later developed into the synthetic constructs required for a CIS.

Synthesis

The CIS approach involves the development of synthetic constructs, which interpret and transform the evidence into a new conceptual form before developing a synthesising argument [35]. A data extraction table was used to summarise the key findings from each article and

relation to the initial primary outcome. Throughout the analysis, papers were summarised but also critiqued and interrogated, with authors assumptions and biases questioned. As such, the general themes identified in initial coding were re-examined to determine four synthetic constructs. While developing the synthetic constructs, the synthesising argument also evolved.

Results

Development of synthetic constructs and synthesising arguments

Four synthetic constructs emerged from this CIS: (1) Elements of population health models exist within communities and can help improve outcomes for more children, (2) Inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development, (3) Children's development can be influenced at a variety of levels, and (4) System change requires a range of drivers and supports.

It is important to note that the constructs presented are of a theoretical nature, emerging from the researchers' professional discourse in education, health and epidemiology. Consideration should also be paid to the key strengths of this approach, in its ability to allow the author to critique and generate theory from a wide range of evidence.

1. Elements of population health approaches exist within communities and can help improve outcomes for more children. The review demonstrated that models such as Health Promoting Schools, the Whole School, Whole Community, Whole Child Approach (WSCC), and Healthy Communities are in place within schools across the world, each of which possess key elements of population health approaches. A review of how these approaches are working, could be used to identify the impact of applying such a model of planning within education. These models typically embody a focus on the health of children, their development and educational attainment, and thus reflect a commonly applied approach to population health. These approaches attempt to promote health behaviours within the school, but fail to address the underlying mechanisms, use evidence-based practices, collaborate across sectors and levels or apply multiple strategies to reduce inequities. Despite their popularity in countries such as the United States, Canada and the United Kingdom, there is currently insufficient evidence of the success of models such as these in improving children's outcomes.

The health promoting schools' approach for example, contains some but not all concepts from a population health approach. Although no strict definition exists, a health promoting school "constantly strengthens its capacity as a healthy setting for living, learning and working," with a focus on: creating conditions that are conducive to health, building capacities, preventing leading causes of death, influencing health-related behaviours, making healthy decisions and caring for oneself and others [39]. The concepts applied are limited to a focus on the health of populations. Therefore, it could be argued that health promoting schools applied health education in a school setting, rather than applying population health planning methodologies within education [39]. Grants are offered by state health departments to support the increasing emphasis on health promotion in schools, and can assist with the development and implementation of programs. While these studies have clearly demonstrated the benefit of health interventions on health outcomes, and that these can be delivered in an education setting, there is little evidence that these benefits extend to other domains [39]. In education, interventions are typically implemented to improve the capacity of children to benefit from education opportunities (i.e., to improve educational outcomes by addressing factors impacting on children's health and wellbeing). A Cochrane systematic review of the impacts of Health Promoting Schools found that of 67 eligible trials, 11 reported the impact on educational outcomes, of which only six reported on student measures [39]. Of these studies, the most commonly reported educational outcome was absenteeism, which saw a slight improvement from

interventions focused on multiple risk behaviours and hand hygiene [39]. Improvements stemming from interventions on multiple risk behaviours, specifically targeting academics, character and student behaviour included: decreased student disaffection with learning, teachers' ratings of academic motivation, improved standardised test scores for reading and maths, and reduced suspensions [39]. Additionally, programs aimed at mental health and anti-bullying also reported increased school attachment and wellbeing [39]. Despite some instances of educational improvement, the review concluded that on the whole, there was a distinct lack of evidence regarding the educational impact of the Health Promoting Schools framework [39]. With schools facing an increasing demand to support children to have good academic outcomes it could, therefore, be argued that it is unreasonable to expect schools to employ such approaches without the benefit of flow on effects to academic achievement. However, despite little empirical evidence, there are still many communities across the world employing these models within their schools. In an environment where resources and funding are typically limited and where the focus is on improving educational achievement, it is crucial that programs employed are grounded in evidence and able to demonstrate improved educational outcomes for children.

When successfully applied, elements of a population health approach such as: collaboration, inclusion, healthy environments, engagement and evidence-based practices that are embedded in policies, practice and relationships, can support children's development [40–44]. Three of these elements also help comprise a population health approach in the form of inter-sectorial action and partnerships (collaboration), addressing the social determinants (evidence-based practices) and understanding needs and solutions through community outreach (engagement) [25]. By integrating these elements into the functioning of a site or school the potential to improve outcomes for a wider range of children is increased. Although the focus and success of these programs has typically been linked to physical health, similar principles could theoretically be applied to improve the social, emotional and cognitive development of the child. As educational practice occurs in partnership with families and communities, it is likely that children's learning and development could be further supported if these elements of collaboration and engagement were applied outside of the school and site.

2. Inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development. As described in Table 1, collaboration, basing decisions on evidence, drawing on a variety of data and demonstrating accountability are key elements of a population health approach. Although collaboration across multiple sectors is common in public health departments, this review found that within education, inter-disciplinary collaboration appears to exist at a relatively superficial level with schools, occasionally involving communities coming together to form genuine partnerships [25, 45–47].

Where relationships were formed, data was used to support initial conversations between staff and across sectors and build accountability systems [40, 48]. Murray described how schools and jurisdictions are held accountable for academic outcomes and process measures, and how "incorporating metrics related to health and wellness into data tracking and school accountability systems (provides) educators, policy makers and the public with a refined understanding of how to achieve learning and academic outcomes" [40]. Aligning data such as attendance, discipline, behaviour and absenteeism with intervention efforts allowed schools to demonstrate the effect of their programs and inform policy, processes and practices [40]. In Belansky's Adapted version of Intervention Mapping [48]school-level data was introduced alongside handouts of best practices to supplement conversations on what could be changed about the school environment [48]. This created a common ground where all those involved could discuss children's development and begin their journey grounded in evidence. By working together towards a shared goal, stakeholders reduced the burden placed on any one

organisation by sharing resources, contacts, knowledge and experiences [49–51]. The most common barriers to continued partnerships and programs were time and money [52, 53]. However, where groups pooled their resources these barriers were reduced often leading to sustained programs and improved outcomes [51]. Additionally, sharing knowledge of the community and their challenges and strengths allowed for more suitable and ultimately successful response [54].

A focus on building genuine relationships, and a commonality of intent and shared goals were key components of success [55]. Additional elements for successful partnerships included: active and engaged leadership, effective use of data, integration of the process within the existing site and school improvement process, distributed team leadership, ongoing and embedded professional development and creation or modification of policy [56]. In one such example, Toronto First Duty (TFD) brought together kindergarten, child care and parenting supports into a single program and produced positive outcomes for children's development as well as improved quality of family life [57]. TFD demonstrated short-term positive effects on children's social-emotional development on the Early Development Instrument and found that more intense use of the program (i.e. higher dose) also predicted children's cognitive and language development [57]. Elements from this prior-to-school approach could be applied to school settings to develop a successful collaborative model.

The results of the search returned minimal results demonstrating how schools work with other stakeholders in the community to support children's development in the years prior to them beginning their formal education. This is likely due to a lack of time, funding and support for this type of research, with education research focused on educational constructs (e.g. curriculum, pedagogy, educational leadership). This does not mean that schools were not engaging with community. Community engagement is a recognised strategy for enabling schools to best facilitate learning and improve their educational outcomes for children [58]. Accounting for constraints around time, funding and support, schools may simply not envisage their work as having broader health- or child development-focussed outcomes. Nevertheless, there has been a call for schools to play a larger leadership role, allowing them to address health in a more strategic manner; supporting the idea that schools could have a more active role in communities [59]. As the factors influencing learning and development are complex and multifaceted, it is important to consider the role of the school in children's lives and their ability to bridge critical home and community ecologies. Regardless of their position in the community, either leadership or an active member of a local partnership, schools will continue to be a universal access point for families, creating a natural hub and the ability to play a significant role in the development of children in the community. It could, therefore, be argued that more clarity around the shared intention of improved educational and life outcomes for children is required before health and education sectors 'buy in' to the use of population-level data in their respective and shared professional practices [60–62].

3. Children's development can be influenced at a variety of levels. The review demonstrated that the impact of the family and community on children's development is well known and is often the focus of health campaigns. Like the population health model, the findings of this study suggest that education sectors are beginning to move towards a holistic approach and are considering the impact of the family and the community on development. However, an opportunity exists for sites and schools to further draw on these influencers to support children's development both before they reach school and once formal education has begun. Initial search results revealed a large number of articles outlining how planning occurs for children's needs at the individual level, including Individual Learning Plans which are used by schools across Australia [63]. There remains scope to increase the extent to which planning for children in the community is based on their holistic needs. By shifting the focus away from the

individual, educators can anticipate the needs of their incoming cohorts and work to improve outcomes before they enter the classroom, working towards more upstream intervention strategies. For the individual, educators can use this knowledge to better understand how their learners' needs are shaped by a range of sociological factors. In turn, these considerations also help schools consider where strategic partnerships may be required to overcome systematic barriers such as waiting lists for assessment of support needs.

The research reviewed, indicated that population health approaches that focus on strengthening protective factors in families and promoting the development of children are able to improve children's outcomes [64]. Reminiscent of the theory of proportional universality, common to the public health approach, a mixture of targeted high-intensity services for those requiring additional support and universal services for all that address risk and protective factors, addressing the determinants of health and their interactions, have been found to enhance children's developmental trajectories [51]. Currently, school-based universal interventions are commonly focused on addressing the needs of educators and the site by improving school structure, supporting educator's pedagogy and instructional policy, rather than focusing on the needs of the children [65]. Population health approaches argue that focusing only on children with complex needs fails to address the needs of all children and thereby limits its potential for widespread impact in a community [66]. Additionally, the prevention paradox understands that multiple levels of intervention are required to prevent poor outcomes in childhood and adolescence. A mix of universal interventions, selective interventions focusing on at-risk groups and indicated interventions for those already facing challenges are required [65]. By addressing risk at multiple levels, those who are at the highest risk are able to receive targeted support, while those who would typically be overlooked due to a lack of risk factors are also identified. However, in order to reach such a large group, cross-sector collaboration and policy that enables collaboration is essential.

Finally, the review highlighted that interventions that focus efforts on a single program or intervention are unlikely to create sustained improvement and instead, that systems need to change to support children and families, and that this type of change is driven by changes to organisational policy [66]. Generation of political support and building policy that promotes positive factors for children's learning and development, could be considered another key element of a population health approach [26]. The review demonstrated that investment by local authorities can provide much needed support to sites and schools, and can have a significant impact on priorities, enhancing health and supporting academic achievement [67]. Policy in an educational setting that promotes the healthy development of all children can take many forms including: promoting integrated systems of care, ensuring optimal use of existing resources and enabling the use of data to document issues and inform advocacy [26, 66]. In summary, improvements require an individual acting as a champion, data to evidence the needs (of the local community) and educational policies and procedures that have sufficient flexibility to reflexive change to be enacted.

4. System change requires a range of drivers and supports. This review highlighted the importance of considering how population change (improvement for many children in a community) is achieved and maintained. In order to achieve sustainable change, supports are required at the leadership level. Where schools have been successful in implementing population health models support from senior staff was essential [50, 68]. Additionally, programs where there was a staff member acting as a champion for the community or intervention were also more likely to have success [69]. Described as a key action for collaborating across sectors and levels, identifying and supporting a champion also occurs in a population health approach. Rooney [68] describes the Whole School, Whole Community, Whole Child Model and the importance of having a strong leader who can advocate, communicate and coordinate

throughout the process. Leadership also supported the success of the program by clearly linking the model initiatives to academic indicators establishing buy-in and sustainability [68]. Conversely, where there was little or no support from leadership or a key champion was no longer in the role, the project was more likely to fail [47].

A clear link to existing work such as curriculum planning and reporting may be useful to promote a population health approach. Educators are already burdened with large amounts of paperwork and duties, therefore building on or modifying existing systems rather than adding new activities or programs is often a more successful approach [70]. Given the existing requirements within education to: engage in site and quality improvement planning, document how these plans are enacted, engage in collaborative work and use evidence to support planning, there remains an opportunity to improve children's learning and outcomes by drawing on the systems already in place.

The review highlighted the potential to draw on the theory of diffusion of innovations (DOI). The DOI theory seeks to explain the how, why and the rate at which new ideas spread [71]. Rogers theorises that four main elements influence the spread of an idea: 1. The innovation itself, 2. Communication channels, 3. Time, 4. A social system. Each of these elements are made up of adopters characterised as innovators, early adopters, early majority, late majority and lagers, each with different motivations and requirements for taking on a new idea [71]. Drawing on this theory, schools could be supported to adopt aspects of a population health approach within their planning, by identifying and tapping into existing supports within the education system. DOI theory can also be used as a reflective tool to review change programs and identify emerging barriers to successful implementation [72]. For some, proven stories of success are required before implementing change. Academic partnerships were discussed as being able to provide such stories and therefore support the development an uptake of new programs [48]. When implementing a new approach, it will be important to consider both the target population and those executing the changes to ensure appropriate supports and motivators are in place.

Discussion

This review has identified four synthetic constructs that attempt to interpret some of the research in the area of educational planning, in order to respond to the original question: "*How can a population heath approach be applied to educational planning to support children's early development*?" The four constructs identified from the literature were: elements of population health approaches exist within education communities and can help improve outcomes for more children; inter-disciplinary collaboration and partnerships possess unique opportunities to influence children's development; children's development can be influenced at a variety of levels, and system change requires a range of drivers and supports. Despite their differing sources, these concepts contain unifying themes that can be used to draw generalisations from the findings.

Several elements of a population health approach were identified within the education system including focusing on the health (educational attainment) of children, addressing the determinants of health and their interactions, basing decisions on evidence, collaboration across sectors and levels, and identification of a key champion. Though these elements are present in various programs and processes, there was no evidence of all eight approaches being employed simultaneously. Population health approach elements that were not demonstrated in the review included: increase upstream investments, employ mechanisms for public involvement, demonstrate accountability for health systems. Therefore, it could be argued that although the education sector does draw on elements of a population health approach, they are

often applying health or wellbeing interventions and are not employing the complete approach, missing out on a critical opportunity to maximise return from their efforts and improve outcomes for children.

There appears to be two distinct areas of opportunity to integrate population health approaches into planning. The first, would be to include it in the work that is already taking place in prior-to-school and school settings through planning for children's needs based on their past experiences. Continuity of learning and successful transitions have been argued to play a crucial role in children's education success and their ability to maximise learning opportunities [73]. As such, there is a requirement within education systems to ensure programs are organised in ways that maximise opportunities for each child's learning [74]. Educators who are prepared for their cohorts are better placed to support children at crucial transitions, thereby increasing the proportion of children who experience continuity in their learning rather than disruption. This review has identified the potential benefit of incorporating information about the factors influencing children's development into educational planning to better encompass and build on children's previous experiences and to anticipate how these may continue to impact their learning, development and capacity to engage with learning opportunities. Importantly, properly designed and managed education programs have been shown to generate large returns on investment, primarily in the way of savings in relation to reducing conditions later in life [75]. Several models have been proposed to explain the effect of socioeconomic status and ultimately life experiences on later life outcomes and each provides an argument for education systems to play a substantial role in reducing upstream burdens for individuals, communities and economies. The timing model suggests that socioeconomic factors have the greatest influence if experienced during specific developmental periods such as birth to three years [76]. Within education, research suggests that systems need to respond early in children's lives and provides an impetus for schools to advocate for children before they enter formal education, in order to avoid challenges later in life. Conversely, the accumulation model suggests that the detrimental effects of socioeconomic status can accumulate throughout the life course and will continue to do so with increasing duration of exposure to disadvantage [76]. This model may help educators consider the factors that have influenced children's development and consider how these may present the child with additional challenges and barriers to engagement in learning. Although prior-to-school and school settings are not able to impact socioeconomic status (SES), there are instances where education has also been able to help mediate some of the negative impacts of SES [12]. Regardless of their differences, these models each emphasise the importance of early sensitive periods and their impact on later health and development. If schools have insight into the capabilities children bring with them to school and plan an education experiences that is well placed to build on these capabilities, there is not only a greater opportunity to cater to children's needs but also an increased likelihood of developmental gains.

The second area of opportunity to integrate a population health approach, would be to build on what is already occurring and increase the outreach into the community. The significance of partnerships emerged as a recurring theme across the four constructs. Partnerships with community stakeholders and families supported children's development by reducing inequities in access, ensuring all children were connected with the school, and children were receiving the services and supports they required. Once children are enrolled in school there are many programs and interventions available to support children and families and improve health. However, there appears to be multiple challenges facing schools and their ability to increase their reach into the community prior to children starting school including funding, role constraints and data sharing [53]. To overcome these challenges, schools could employ aspects of a population health approach to working together with other stakeholders in the

community, to promote healthy child development before school entry. This could support families and the community, so that their children can arrive at school with an increased capacity to learn. Early intervention programs can have positive effects on children's developmental trajectories and learning, particularly when applied prior to school age [77, 78]. Local approaches that focus on addressing risk factors and promoting protective factors at a community level are not only more cost efficient but could also improve the success of the program by ensuring it reaches all children during the crucial years of development [79, 80].

Data was discussed throughout the literature and across the constructs as supporting planning to ensure actions were grounded in evidence. Despite the recurring references to its importance there was a lack of discussion about how to use data at a population level, with the majority of use centring around individual children. Despite the known interactions between early childhood education and later life outcomes it appears as though there is a wariness of educational research and practice towards health paradigms. This may be due to educators feeling as though they do not possess the skills to draw these connections or being unable to obtain the appropriate data required to draw such links [81]. Within Australia, large datasets such as the AEDC can be utilised to demonstrate the connections between education and later life outcomes. Demonstrating these links can support diverse sectors to form partnerships to address shared concerns. Through interrogating the AEDC data educators and education leaders can identify and understand where children in the community are facing challenges and explore what may have impacted their development. Becoming more aware of children's contexts and early experiences supports sites and schools to be prepared for their incoming cohorts. Trend data, such as that from the AEDC can help to identify where there are protective and risk factors at a community, state or national level, and help educators to consider appropriate resources that can help them address the needs of incoming cohorts. In turn, educators are likely to be better placed to develop a suitable curriculum and by understanding the source of the problems can put in place supports for children to reduce the time spent reacting to the everyday problems presented in the classroom. Further support in the way of professional development or integration into early childhood education courses, may be required to assist educators in developing relevant data interrogation skills and to acknowledge the usefulness of data in their practice.

If a population health approach were to be applied to educational planning, with the ultimate goal of supporting children's development, it would require consideration of the supports and structures already in place at both the local and systemic levels. Recognising the differing goals of health and education systems, any approaches applied would need to be modified for the environment and goals of the education sector. It is likely that a new approach, specifically designed with education at the helm, would be required to meet the needs and restraints of the system. An 'education promotion approach' could see improved stakeholder relationships prior to school entry and ultimately improved outcomes for children.

Conclusion

This review utilised the CIS method to outline the key concepts that occurred in the literature around population health approaches and their application to education planning and children's early development. Within education, there are a number of models which are used to improve outcomes for children and families. Although a population health approach to planning does not explicitly exist within education, the results from this review indicate that it would indeed be possible to adapt the population health approach to prior-to-school and school educational planning, and that doing so is likely to be advantageous for children's development. Presently, there is a dearth of research demonstrating this benefit, and more

work is needed to articulate the ways in which population data adds value to schools, and the extent to which this type of planning improves the experiences of children in school and their educational outcomes. Finally, implementing such an approach will require system changes and supports that enable schools to connect with their communities and flexibility to respond to the context of children.

Thus, this review asserts several key questions that could guide future research or inform practice. Firstly, does population data enhance educator understanding of context and factors driving children's learning and development, and in this way planning for children's development and learning? Secondly, how can partnerships support educators to plan holistically from a population-based perspective? Finally, are schools able to work with communities prior to children entering school and if so, what impact does this have on children's development at school entry?

Supporting information

S1 File. Data extraction table.
(DOCX)

S2 File. PRISMA checklist.
(PDF)

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Appendix B. Data extraction table

Reference	Title	Type of paper	Methods	Summary	Key Findings	Concepts
Adelman & Taylor (2015)	Whole Child Schooling and the 2015 National Initiative for Transforming Student and Learning Supports	Commentary	Discussion of current approaches to student learning and supports	Describes the fragmented nature of school planning and promotes the need for collaborative approaches to improve student and learning supports.	Learning and student supports differ across schools, though are generally fragmented. This fundamental policy problem leads to schools ineffectively addressing barriers to student and learning supports, duplication across services and marginalisation. Interrelated solutions require collaboration and sharing of resources, connecting schools with families and communities to achieve a common goal.	School planning, community collaboration
Ambrose & Short (2009)	Integrating health planning and social planning: a case study in community-based partnerships for better health	Primary research	Case study. Interviews and document reviews	The study investigated the process by which health and social planning were integrated in practice at the community level. A retrospective study of a community-based health promotion project for early childhood environments was conducted.	Planning followed a similar process as the 'Health Promoting Schools' model, but was also influenced by local, state and federal policy, as well as emerging research about the importance of early childhood development and health. Time constraints were discussed as a significant barrier in planning and linking to other community services/agencies. Professional development, networking and partnerships and inclusion, engagement and change all lead to an increase in empowerment in staff.	Collaboration, stakeholder partnerships, increased engagement, program planning

Amed (2015)	Creating a collective impact on childhood obesity: Lessons from the SCOPE initiative	Primary research	Community-based participatory research	Describes the processes used in SCOPE to achieve multi-sectorial engagement and collective action to prevent childhood obesity	A multi-pronged community-led childhood obesity prevention initiative can be achieved by using community-based participatory research principles. Best practice processes were found to align with the principles of CBPR and the conditions of collective impact.	Community-based participatory research, collective impact, community engagement
Bassett-Gunter et al. (2016)	Health school communities in Canada	Commentary	Review of key resources to identify common components and principles necessary for a healthy school communities approach	Describes the process for enhancing communication among organisations and stakeholders invested in health school communities internationally	Education, social and physical environments, policy, community partnerships and the use of evidence were all identified as core components of healthy school communities. The adoption of a whole school approach, education and health service synergy, planning and assessment, leadership and sustainability were discussed as fundamental principles.	School planning, healthy school communities, school health and well-being
Belansky et al. (2011)	An Adapted Version of Intervention Mapping (AIM) Is a tool for conducting community-based participatory research	Primary research	Community-based participatory research, Intervention mapping and interviews	The adapted version of Intervention Mapping is closely aligned to 7 of the 9 community-based participatory research principals	A strong appreciation for outside facilitation of the planning process and resources were key themes emerging from the analysis. The value of research partners was discussed in terms of sharing data and success stories, evidence-based practices and administrative support (organisation of meetings). Outside facilitation was viewed positively, as it allowed members to feel they	Collaboration, intervention-mapping, school planning, community-academic partnerships

					had an equal vote in the discussion.	
Blank (2015)	Building sustainable health and education partnerships: stories from local communities	Primary research	Case study. Interviews and document reviews	This paper describes community schools, their relationships with partners and the outcomes associated with sustainable partnerships	Schools and districts with strong health partnerships reflecting community schools strategy have been shown to improve attendance, academic performance and increase access to mental, dental, vision and health supports for their students. Leadership and management infrastructure was discussed as necessary for success. Data, professional development and a focus on results all support outcomes	School planning, cross-sector patronships, education and health outcomes, data
Bolton et al. (2017)	The outcomes of health-promoting communities: being active eating well initiative - a community-based obesity prevention intervention in Victoria, Australia	Primary research	Mixed method, multilevel quasi-experimental evaluation	This study evaluates the impact of the Health-Promoting Communities: Being Active Eating Well initiative.	Common strategies included social marketing, stakeholder engagement, network and partnership development, community-directed needs assessment and capacity building. Gains were shown in community capacity. Results varied across communities, with one achieving a higher level of healthy eating policy in schools, two with improved healthy eating related behaviours, one with lower sedentary behaviours and one with higher levels of	Health promotion, healthy communities, intervention, policy

					physical activity in schools. High-level multi-sectoral partnerships across government departments and state-level policies in education settings are recommended. It is suggested that future research should consider a systems approach modified existing systems rather than relying on the addition of new activities. To achieve effective and sustainable solutions, strategies need to become integrated into existing practice and operating systems to support the community in general.	
Bostock (2018)	Diffusion theory and multi-disciplinary working in children's services	Primary research	Qualitative. Interviews	Explores how innovation in children's services is adopted and developed by staff within new multi-disciplinary teams.	DOI theory is described, identifying the five innovation attributes that are important for rapid diffusion: rapid advantage compatibility, complexity, trialability and observability. Multi-disciplinary team working and group supervision were viewed as advantageous and improved the service to children and families. DOI was viewed as a useful reflective tool for senior managers to plan and review change programmes and to identify and emerging barriers to successful implementation	Diffusion of innovations, multi-disciplinary planning

Bruce, Klein, Keleher (2012)	Parliamentary inquiry into health promoting schools in Victoria: Analysis of Stakeholder views	Primary research	Thematic analysis of parliamentary submissions	This paper discusses the barriers and enablers to school health promotion, including the need for stronger leadership from the Departments of Health and Education and Early Childhood Development.	Submissions (from the Inquiry) supposed the need for increased resources allocation to support health promotion in schools, and for coordinated approached with stronger leadership from the health and education sectors, rather than supporting the idea that schools could have a wider role in communities. This structure would allow schools to address health in a more strategic manner, with increased resources, capacity and outcomes.	Health promoting schools, school health
Can (2015)	The value of using schools and community assets for health	Review	Meta-synthesis	This review investigates if the wider learning environment provided in a school is valuable in improving health.	Asset-based Community Development was described as a useful lens to view research in schools on the interaction of education and health improvement. This model was discussed as potentially useful for national governments to develop resources for education and health.	School planning, community development, community assets, collaboration

Campo (2017)	Examining school leadership in New York Community schools	Primary research	Interviews, surveys	The community school model is rooted in John Dewey's (1902) conceptualization of the public school as a hub for the community. This work has evolved over a hundred years and recently experienced prominence in the public eye as a fundamental component of New York City's school turnaround policy. This dissertation describes findings and recommendations from interviews with leaders in ten New York City community schools. These interviews are triangulated with analysis of the New York City school environment survey using both faculty and parent responses. This research investigated the values, processes and behaviours of leaders that hinder or	Principals of community schools must undergo a paradigm shift, shaped by the understanding that leading a community school is different from a traditional public school, and requires specific skills and behaviours. Primarily, school leaders need to cultivate a distributed leadership approach supported by practices of mindfulness and the cultivation of collaborative systems. In order to create a healthy school climate, they must develop processes to collaboratively create school values and vision and periodically revisit how these values are being supported by the community school. This work is hindered by a lack of specific policies supporting community school management and daily practices, as well as an unclear definition of roles and hierarchy. An emerging theme was the disproportional cultural capital of CBO staff compared to DOE staff, and the author provides recommendations to address the accountability imbalance which reinforces this dynamic between the two factions.	Community schools, teacher leadership

				contribute to the partnership between community-based organizations (CBO) and the Department of Education (DOE).		
Cappella (2008)	Enhancing schools' capacity to support children in poverty: an ecological model of school-based mental health services	Commentary	Discussion on refocusing school-based services in poor communities on the core function of schools to promote learning.	An ecological model informed by public health and organisational theories to refocus school-based mental health services in high poverty communities on the core function of schools to promote learning is proposed. The influence of poverty on child development and the limitations of current models of prevention and intervention in schools is also discussed.	Schools are discussed as having an inherent capacity to support children's mental health and development, and to bridge critical home and community ecologies. Underfunded schools do not have the adequate environments to protect children from the influence of risk. Ecological, public health and organisational theories can be used to reconceptualise the service delivery in these communities to focus on schools' core function and inherent capacity to promote children's learning and development. Influential individuals from among the school or community were also mentioned as able to enhance the effectiveness and sustainability of services and	Ecological model, organisational theory, school planning, collaboration

					help bridge the gap between university-based research and community practices.	
Close (2012)	Developing multi-agency leadership in education	Review	Review of multi-agency leadership	This article contributes to the knowledge of how multi-agency leadership in children and young people's services is understood and developed. It presents a framework for multi-agency leadership development.	The framework presented comprises six elements: complexity and culture, multi-professional groups and inter-organisational partnerships and organisational consultancy and professional supervision. Ethical maturity must be achieved if multi-agency leadership is to benefit children and young people.	Leadership, educational change, inter-disciplinary research
Comer & Ben-Avie (2010)	Promoting community in early childhood programs: a comparison of two programs	Primary research	Cross-sectional	Describes the Jewish Early Childhood Education Initiative, exploring quality in early childhood education, the impact of early childhood programs on the lifepaths of families, and the contribution of the families to the programs	JECEI implemented a governance and management process that improved relationships and increased the capacity of early childhood centres to impact the families. A governance and management process that enables the school community to anticipate and manage change, as well as coordinator all initiative is required to successful engagement. JECEI families were positively influences by the	Early childhood education programs, family engagement, school improvement

					early childhood program, resulting in better connected communities and families.	
Corter & Pelletier (2015)	Schools as Integrated Service Hubs for Young Children and Families: Policy Implications of the Toronto First Duty Project	Commentary	Describes policy implications of Toronto First Duty in Canada	The paper describes the Toronto First Duty Project, designed to test the feasibility and effects of a universal model for integrating child care, kindergarten, families support and other services in school-based community hubs.	There was positive evidence on the feasibility of implementing the model, as well as evidence about the processes that work through program and family pathways to enhance child development and parenting. Positive outcomes for children's development were presented, alongside improved quality of family life. Experience from the Toronto First Duty project suggests that ongoing research and development will be an important part of ensuring the success of system change.	integrated services, policy
Denman (1999)	Health promoting schools in England - a way forward in development	Commentary	Describes health promoting schools in England	The paper reviews research and practice and makes recommendations to inform the future development of schools and health promoting organisations.	The model is described as process driven, requiring commitment and an ability to adapt to the changing needs of the school community. External agencies can stimulate and support schools in their endeavours.	Health promoting schools, school health

Dworkin & Sood (2016)	A population health approach to system transformation for children's healthy development	Commentary	Describes the Help Me Grow program alongside the implications from the science of early brain/child development and adversity and toxic stress.	This article shares the story of Help Me Grow, a program designed to support children across a range of developmental trajectories, linking children and their families to community-based programs and services to strengthen protective factors that promote children's optimal healthy development.	Cross-sector collaboration is essential to address families' needs. Focusing only on children with complex needs fails to acknowledge the benefits of targeting the needs of all children in a population health approach. System building should encompass all sectors that influence family's capacity and well-being.	Population health approach, social determinants, child development
Ellis & Dietz (2017)	A new framework for addressing adverse childhood and community experiences: the building community resilience model	Primary research	Qualitative. Interviews and focus groups	Proposes a transformative approach to foster collaboration across agencies to address the causes of toxic stress and childhood adversity to build community resilience.	The Building Community Resilience model as a means to explore capacity issues, reduce fragmented health care deliver and facilitate integrated systems across partners was supported.	Adverse childhood experiences, integrated models, community resilience
Gleddie (2010)	A journey into school health promotion: direct implementation of the health promoting schools' approach	Primary research	Case study. Interviews, focus groups, document analysis, observations	Describes the Battle River Project in line with the health-promoting schools' approach. The original study aimed to examine the effectiveness of a local school district	Participation, coordination and integration were identified as descriptors to how the program worked and was organised. The program was particularly effective in stimulating the development of policy and programs grounded in the Health Promoting Schools framework, inclusive of physical	Health promoting schools

				implementation model of the HPS.	activity, healthy eating and mental well-being. A systemic divisional approach was discussed as a successful approach that considers local differences and is an effective use of resources.	
Haggett (2002)	School-community engagement: an opportunity for relational leadership theory in action	Primary research	Multi-method study, interviews, observation, surveys	Explores systems theory, change theory and relational theory and how the three connect to guide the research in an enactment of a leadership opportunity a forum for school=community dialogues on best practices in education.	Educational leadership can relate a climate that ignites a leadership community, rather than relying on a hero-leader. This paper also provides examples of how educators and the public can cultivate healthy relationships that support beneficial change.	Leadership, community collaboration, schools, engagement
Halfon et al. (2004)	Building bridges: A comprehensive system for healthy development and school readiness	Report	Discussion of the State Early Childhood Comprehensive Systems Initiative: a policy designed to improve early childhood programs to ensure that all children arrive at school health and ready to learn.	This report focuses on bridging concepts, platforms, pathways, strategies, and tools that can be used by SECCS grantees to achieve the goals of the initiative.	Strategies for the engagement process are described as well as how to create a common framework for systems building	Collaboration, planning

Hayman (2014)	Personal, social, health and economic education: the bridge between public health and education	Commentary	Discusses how schools can achieve public health objectives and develop partnerships	Describes the Healthy School approach and explores ways in which schools and local authorities can work together to achieve shared outcomes.	The healthy school approach can bridge the gap between positive health outcomes and educational attainment. Local authority investment was discussed as providing support to schools. The approach is suggested to have significant impact on both school and local authority priorities, enhancing health and well-being and supporting academic achievement	Healthy school communities, collaboration
Healthy Communities, Healthy Kids (2009)	Healthy Communities, Healthy Kids: How Ophea's Living Schools are pointing the way to a healthier lifestyle for Canada's kids	Commentary	Discusses Ophea's Living Schools	The common process of Living Schools is presented, alongside the six critical success factors for creating healthy schools.	Living School approach recognises the factors contributing to poor health outcomes. The concept is a lens through which a school's existing activities can be viewed and enhanced. Pillar partners (students, parents, local businesses and other community leaders) are discussed as necessary for developing and implementing plans. Critical success factors are discussed: shared leadership and responsibility, a clear and common vision, clearly articulated process steps, dedicated and sustained funding and support, assessment, monitoring and evaluation and establishment of a healthy school's office or department.	Partnerships, school health, child development

					Living schools saw a number of positive outcomes through test score, behaviour, belonging, physical health and attendance.	
Hopson & Lawson (2011)	Social workers' leadership for positive school climates via data-informed planning and decision making	Primary research	Cross-sectional	The paper discusses the role of social workers in schools, developing a schoolwide understanding of students need and resources and the potential for leadership roles. The importance of data-informed decision making is discussed.	A positive school climate requires data-informed decision making. Data can also be applied to district improvement plans. A data-informed theoretical framework for developing a positive school climate by providing opportunities, skills and reinforcement is proposed.	Academic outcomes, evidence-based practice
Horn, Freeland, Butler (2015)	Schools as Community Hubs: Integrating support services to drive educational outcomes	Commentary	Discusses schools as community hubs	Discusses how schools can function in an interdependent manner with other service providers yet maintain the control needed to customise services to student's needs and achieve academic outcomes	Student information sharing was discussed as often difficult but to privacy rules. The impact of hub-based services in the wider community was mentioned as rarely measured fully or reflected in budgets for the hub. Authors recommend a wider use of budget waivers and specialised training for school leaders to coordinate services efficiently.	School-based hubs, integrated services, policy

Israel (1998)	Review of community-based research: Assessing partnership approaches to improve public health	Review	Discussion of the literature on community-based and related forms of research	Provides a synthesis of key principles of community-based research, examines its place within the context of different scientific paradigms, discusses rationales for its use, and explores major challenges and facilitating factors and their implications for conducting effective community-based research aimed at improving the public's health	Key principles can be summarised as: recognises community as a unit of identity; builds on strengths and resources within the community; facilitates collaborative partnerships in all phases of the research; integrates knowledge and action for mutual benefit of all partners, promotes a co-learning and empowering process that attends to social inequalities, involves a cyclical and iterative process, addresses health from both positive and ecological perspectives and disseminates findings and knowledge gained to all partners. Challenges associated with the approach include partnership related issues such as a lack of trust and respect, methodological issues such as proving intervention success, and broader social, political, economic, institutional and cultural issues.	Community-centred, collaborative, public health partnerships
Iversen (2006)	Developing a participatory multidisciplinary team approach to enhance the quality of school start	Primary research	Participatory action research	Discusses how PAR was applied at 27 schools in Norway, to enhance the quality of school start	Multidisciplinary teamwork and relationships were improved and there was an increased focus on developmental and health care issues. Authors also report that professional knowledge and practical skills and support to local educational staff was	Multi-disciplinary teamwork, Children's development

					improved. Local creativity and ownership with supportive administrative structures were discussed as promoting factors. Time and external professional resources were reported as the main barriers.	
Langford et al. (2014)	The WHO health promoting school framework for improving health and well-being of students and their academic achievement (review)	Review	Systematic	A systematic review assessing the effectiveness of the Health Promoting Schools framework in improving the health and well-being of students and their academic achievement	Positive effects for some interventions for: FMI, physical activity, fitness, fruit and vegetable intake, tobacco use and being bullied were found. Few studies included any academic, attendance or school-related outcomes.	Health promoting schools, outcomes
Lewallen (2015)	The Whole School, Whole Community, Whole Child Model: A new Approach for Improving Educational Attainment and Healthy Development of Students	Review	Discusses the development of the Whole School, Whole Community, Whole Child approach.	Experts from education and health discussed lessons learned from the implementation of the coordinated school health and Whole child approaches. As a result of the discussions the Whole School, Whole Community, Whole Child approach was developed.	The WSCC approach provides opportunities that will improve education attainment and healthy development for students. Community engagement, policies, processes and practices build upon the strengths of each approach and address the needs of modern schools.	Coordinated school health, whole child approach
Lowe et al. (2001)	School-based health centers as a locus for	Commentary	Discussion of school-based health centres	This paper discusses how health professionals and educators can	School-based health centres were found to be critical resources for providing and coordinating services (health	School-based hubs, integrated services

	Community Health Improvement			collaborate effectively in addressing the specific concerns of school attendance and teen smoking.	and medical) for children and adolescents.	
Mort (2007)	School districts in Community Intersectoral Coalitions: models of collaboration for young children	Primary research	Mixed-methods. Focus groups, interviews, observations.	This dissertation explored how school districts participated in successful interdisciplinary community coalitions, to improve the quality of and the opportunities for services of young children and their families, resulting in school success.	The coalitions work resulted in improved coordination, services and access to programs for the early learning of young children. Schools and districts were discussed as playing a key role, the need for reliable data was also described, as well as the need for sustainable and transformative leadership that is able to evolve. Government support is required for grassroots movements by new service reorganisation, funding mechanisms and related policy redevelopment.	Interdisciplinary, children's development, collaboration
Murray et al. (2007)	Coordinated school health programs and academic achievement: a systematic review of the literature	Review	Systematic	This review examines the evidence that school health programs aligned with the Coordinated School Health Program model improve academic success	A positive effect was found on some academic outcomes from school health programs for asthmatic children. A lack of evidence exists for negative effects of physical education programs on academic outcomes. Limited evidence exists to support the effect of health, nutrition and mental health services. No evidence was found supported the effect of staff health promotion programs or school environment	Academic achievement, coordinated school health

					interventions on academic outcomes.	
Murray (2015)	Supporting the whole child through coordinated policies, processes and practices	Commentary	Discusses the roles of the school district and of schools in creating optimal learning environments that support the whole child.	This paper discusses the WSCC model, determining key factors to success.	Three factors led to successfully implementing WCSS: hiring a coordinator at the district and school levels, having collaborative teams address health and learning at the district and school levels, and using data to make sessions and build health outcomes into accountability systems.	Whole child model, school health, community collaboration
Poduska (2012)	Developing a collaboration with the Houston Independent School District: Testing the generalizability of a partnership model	Commentary	Discusses the development of a academic/school partnership	This paper describes the development of a partnership between the Houston Independent School District, The Houston Federation of Teachers and the American Institutes of Research, aiming looking at the Good Behaviour Game.	The partnership was summarised in a six-step framework: analyse the social/political context; learn abut the problems, priorities, and vision of community leaders; identify mutual self-interest; develop a common vision; request ad hoc oversight from district and community leaders; work through issues of trust.	Researcher-practitioner partnerships, community-based participatory research
Rooney	Using the whole school, whole community, whole child model: Implications for practice	Commentary	Discusses the Whole School, Whole community, Whole Child model	This article discusses the strategies, steps and resources that can be integrated into existing process, that help to improve health	Administrative support was identified as an important factor for implementing strategies and sustaining efforts. Other key elements of the planning phase include strategy selection and evaluation, which guides	Whole child model, school health, community collaboration

				and academic outcomes.	successes and provides direction for program adjustment,	
Schools (2005)	Schools: The Perfect place to address the needs of the whole child'	Commentary	Discusses the role of schools in addressing the needs of the whole child	This article describes the role that schools can play as institutions, bringing the community into schools and acting as a service point for youth development and support.	Schools can have a significant impact on children's lives, therefore engagement is crucial for improved outcomes. Authors recommend schools adopt a Whole-Child approach that incorporates roles for families and communities, improve school climate and increase student connectedness, align resources with needs, align goals across agencies and provide incentives to reward improved coordination and fight for local, state and federal community school initiatives.	School-based hubs, integrated services, policy
Slade & Griffith (2013)	A whole child approach to student success	Commentary	Discusses the Whole Child approach	The conception of the Whole Child Approach is discussed as well as the policy and economic implications	Improvement strategies should be evidence based. Educators need help to support students through funding and training. Ensuring that all children are healthy, safe, engaged, supported and challenged should be a national priority. Parents, educators and community members should be engaged to provide a whole child approach to education.	Whole child model, school improvement
St Leger (1999)	The opportunities and effectiveness of the health	Review	Review of the opportunities and	This article disuses the health promoting school and the claims	Health gains for primary school students are most likely to occur if a well-designed program is	Child health, health

	promoting primary school in improving child health - a review of the claims and evidence		effectiveness of the health promoting primary school in improving child health	and evidence from the school health research literature, focused on primary schools	implemented which links the curriculum with other health promoting school actions, contains professional development and is underlined by a theoretical model.	promoting school
Thomas, Rowe & Harris (2010)	Understanding the factors that characterize school-community partnerships The case of the Logan Healthy Schools Project	Primary research	Qualitative. Interviews and observations	This study examines the factors that make up an effective school-community partnership that support the sustainability of school health initiatives applied within a health-promoting schools approach	A focus on building relationships between school and community partners, complementary capacities, commonality of intent and shared goals, competence of practice were all described as key components of success.	Health promoting schools, partnerships, collaboration
Valois et al. (2015)	The ASCD Health School Communities project formative evaluation results	Primary research	Evaluation including qualitative component (site visits, interviews), document analysis, report card results and school improvement plans	This evaluation utilised 11 sites to determine the levels of change in a school community that allow for the initiation and implementation of best practice and policy for improving school health	Nine key elements were determine: principal as leader of the efforts, active and engaged leadership, distributive team leadership, effective use of data, integration of the process with the school improvement process, ongoing and embedded PD, authentic and mutually beneficial community collaborations, stakeholder support of the effect, creation or modification of policy	Health promoting schools, outcomes, healthy school community

Weist, Ambrose & Lewis (2006)	Expanded school mental health: a collaborative community-school example	Commentary	Discusses a mental health framework involving school and community staff	This article discuses a school mental health framework that through the involvement of school and community staff enhances mental health programs for youths	Working across disciplines and constraints of job duties were described as challenges to collaboration. Sustaining school-community program collaboration was discussed in term of funding and investment of energy in building a collaborative relationship. Support from leadership was crucial in overcoming this barrier. Communication, decision making and mutual support were discussed, Positive channels of communication need to be established early, gaps in services and unmet needs need to be addressed and feedback should be sought.	Collaboration
Whitcomb (2009)	Strong start: Impact of direct teaching of a social-emotional learning curriculum and infusion of skills on emotion knowledge of first grade students	Primary research	Quasi-experimental	This dissertation discusses a pilot study that examined the impact of the program on first grade students social-emotional knowledge skills.	Students' knowledge about emotional situations was increased, while students internalising behaviours decreased with exposure to the program.	Social-emotional, population health approach, mental health

Synthetic construct analysis

Synthetic Construct	General theme	Topics included	References
Collaboration and partnerships possess unique opportunities to influence children's development	Collaboration & partnerships to support children's development	Collaboration	Ambrose & Short (2009)
			Belansky et al. (2011)
			Can (2015)
			Halfon et al. (2004)
			Hayman (2014)
			Israel (1998)
			Thomas, Rowe & Harris (2010)
			Weist, Ambrose & Lewis (2006)
		Collective impact	Amed (2015)
		Community-academic partnerships	Belansky et al. (2011)
		Community assets	Can (2015)
		Community-based participatory research	Amed (2015)
			Poduska (2012)
		Community collaboration	Adelman & Taylor (2015)
			Cappella (2008)
			Haggett (2002)
			Mort (2007)
			Murray (2015)
			Rooney
		Community development	Can (2015)
		Cross-sector partnership's	Blank (2015)
		Data	Blank (2015)
		Interdisciplinary	Close (2012)
			Mort (2007)
		Multi-disciplinary planning	Bostock (2018)
			Iversen (2006)
		Multi-disciplinary teamwork	Iversen (2006)
		Organizational theory	Cappella (2008)
		Partnerships	Ambrose & Short (2009)
			Healthy Communities, Healthy Kids (2009)
			Thomas, Rowe & Harris (2010)
		Policy	Bolton et al. (2017)

			Corter & Pelletier (2015)
		Public health partnerships	Israel (1998)
		Researcher-practitioner partnerships	Poduska (2012)
		Stakeholder partnerships	Ambrose & Short (2009)
Children's development can be influenced at a variety of levels	Factors influencing children's development	Adverse childhood experiences	Ellis & Dietz (2017)
		Children's development	Dworkin & Sood (2016)
			Iversen (2006)
			Mort (2007)
			St Leger (1999)
		Community resilience	Ellis & Dietz (2017)
		Early childhood education programs	Comer & Ben-Avie (2010)
		Family engagement	Comer & Ben-Avie (2010)
		Intervention	Bolton et al. (2017)
		Intervention-mapping	Belansky et al. (2011)
		Mental health	Whitcomb (2009)
		Social determinants	Dworkin & Sood (2016)
	Outcomes	Academic achievement	Murray et al. (2007)
		Academic outcomes	Hopson & Lawson (2011)
		education and health outcomes	Blank (2015)
		Social-emotional	Whitcomb (2009)
		Outcomes	Langford et al. (2014)
			Valois et al. (2015)
Population health models exist within public health and can help improve outcomes for more children	Population health models	Community-centered	Israel (1998)
		coordinated school health	Murray et al. (2007)
			Lewallen (2015)
		Ecological model	Cappella (2008)
		Evidence-based practice	Hopson & Lawson (2011)
		Healthy communities	Bassett-Gunter et al. (2016)
			Bolton et al. (2017)
		Health promotion	Bolton et al. (2017)
			Valois et al. (2015)
		Health promoting schools	Bruce, Klein, Keleher (2012)
			Denman (1999)
			Gleddie (2010)

			Langford et al. (2014)
			St Leger (1999)
			Thomas, Rowe & Harris (2010)
		Healthy school communities	Hayman (2014)
			Valois et al. (2015)
		Integrated models	Corter & Pelletier (2015)
			Ellis & Dietz (2017)
		Integrated services	Lowe et al. (2001)
			Schools (2005)
		Population health approach	Dworkin & Sood (2016)
			Whitcomb (2009)
		Whole child approach	Lewallen (2015)
			Murray (2015)
			Rooney
			Slade & Griffith (2013)
System change requires a range of drivers and supports	Supporting development in education settings	Diffusion of innovations	Bostock (2018)
		Educational change	Close (2012)
		Increased engagement	Ambrose & Short (2009)
			Haggett (2002)
		Leadership	Close (2012)
			Haggett (2002)
		Program planning	Ambrose & Short (2009)
		School-based hubs	Lowe et al. (2001)
			Schools (2005)
		School health	Bruce, Klein, Keleher (2012)
			Denman (1999)
			Healthy Communities, Healthy Kids (2009)
			Murray (2015)
			Rooney
		School health and well-being	Bassett-Gunter et al. (2016)
		School improvement	Comer & Ben-Avie (2010)
			Slade & Griffith (2013)
		School planning	Adelman & Taylor (2015)
			Bassett-Gunter et al. (2016)
			Belansky et al. (2011)
			Blank (2015)
			Can (2015)
			Cappella (2008)
			Halfon et al. (2004)

Appendix C. An overview of the documents included in the review

National Quality Standard (NQS)

The National Quality Standard (NQS) is described as a 'national benchmark for early childhood education and care,' and includes seven quality areas which focus on the educators' practice, and are intended to support child outcomes (Australian Children's Education & Care Quality Authority (ACEQUA), 2017). The NQS aims to promote: the safety, health and wellbeing of children; a focus on achieving outcomes for children through high quality educational programs; and families' understanding of what distinguish a quality service. Services are assessed by their regulatory authority against the seven areas and given a rating based on the results. The quality areas covered by the NQS include: 1. Educational program and practice; 2. Children's health and safety; 3. Physical environment; 4. Staffing arrangements; 5. Relationships with children; 6. Collaborative partnerships with families and communities; 7. Leadership and service management. Although focused on the early childhood education and care sector, the NQS was included in this review as many of the themes and key ideas carry forward to the early years of school.

Early Years Learning Framework (EYLF)

The Early Years Learning Framework (EYLF) was developed collaboratively by the Australian and State and Territory Governments to enrich and extend children's learning from birth to five years and through the transition to school (Australian Government Department of Education and Training, 2009) The framework has been designed for use by educators working in partnership with families, and draws upon international evidence surrounding children's learning and development. The EYLF uses a learner disposition approach – focussing on the habits of mind that successful learners need now and into the future. The framework aims to reinforce educators in their daily principles described in the United Nations Convention on the Rights of the Child, which states that 'all children have the right to an education that lays a foundation for the rest of their lives, maximises their ability, and respects their family, cultural and other identities and languages' (UN General Assembly, 1989, p.3). The framework comprises three elements: Principles, Practice and Learning Outcomes and supports a model of curriculum decision-making as an ongoing cycle. The first section contains five Principles that reflect contemporary theories and evidence and underpin practice which seek to position children to make progress in relation to the Learning Outcomes. These principles include: 1. Secure, respectful and reciprocal relationships; 2. Partnerships; 3. High expectations and equity; 4. Respect for diversity; and 5. Ongoing learning and reflective practice (Australian Government Department of Education and Training, 2009) Practices are guidelines for how to achieve the goals set out in the

principles. Outcomes is a list of give overall goals, each of which contain sub goals and a list of items which demonstrate the child's proficient in the area. The learning outcomes presented by practice Australian Government Department of Education and Training (2009) include: 1. Children have a strong sense of identity; 2. Children are connected with and contribute to their world; 3. Children have a strong sense of wellbeing; 4. Children are confident and involved learners; 5. Children are effective communicators. Three themes of Belonging, Being, Becoming are contained in each of these elements, and anchor the framework in the view that children are connected to family, community, culture and place, that their learning takes place through their earliest relationships, and that as children participate in everyday life they develop interests and construct their own identities and understandings of the world (Australian Government Department of Education and Training, 2009).

Children's experiences prior to school are understood to be significant as they make the transition from birth to five settings into school (Australian Government Department of Education and Training, 2009). The role of the EYLF is understood to be common to many children; hence its inclusion in the document analysis.

Australian Professional Standards for Teachers

The Australian Professional Standards for Teachers consist of seven standards, which teachers will meet at differing levels through their careers. These Standards can help guide professional learning, practice and engagement which improve teacher quality and children's learning. The Standards provide a framework which clearly demonstrates the knowledge practice and professional engagement required across educators' careers and can be used as a professional accountability model from graduate to a leader in the profession. The Standards also underpin accreditation of initial teacher education programs and support nationally consistent teacher registration. The Standards (2011) outline the expected knowledge and abilities of teachers: 1. Know students and how they learn; 2. Know the content and how to teach it; 3. Plan for and implement effective teaching and learning; 4. Create and maintain supportive and safe learning environments; 5. Assess, provide feedback and report on student learning; 6. Engage in professional learning; 7. Engage professionally with colleagues, parents/carers and the community (Australian Institute for Teaching and School Leadership, 2011). The Standards are grouped into three domains of teaching: Professional Knowledge, Professional Practice and Professional Engagement. Focus areas within each standard provide further illustration of teaching knowledge, practice and professional engagement at four professional careers stages: Graduate, Proficient, Highly Accomplished and Lead.

Australian Professional Standard for Principal and the Leadership Profiles

The Australian Professional Standard for Principals outlines the expected knowledge, understanding and action of principals in order to succeed as a principal or school leader. The Standards are a model which recognise the common qualities and capabilities of successful leadership, based on three interwoven lenses. The first, lens Leadership Requirements focuses on: 1. Vision and values; 2. Knowledge and understanding; 3. Personal qualities, social and interpersonal skills (Australian Institute for Teaching and School Leadership, 2014). These requirements are enacted through the Professional Practice lens which focuses on: 1. Leading teaching and learning; 2. Developing self and others; 3. Leading improvement, innovation and change; 4. Leading the management of the school; 5. Engaging and working with the community (Australian Institute for Teaching and School Leadership, 2014). The third lens, Leadership Emphasis describes a school leaders' actions with an: operational, relational, strategic or systemic emphasis (Australian Institute for Teaching and School Leadership, 2014). Each of the focus areas contain a practice description, and a developmental pathway which describes various actions leaders may take as their proficiency increases. The Standards can be used by leaders in a variety of ways including self-reflection, professional growth, to support professional learning programs, selection and recruitment, talent development and succession and performance reviews.

The Leadership Profiles are a set of statements which describe the Principal Standard in more detail, and can be used as a guide to becoming a better leader. The profiles contain three core Leadership Requirements, and five Professional Practices that are required to improve impact as a current or future school leader. The Standards and Profiles were included in the document analysis as they are key documents for school leadership. Exploration of the requirements of principals through the Standards will allow for a deeper analysis and understanding of the key factors influencing decision making and expectations within the school environment, which subsequently impact the experience and achievement of children once they have entered formal schooling.

Early Childhood Australia Code of Ethics

The Early Childhood Australia (ECA) Code of Ethics is a set of statements describing appropriate and expected behaviour of early childhood professionals, based on the United Nations Convention on the Rights of the Child (Early Childhood Australia, 2016). The Code 'reflects current pedagogical research and practice, providing a framework for reflection about the ethical responsibilities of early childhood professionals who work with or on behalf of children and families in early childhood setting' (Early Childhood Australia, 2016). The

Code of Ethics comprises 60 statements in relation to: children (12 statements), families (ten statements), colleagues (six statements) and communities (six statements), children (seven statements), employers (three statements), themselves as a professional (nine statements) and conduct of research (seven statements). Despite being focused on those working in early childhood, the code of ethics is relevant to all educators and their work as research-based practice seeks to work in the best interests of all children. It was selected for inclusion in the analysis, as the principles can be applied to both prior to school and school settings. The Code is recommended for use by Early Childhood Australia, rather than required for use in Australian educational contexts.

Australian Curriculum

The Australian Curriculum, developed by ACARA, is a national framework which describes the prescribed learning areas of Australian children, irrespective of their location or background from when they enter formal schooling. The curriculum consists of eight learning areas: English; Mathematics; Science; Humanities and Social Sciences; The Arts; Technologies; Health and Physical Education as well as Languages. The curriculum demonstrates progression of complexity which corresponds by year level, and for the purpose of this analysis was reduced to include only those items pertaining to children from Foundation to Two.

General Capabilities comprise one of the three dimensions of the Curriculum, encompassing knowledge, skills, behaviours and dispositions that alongside curriculum content, assist students to be successful in their lives (Australian Curriculum Assessment and Reporting Authority, 2016). The seven General Capabilities include: Literacy; Numeracy; Information and Communication Technology capability; Critical and Creative Thinking; Personal and Social Capability; Ethical Understanding; Intercultural Understanding (Australian Curriculum Assessment and Reporting Authority, 2016). Within the Curriculum, these capabilities are addressed through learning areas and content descriptions.

Due to the enormity of the Australian Curriculum, a subsection consisting of two areas deemed most relevant, Humanities and Social Sciences (HASS) and General Capabilities were chosen. These subsections were decided upon by the authors after consideration of the curriculum and its parts. Additionally, after reviewing the curriculum the authors determined that the HASS and General Capabilities frameworks would be most likely to encompass elements of the PHA due to their focus on behaviour, social determinants and responsibility.

Despite being a national framework, the Australian Curriculum is implemented in only five jurisdictions with Western Australia, New South Wales and Victoria each employing their own versions of the curriculum. Additionally, variants of the EYLF are utilised in Queensland

and Victoria. Notably, these variations do not differ significantly from the national curriculum and therefore no alternate versions were included in this review.

Appendix D. Summary of results by framework

Early Years Learning Framework

The EYLF content had a strong focus on exploring diversity within learners and their backgrounds (Australian Government Department of Education and Training, 2009). However, this framework concentrated more on an exploration of this information in developing professional knowledge and to develop partnerships. These concepts were presented in the Principles and Practice sections of the document and were not included in the Outcomes for children or educators. Concepts of promoting children's wellbeing were also evident, though there was little information or suggestions on how this could be translated into early learning settings.

National Quality Standards

The NQS contained a number of PHA elements, though 'Focus on children's developmental and learning progress' was coded most frequently, followed by 'collaboration occurs with other educators, leaders and community partnerships.' Quality area 7, Governance and Leadership, was a particularly interesting section of the standard as unlike other frameworks it has a particular focus on how effective governance and leadership support the operation of a quality practice, promote positive organisational culture and a professional learning community (Australian Children's Education and Care Quality Authority, 2020). This quality area explicitly requires educators to use assessment and quality improvement processes and evaluate the learning environment. Additionally, the educational leader is required to 'support and lead the development and implementation of the educational program and assessment and planning cycle.'

Australian Professional Standard for Principals and the Leadership Profiles

As the title suggests, this document provides a leadership framework for principals in school settings. Review of the content demonstrated a focus on using evidence to inform decision making and demonstrate outcomes, promoting equity and collaborating with communities and other educators. The impact of policy in planning and decision making was also presented in this framework.

Overall, this framework supported a variety of PHA elements. However, the practical application of this profile and its alignment to that of educators cannot be determined in this review and should be explored in future research. Through an analysis of the documents, it does not appear as though there is a strong enough alignment between the requirements of leadership to use evidence and data to that required of educators. This is evidenced by a lack of overlap between the content in documents provided for leaders where there is a

recurring focus on the use of data for informing practice and maintaining accountability, compared with educator-intended documents where there is little mention of data at all (Australian Institute for Teaching and School Leadership, 2014).

General Capabilities

The General Capabilities learning continuums focused on children's abilities, rather than the actions of the educators and leaders within the school. Addressing the determinants of children's developmental progress was coded the most frequently across the General Capabilities frameworks.

Australian Curriculum: HASS

The Australian Curriculum contained very few PHA elements; the History curriculum mentioned parental and community inclusion, and also made links to children's Aboriginal and Torres Strait Islander backgrounds. However, these links were relatively superficial and did not require educators or children to analyse the effects of these backgrounds or understand how it may impact on children's learning.

Early Childhood Australia: Code of ethics

Although the intent of the Code of Ethics (Early Childhood Australia, 2016) is to provide early childhood educators with a framework for reflection on their ethical responsibilities, the document contained a number of PHA elements throughout. Specifically, the Code of Ethics asks educators to consider children's past experiences and identities and how these impact on their learning and development. Additionally, the document requires early childhood professionals to build connections and relationships with families in the community. The significant presence of the PHA may demonstrate a potential avenue for strengthening context informed planning as the elements are understood as rights of the child.

Australian Professional Standards for Teachers

The Australian Professional Standards for Teachers (2011) were the most heavily coded document in the analysis, with a total of 130 references coded throughout. Overall, the Standards contained a broad range of population health elements from both the original approach and the newly developed approach for education. The Standards provide educators with a variety of focus areas and descriptors that can be built upon as their experience progresses. Therefore, by providing a variety of suggestions on how educators' could improve their teaching across their career, the Standards contained the most in-depth examples which ultimately described key elements of the PHA.

Appendix E. Comparison of the presence of Population Health Approach elements by Health Canada and Wilson et al. in education frameworks

PHA element (Health Canada)	Framework							PHA element (Author et al.)
	NQS	*EYLF*	*APSfT*	*APSfP*	*Aus Curriculum*	*Code of Ethics*	*General Capabilities*	
Focus on the health of populations	**10**	**5**	**7**	**7**				***Children's developmental and learning progress.***
Address the determinants of health and their interactions	**1**	**18** 10	**14**	**5** 1	**3**	**1** 3	**2**	***Children's progress by exploring the contextual and operational factors at play.***
Base decisions in evidence	**4** 5	6	**1** 5	11	3		2	***Uses evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities.***
Increase upstream investments			**4**	**5** 2	1	1		***Concerned with impact of studies to inform the direction of, and to improve educational outcomes. Investments are both short and long term***
Apply multiple strategies	**4**	**10**	**2**	3 **1**				***Applying concepts from other disciplines, such as health and wellbeing, to education settings. Strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges.***
Collaborate across sectors and levels	**8**	2 **8**	**14**	1 **20**	4 **7**		1 **1**	***Occurs with other educators, leaders and community partnerships.***
Employ mechanisms for public involvements	**7**	12	**9**	**5**	**12**	2 **11**		***To promote family and community engagement and the value of education.***
Demonstrate accountability for health outcomes	**2**	**2**	**21**	**18**		**3**	**1**	***For education outcomes to ensure they are evidence-informed over time; and include all involved in the learning community, as a part of a process of continuing quality improvement and reflexive practice.***

#Note: PHA elements defined by Health Canada, presented on the far-left column of the table are displayed as plain text numbers. Elements defined by Author et al, shown on the far right column are presented in bold, blue text to allow for a comparison of codes across both approaches.

Appendix F. Summary of codes and references

Node	Files (Frameworks)	References (codes)
Addresses children's progress by exploring the contextual and operational factors at play	7	44
Addresses the determinants of health and their interactions	3	14
Applies multiple strategies	1	3
Applying concepts from other disciplines, such as health and wellbeing to education settings	4	17
Base decisions in evidence	2	5
Collaborate across sectors and levels	4	8
Collaboration occurs with other educators, leaders and community partnerships	6	58
Concerned with the impact of studies to inform the direction of, and to improve educational outcomes	2	9
Demonstrate accountability for health outcomes	0	0
Demonstrate accountability for education outcomes to ensure they are evidence-informed	6	47
Employ mechanisms for public involvement	1	2
Employ mechanisms to promote family and community engagement and the value of education	6	56
Focus on children's developmental and learning progress	4	29
Focus on the health of populations	0	0
Include all involved in the learning community as part of a process of continuous quality improvement	7	48
Increase upstream investments	3	4
Strategies tend to be singular and can be employed across the whole school or targeted	2	9
Uses evidence-informed outcomes and descriptive studies to make decisions	6	32

Appendix G. Ethics approval, Flinders SBREC

Subject: 8470 ETHICS approval notice (13 December 2019)
Date: Friday, 13 December 2019 at 12:34:29 pm Australian Central Daylight Time
From: Human Research Ethics
To: Ashleigh Wilson, Paul Ward, Jessie Jovanovic
Priority: High
Attachments: image001.png

Dear Ashleigh,

Your conditional approval response for project 8470 was reviewed by the Deputy Chair of the Social and Behavioural Research Ethics Committee (SBREC) and was **approved.** The ethics approval notice can be found below.

APPROVAL NOTICE

Project No.:	**8470**
Project Title:	Population Health Approaches to Improve Children's Learning
Principal Researcher:	Ms Ashleigh Wilson
Email:	ashleigh.wilson@flinders.edu.au
Approval Date:	13 December 2019
Ethics Approval Expiry Date:	**1 January 2021**

The above proposed project has been **approved** on the basis of the information contained in the application, its attachments and the information subsequently provided.

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 Sub-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 dialling codes for all telephone and fax numbers listed for all research to be conducted overseas.

- the SBREC contact details, listed below, are included in the footer of all letters of introduction and information sheets.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 'INSERT PROJECT No. here following approval'). For more information regarding ethics approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au.

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 **13 December** (approval anniversary date) for the duration of the ethics approval using the report template available from the Managing Your Ethics Approval web page.

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 modification request form).

First Report due date:	**13 December 2020**
Final Report due date:	**1 January 2021**

Student Projects
For student projects, the SBREC 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 Sub-Committee of any proposed modifications to the project please submit a Modification Request Form available from the Managing Your Ethics Approval SBREC web page. Download the form from the website every time a new modification request is submitted to ensure that the most recent form is used. Please note that extension of time requests should be submitted prior to the Ethics Approval Expiry Date listed on this notice.

Change of Contact Details
If the contact details of researchers, listed in the approved application, change please notify the Sub-Committee so that the details can be updated in our system. A modification request is not required to change your contact details; but would be if a new researcher needs to be added on to the research / supervisory team.

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.

Kind regards
Rae

Andrea Mather and Rae Tyler (Mon, Wed and Fri morning)
Human Research Ethics Officers (Social and Behavioural Research Ethics Committee)
Research Development and Support

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

P: (+61-8) 8201 3116 | andrea.mather@flinders.edu.au
P: (+61-8) 8201 7938 | rae.tyler@flinders.edu.au
www.flinders.edu.au/research/researcher-support/

Appendix H. Ethics modification approval, Flinders SBREC

Subject: SBREC 8470 Transfer / Transfer Modification Approval
Date: Wednesday, 15 July 2020 at 10:13:39 am Australian Central Standard Time
From: donotreply@infonetica.net
To: Ashleigh Wilson

Dear Ms Ashleigh Wilson,

We are happy to advise that the transfer of your project SBREC 8470 - Population Health Approaches to Improve Children's Learning (*ResearchNow Ethics & Biosafety ID "*2002*"*) has been approved.

This approval also covers any modifications submitted with the transfer request.

1. **Modifications**

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.

2. **Annual 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. Please submit the HREC Annual Report Form when the report is due.

3. **Adverse Events and/or Complaints**

Researchers must submit the Unexpected Adverse Events form within 24 hours if:

- a serious or unexpected adverse event occurs that effects participants;
- an unforeseen event occurs that may affect the ethical acceptability of the project.

Researchers should also contact the Ethics office if any complaints regarding the research have been received.

All the best with your research project.

Hendryk

Research Development and Support
human.research@flinders.edu.au

Appendix I. Ethics approval, Queensland Department of Education

Queensland Government

Department of **Education**

13 March 2020

Ms Ashleigh Wilson
Flinders University
Ashleigh.wilson@flinders.edu.au

Dear Ms Wilson

Thank you for your application, titled *Population Health Approaches to Improve Children's Learning*, seeking permission to conduct research in Queensland state schools (Ref. 550/27/2282). I wish to advise that your application has been supported.

This letter gives you permission to approach the principals of the schools nominated in your application to seek their final approval for the research to be administered at their school.

Please provide principals with a copy of the attached letter that contains important information to inform their decision about whether they wish to participate in this research project. Your permission to approach schools is conditional upon the provision of this letter to each of the principals you have nominated.

As detailed in the Department of Education's (Department) Guidelines for Conducting Research, the following conditions apply to your research:

- You must obtain consent from each principal of the schools nominated in your application before you can commence your research or invite research participants to participate in the project.
- Principals have the right to decline participation if they consider the research will cause undue disruption to educational programs in their schools.
- Principals have the right to monitor any research activities conducted in their facilities and can withdraw their support at any time.

This permission to approach schools has been granted on the basis of the information you have provided in your research application and supporting documents. Permission to approach is subject to the conditions detailed below:

- Contact State Schools Performance to discuss your research prior to conducting focus groups: Nigel.Pearn@qed.qld.gov.au, 07 3513 5971.
- Adherence to the Department's Terms and Conditions for Conducting Research, https://education.qld.gov.au/about/Documents/terms_conditions.pdf.
- Any changes to the project required by your institution's Human Research Ethics Committee (HREC) must be submitted to the Department for consideration before you proceed with the research. Conversely, any changes required by the Department must be submitted to your institution's HREC for consideration and approval before commencing the research.
- No comparisons are to be made between the various Queensland state schools, between Queensland state schools and schools in the Queensland non-state sector, or between Queensland state schools and schools in other state and territory jurisdictions, in publications or presentations.

Research Showcase 2020
Evidence for Impact

Education House
30 Mary Street Brisbane 4000
PO Box 15033 City East
Queensland 4002 Australia
Telephone (07) 303 45929
Website www.qed.qld.gov.au
ABN 76 337 613 647

- Variations to the research proposal, as originally described in the application to the Department, should be submitted to Research Services via email, researchservices@qed.qld.gov.au. Variations may include but are not limited to:
  - extension of timelines;
  - changes to the research team;
  - changes to the methodology or data collection instruments;
  - additional analysis or research with the research data;
  - any additional publication/s based on the data beyond what is normally associated with academic studies;
  - changes to the level of sensitivity or imposition associated with the research; and/or
  - changes that alter the initial information provided to participants or parents/caregivers or provide new information that can reasonably be considered to influence participants' willingness to continue with the study.

  Significant variations will require the submission of a new application.

As detailed in the Department's Terms and Conditions for Conducting Research:

- Papers and articles based on data collected from Queensland state schools and/or departmental sites must be provided to the Department for comment at least three weeks before publication.
- Publications must not disclose the names of individual participants or Queensland state schools.
- You must notify the Department if you are contacted by the media about research activities conducted on departmental sites, or if you intend to issue a media release about your research.
- At the conclusion of your research, you must provide Research Services and principals of participating schools with a summary of your research findings and any associated publications.
- You must also submit a summary of your findings to the Queensland Education Research Inventory (QERI) at https://research.det.qld.gov.au. **Failure to provide a summary of your research may preclude you from undertaking any future research in Queensland state schools.**

Please note this letter constitutes permission to approach principals to participate in the research project outlined in your research application only. It does not constitute ethics approval or support for the general and/or commercial use of an intervention, curriculum program, software program or other enterprise you may be evaluating in your research.

Research Services values your input into the research application process and would like to seek your feedback through a short survey: https://survey.qed.qld.gov.au/anon/1777.aspx
Your valued feedback enables Research Services to improve our existing processes and assess whether they are streamlined and transparent to all stakeholders.

Should you require further information on the research application process, please contact Research Services, Strategic Policy and Intergovernmental Relations, on (07) 3034 5929. Please quote the file number 550/27/2282 in all future correspondence.

I wish your research project every success.

Yours sincerely

Dr Angela Ferguson
Director, Research Services
Strategic Policy and Intergovernmental Relations

Queensland Government

Department of Education

13 March 2020

Dear Colleague

Ms Ashleigh Wilson of Flinders University has the Department's permission to approach your school inviting participation in the research project titled *Population Health Approaches to Improve Children's Learning.*

The acceptance of the invitation to participate is entirely voluntary and at your discretion.

This letter provides you with information about the Department's terms and conditions for research conducted on state school sites to inform your decision as to whether or not your school will participate in this research.

The Department supports the conduct of quality research in state schools and values the potential contribution of good research in informing educational policy and professional practice. Participation in research, however, may impact on the daily operations of schools, and it is therefore imperative that discretion is used when deciding whether to agree to research involving your school.

As a minimum, the researcher should provide you with the following documents to inform your decision regarding school research participation:

- an information statement that describes the research, identifies who will be involved (e.g. students, teachers, parents/caregivers) and explains what will be required of these participants;
- the informed consent form for you to sign to indicate your agreement that school staff, students and/or parents/caregivers can be invited to participate in the research;
- a copy of the approval to approach letter from central office or a regional office (where applicable);
- a copy of the final ethical clearance from their institution's Human Research Ethics Committee;
- full copies of any data collection instruments, such as surveys, questionnaires and interview schedules, to be used in the research; and
- a copy of all current Blue Cards and/or exemption notices from Blue Card Services at www.bluecard.qld.gov.au for any researcher(s) seeking access to children on school sites.

Most importantly, participation in any research is voluntary, and you have the right to decline your school's participation in a research project, even if approval to approach your school has been granted at central office or regional level. It is also recommended that you monitor any research activities conducted in your school and you may, if you wish, withdraw your support for the research study at any time without penalty.

Research Showcase 2020
Evidence for Impact

Education House
30 Mary Street Brisbane 4000
PO Box 15033 City East
Queensland 4002 Australia
Telephone (07) 303 45929
Website www.qed.qld.gov.au
ABN 76 337 613 647

At the conclusion of research involving your school, the researchers are required to provide you and participants with a written report summarising the main findings of the study. They are also required to submit a summary of findings to the Queensland Education Research Inventory (QERI) at https://research.det.qld.gov.au.

Should you require further information on the research application process, please contact Sara Ellis Senior Research Officer, Research Services, Strategic Policy and Intergovernmental Relations, on (07) 3034 5929.

Yours sincerely

Dr Angela Ferguson
Director, Research Services
Strategic Policy and Intergovernmental Relations

Appendix J. Ethics modification approval, Flinders SBREC

Government of South Australia
Department for Education

System Performance
31 Flinders Street
Adelaide SA 5000
GPO Box 1152
Adelaide SA 5001
DX 541
Tel. +61 8 8226 1609
Education.ResearchUnit@sa.gov.au
www.education.sa.gov.au

Reference No: 2019-0048

Ashleigh Wilson
Flinders University

C/- yasmin.harman-smith@telethonkids.org.au

Dear Ashleigh

Your research project *"Population health approaches to improve children's learning"* has been reviewed by a senior officer within the Department.

I am pleased to advise you that your application has been approved, subject to the following conditions:

- That a copy of any final reports, presentations or manuscripts accepted for publication be submitted to the Education.ResearchUnit@sa.gov.au mailbox 30 days prior to their publication.

Please contact Georgia in the Data Reporting and Analytics directorate for any other matters you may wish to discuss regarding your application (Tel. (08) 8226 1609 or email: Education.ResearchUnit@sa.gov.au).

I wish you well with your research.

Yours sincerely

Ben Temperly
EXECUTIVE DIRECTOR, SYSTEM PERFORMANCE

13 January 2020

Appendix K. Ethics approval, SA Department of Education

Government of South Australia
Department for Education

System Performance
31 Flinders Street
Adelaide SA 5000
GPO Box 1152
Adelaide SA 5001
DX 541
Tel. +61 8 8226 1609
Education.ResearchUnit@sa.gov.au
www.education.sa.gov.au

REFERENCE NO: 2019-0048
RESEARCHER: Ashleigh Wilson
RESEARCH BODY: Flinders University

Dear Principal/Director/Site Manager

The research project titled *"Population health approaches to improve children's learning"* has been reviewed centrally and granted approval for access to Department for Education sites. However, the researcher(s) will still need your agreement to proceed with this research at your site.

The researcher(s) whose names appear below are the only persons permitted to conduct research on your site:

Name	Clearance Type	Expiry Date
Ashleigh Wilson	WWCC SA	08/03/2022

Please contact Georgia in the Data Reporting and Analytics directorate for any other matters you may wish to discuss regarding your participation (Tel. (08) 8226 1609 or email: Education.ResearchUnit@sa.gov.au).

Yours sincerely

Ben Temperly
EXECUTIVE DIRECTOR, SYSTEM PERFORMANCE

13 January 2020

Appendix L. Interview framework

Data collection instruments – Interview questions

Question
Before we begin, can you tell me a bit more about yourself? Your name, how long you have been at your current school, your role, and your qualifications/background?
We are here today to talk about how we plan for children's learning, development and wellbeing, so I'd like to begin by asking you to talk about how it is that you start to develop your knowledge of children starting school.
What is your understanding of the role of community data in planning for children's learning and development?
How is that information used to shape your approach to teaching/school planning?
How do you collaborate or work in partnership with others to respond to the needs of children in your school/the community?
How do track the impact of your work on the learning, development and wellbeing of children in your school?
What supports do you feel educators and education leaders need to support their planning?
Is there anything I haven't asked that you think is important for us to consider?

Appendix M. Questionnaire for participants

Interview participant information form

1. What is your school's postcode?

2. What is your role in the school?

   - ☐ Educator
   - ☐ Principal
   - ☐ Other (please specify)

     ……

3. What is your highest level of qualification

4. What grades do you typically teach? *(if applicable)*

5. Which learning areas/subjects do you typically teach? *(if applicable)*

6. How many years have you been working as an [educator/leader]?

7. How many years have you been working in your current role?

8. How many years have you been employed at your current school site?

Appendix N. Coding framework

Name	Files	References
1. ACTOR POWER	0	0
community cohesion	4	9
school as a hub	5	11
shared responsibility	9	16
shifting mindsets	5	9
leadership	0	0
community champions	5	18
within the dept	5	12
partnerships	1	1
local departments	4	4
local orgs	2	5
with families	2	2
with schools	7	14
continuity of learning	4	13
improvement planning	5	11
increase data use	5	14
quality assurance	4	6
to develop community partnerships	5	14
understanding policies	3	7
2. IDEAS	0	0
Ability to generate change	0	0
individual	10	25
organisation	3	7
consistent messaging	2	3
development of resources	1	1
consultation	5	17
evaluation	5	10
improve practices	6	30
initiation	3	7
reducing duplication	1	1
response to need	3	13

Name	Files	References
parents	2	4
school	8	20
within the dept	3	6
understanding of drivers of need	8	25
3. POLITICAL CONTEXTS	0	0
policies	0	0
budgets	5	10
federal	6	7
priorities	7	26
state	8	23
Timings	1	1
4. ISSUE CHARACTERISTICS	0	0
issue characterisitcs	0	0
credible indicators	8	21
effective interventions	6	12
severity	4	8
Other things	0	0
barriers	0	0
alignment (priorities)	3	9
data sharing	2	4
fatigue	1	2
for schools	4	8
funding	2	2
innovation	2	4
red tape	4	7
staffing	1	1
time	6	19
trust	7	12
CONFUSION AROUND HEALTH IN PHA	1	1

Appendix O. Ethics modification approval, Flinders SBREC

Ashleigh Collier

From: donotreply@infonetica.net
Sent: Thursday, 31 December 2020 7:38 AM
To: Ashleigh Wilson
Cc: Ashleigh Wilson
Subject: SBREC 8470 - Transfer Modification Approval

Dear Ms Ashleigh Wilson,

We are pleased to advise that the requested modifications to the below transfer project have been approved on 31 December 2020.

Project ID: SBREC 8470

Project Title: Population Health Approaches to Improve Children's Learning

Chief Investigator: Ms Ashleigh Wilson

Expiry Date: 01/02/2022

Application Link: https://researchnow-ethics-forms.flinders.edu.au/Project/Index/1285

You can access the application in the ResearchNow Ethics & Biosafety system via the Application Link above.

Please don't hesitate to contact the Human Ethics Executive Officer if you have any questions.

Regards,

Mr Hendryk Flaegel

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

Appendix P. Ethics modification approval, Queensland Department of Education

Ashleigh Collier

From: BROWN, Fiona <Fiona.BROWN@qed.qld.gov.au>
Sent: Thursday, 4 February 2021 12:13 PM
To: Ashleigh Wilson
Subject: Approval of Variation Request for Research Application – 550/27/2282 – Ashleigh Wilson

Dear Ashleigh

Thank you for seeking approval of a variation to your original research application, *Population health approaches to improve children's learning* (ref. 550/27/2282), in order to interview seven departmental staff, in addition to the originally approved principals and teachers.

My Director has now approved your request.

Please let me know if I can be of any further assistance.

Kind regards
Fiona Brown
Research Officer
Research Services

Strategic Policy and Intergovernmental Relations
Department of Education

P: 07 3034 5959
E: fiona.brown@qed.qld.gov.au
W: https://qld.gov.au/DoEresearch

Level 21 | Education House | 30 Mary Street | Brisbane QLD 4000
PO Box 15033 | City East QLD 4002

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Queensland Government

appropriate use of its computer network. It is your responsibility to ensure that this email does not contain and is not affected by computer viruses, defects or interference by third parties or replication problems (including incompatibility with your computer system).

The Department of Education does not accept any responsibility for any loss or damage that may result from reliance on, or the use of, any information contained in the email and any attachments.

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Appendix Q. Interview questions

Data collection instruments – Policy Maker Interview Questions

Question	Seeking information on the following
Before we begin, can you please let me know a little about yourself - your name, your role, how long you have been in the position, and your qualifications/background?	Prompts: • Can you describe your work/role? • What does an average day look like for you? • Who are the main stakeholders whom you support? *Participant information* *Time within role* *Further study*
Can you tell me a bit about how you approach planning when developing new supports or resources?	Prompts: • What information or data do you draw upon to understand the need of schools? • Do you use anecdotal evidence from school staff? • How do you use the AEDC data to inform understanding of children's needs? *ACF Construct – Coalition beliefs – Strategy Consideration of a population health approach*
To what extend would you say this process is influenced by Federal and State polices?	Prompts: • Does a change in leadership impact how you can produce or deliver supports? • Does this impact your budgets or goals? *ACF Construct - Policy subsystems* *ACF Construct - External events*
To what extent do you feel you have the power to create change? Or respond to needs? (individual & as a group/organisation)	Prompts: • Who decides what will be developed? • Who determines which needs are prioritised? • How is this determined? (I.e. Describe the process/criteria for such assessment)

	ACF Construct - Policy Outputs & Impacts
Can you tell me a bit about how the school community impacts, shapes, or provides feedback on school polices or practices?	Prompts: • Is feedback regularly sought, and changes made based on how the resource or support is working? • Is there an evaluation process? • Who determines (if anyone) whether a support or resource is appropriate & meeting needs? • Who are the end-users? • Whose voices do they hear? (i.e. Are they hearing only from school leaders or is it filtering down to educators?) • How is diversity reflected also? (e.g. How is remote SA consulted?) • What impediments, if any, exist in this process? *ACF Construct - Policy Outputs & Impacts*
What barriers do you encounter when responding to need of schools, either individually as educators or as a whole?	Prompts: • What kind of supports do you provide? • How do you support schools to use data in their planning? • Is there anything that gets in the way (e.g. access to sites/staff, budgets, resources, lack of time) *ACF Construct - Coalition Beliefs – resources Consideration of a population health approach*
How do you view the role of the whole school or community in supporting children's development?	Prompts: • Is there anything that you think schools are particularly good at? • Is there anything where you think they could use additional support to improve? *ACF Construct - Coalition Beliefs – resources Consideration of a population health approach*
Is there anything I haven't asked, that you think is important for us to consider?	*An opportunity to share any other thoughts or clarify points*

Appendix R. Coding framework

Name	Description	Files	References
1. ACTOR POWER		0	0
community cohesion		4	9
school as a hub		5	11
shared responsibility		9	16
shifting mindsets		5	9
leadership		0	0
community champions		5	18
within the dept		5	12
partnerships		1	1
local departments		4	4
local orgs		2	5
with families		2	2
with schools		7	14
continuity of learning		4	13
improvement planning		5	11
increase data use		5	14
quality assurance		4	6
to develop community partnerships		5	14
understanding policies		3	7

Name	Description	Files	References
2. IDEAS		0	0
Ability to generate change		0	0
individual		10	25
organisation		3	7
consistent messaging		2	3
development of resources		1	1
consultation		5	17
evaluation		5	10
improve practices		6	30
initiation		3	7
reducing duplication		1	1
response to need		3	13
parents		2	4
school		8	20
within the dept		3	6
understanding of drivers of need		8	25
3. POLITICAL CONTEXTS		0	0
policies		0	0
budgets		5	10
federal		6	7
priorities		7	26
state		8	23

Name	Description	Files	References
Timings		1	1
4. ISSUE CHARACTERISTICS		0	0
issue characterisitcs		0	0
credible indicators		8	21
effective interventions		6	12
severity		4	8
Other things		0	0
barriers		0	0
alignment (priorities)		3	9
data sharing		2	4
fatigue		1	2
for schools		4	8
funding		2	2
innovation		2	4
red tape		4	7
staffing		1	1
time		6	19
trust		7	12
CONFUSION AROUND HEALTH IN PHA		1	1

Appendix S. Ethics approval, Flinders SBREC

Ashleigh Wilson

From: Human Research Ethics
Sent: Monday, 23 December 2019 11:18 AM
To: Ashleigh Wilson; Paul Ward; Jessie Jovanovic
Subject: 8522 ETHICS approval notice (23 December 2019)
Attachments: 8522 application (14 November 2019).pdf; 8522 Conditional ethics approval notice (6 December 2019).pdf; 8522 Conditional approval response (10 December 2019); 8522 conditional approval response - Additional Info PROVIDED (20 December 2019)

Importance: High

Dear Ashleigh,

Your conditional approval response for project 8522 was reviewed by the Chairperson of the Social and Behavioural Research Ethics Committee (SBREC) and was **approved.** The ethics approval notice can be found below.

APPROVAL NOTICE

Project No.:	**8522**
Project Title:	Exploring how schools can influence children's academic achievement in the early years
Principal Researcher:	Ms Ashleigh Wilson
Email:	ashleigh.wilson@flinders.edu.au
Approval Date:	23 December 2019
Ethics Approval Expiry Date:	**31 December 2020**

The above proposed project has been **approved** on the basis of the information contained in the application, its attachments and the information subsequently provided.

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 dialling codes for all telephone and fax numbers listed for all research to be conducted overseas.

- the SBREC contact details, listed below, are included in the footer of all letters of introduction and information sheets.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 'INSERT PROJECT No. here following approval'). For more information regarding ethics approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au.

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 **23 December** (approval anniversary date) for the duration of the ethics approval using the report template available from the Managing Your Ethics Approval web page.

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 modification request form).

First Report due date:	**23 December 2020**
Final Report due date:	**31 December 2020**

Student Projects
For student projects, the SBREC 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 from the Managing Your Ethics Approval SBREC web page. Download the form from the website every time a new modification request is submitted to ensure that the most recent form is used. Please note that extension of time requests should be submitted prior to the Ethics Approval Expiry Date listed on this notice.

Change of Contact Details
If the contact details of researchers, listed in the approved application, change please notify the Committee so that the details can be updated in our system. A modification request is not required to change your contact details; but would be if a new researcher needs to be added on to the research / supervisory team.

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.

Kind regards
Andrea

Andrea Mather and Rae Tyler
Human Research Ethics Officers (Social and Behavioural Research Ethics Committee)
Research Development and Support

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

P: +61 8 8201 3116 (Andrea) | Monday - Friday
P: +61 8 8201 7938 (Rae) | Monday, Wednesday and Friday mornings
E: human.researchethics@flinders.edu.au
www.flinders.edu.au/research/researcher-support/

Flinders UNIVERSITY
Research Development and Support

Proactively supporting our Research

Appendix T. SA department data application approval

Government of South Australia
Department for Education

System Performance
31 Flinders Street
Adelaide SA 5000
GPO Box 1152
Adelaide SA 5001
DX 541
Tel. +61 8 8226 1609
Education.ResearchUnit@sa.gov.au
www.education.sa.gov.au

Reference No: 2019-0043

Ashleigh Wilson
College of Medicine and Public Health
Flinders University

C/- yasmin.harman-smith@telethonkids.org.au

Dear Ashleigh

Your research project *"Exploring how schools can influence children's academic achievement trajectories through planning and programs in the early years"* has been reviewed by a senior officer within the Department.

I am pleased to advise you that your application has been approved, subject to the following conditions:

- That a copy of any final reports, presentations or manuscripts accepted for publication be submitted to the Education.ResearchUnit@sa.gov.au mailbox 30 days prior to their publication.
- That the Department for Education is notified when findings are to be released to other government or non-government agencies or to participating sites.

Please contact Georgia in the Data Reporting and Analytics directorate for any other matters you may wish to discuss regarding your application (Tel. (08) 8226 1609 or email: Education.ResearchUnit@sa.gov.au).

I wish you well with your research.

Yours sincerely

Ben Temperly
EXECUTIVE DIRECTOR, SYSTEM PERFORMANCE

13 January 2020

Appendix U. Ethics modification approval, Flinders SBREC

Ashleigh Collier

From: donotreply@infonetica.net
Sent: Monday, 11 January 2021 8:08 AM
To: Ashleigh Wilson
Cc: Ashleigh Wilson
Subject: SBREC 8522 - Transfer Modification Approval

Dear Ms Ashleigh Wilson,

We are pleased to advise that the requested modifications to the below transfer project have been approved on 11 January 2021.

Project ID: SBREC 8522

Project Title: Exploring how schools can influence children's academic achievement trajectories through planning and programs in the early years

Chief Investigator: Ms Ashleigh Wilson

Expiry Date: 01/01/2022

Application Link: https://researchnow-ethics-forms.flinders.edu.au/Project/Index/2504

You can access the application in the ResearchNow Ethics & Biosafety system via the Application Link above.

Please don't hesitate to contact the Human Ethics Executive Officer if you have any questions.

Regards,

Mr Hendryk Flaegel

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

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

Appendix V. Extraction template

ID	Title	Author	Year	Type	On/off-diag	Focus on development & learning	Address determinants	Base decisions on evidence	Increase investements	Apply multiple strategies	Collaborate	Employ mechanisms for public movement	Demonstrate acocuntability	Focused on improving literacy & numeracy	Score (/10)
1	School document name	School name	e.g. 2015	e.g. SIP											
2															
3															
4															

Appendix W. Population Approach rubric

PHA element	1 – Not evident	2 – Partially evident	3 – Evident with some application	4 – Evident with sound and reasoned application	5 – Evident with considered and well-articulated application
Focuses on children's developmental and learning progress	Focuses solely on academic progress.	Focuses on academic progress, with some consideration of aspects of children's learning and development	Focuses on academic progress with consideration of aspects of children's learning and development. Data is used to understand need of individuals.	Focuses on academic and learning and development progress. Data is used to understand need and is incorporated into planning at the year level.	Focuses on academic and learning and development progress. Data is used to understand need and is incorporated into planning at a site level.
Addresses the determinants of children's progress by exploring the contextual and operational factors at play	Addresses no determinants of children's progress. No connection made into the school context.	Addresses partially determinants of children's progress. Some connection made into practices within the school context.	Addresses determinants of children's progress. Articulates briefly how children's past experiences may impact on their progress.	Addresses determinants of children's progress. Articulates clearly how children's past experiences may impact on progress.	Addresses determinants of children's progress. Articulates coherently how children's past experiences impact on progress using evidence to support their reasoning. Works with families and/or the community to address disadvantage.
Uses evidence/outcomes-based and descriptive studies to make decisions about educational goals and improvements for learning communities	Uses no or little evidence in decision-making.	Uses anecdotal data only in decision-making. Goals and improvements not clearly tied to data	Uses some evidence-based data in decision-making.	Uses evidence-based data in decision-making. Goals are well justified.	Uses best available evidence in decision-making. Goals are articulated clearly and are linked to evaluation methods.

Concern with impact of studies to inform the direction of, and to improve educational outcomes. Investments are both short and long term	Articulates no or limited investments, may be short term and not based on evidence.	Articulates both short and long term investments, may be based on no or limited evidence.	Articulates both short and long term investments , may be proven to improve outcomes.	Articulates both short and long term investments, based on a documented need within the school. Works are underpinned by evidence and evaluation practices.	Articulates both short and long term investments, based on documented need within the school and/or community. Works are underpinned by evidence and evaluation practices.
Applies concepts from other disciplines, such as health and wellbeing, to education settings. Strategies tend to be singular and can be employed across the whole school or targeted to those facing challenges	Applies not at all or rarely, with focus only on children facing challenges, at an individual level.	Applies some strategies at the whole school level, but mostly focused on individuals facing challenges.	Applies strategies with some consideration into holistic development.	Applies strategies, largely focused on holistic development of children. Strategies are employed at a variety of levels within the school.	Applies strategies. focused on the holistic development of children, including wellbeing. Strategies are applied at multiple levels including outside of the school (e.g. family and/or community).
Collaborates with other educators, leaders and community partnerships	Collaborates not at all, or occurs only within the school site. *Conversation*	Collaborates between preschools and the school, and between educators at the school. *Communication*	Collaborates regularly between preschools and at the school. School staff collaborate occasionally when organised by the Department. Some collaboration may occur with families and/or community.	Collaborates regularly between educators at the school, preschools and families. External collaboration occurs regularly but may be newly developed. *Cooperation*	Collaborates frequently over an extended period of time, in partnership with community, families, and other education providers. *Collaboration*

			Coordination		
Employs mechanisms for public movement, to promote family and community engagement and the value of education	Engages little with families, may be limited to transition visits or enrolment interviews.	Engages with families using mechanisms focused on those already enrolled at the school.	Engages with families using mechanisms focused on those already enrolled at the school.. Community engagement is evident but limited.	Engages using mechanisms employed at multiple levels to engage families and community in the value of education, reaching beyond those currently enrolled.	Engages using mechanisms employed at multiple levels to engage families and community in the value of education, reaching into the wider community and beyond expected enrolments.
Demonstrates accountability for education outcomes to ensure they are evidence-informed over time	Reports no or little education outcomes with no evidence base. No accountability measures are discussed.	Reports on education outcomes from anecdotal evidence. Some accountability measures are discussed	Reports clearly on education outcomes from evidence-base. Accountability measures are discussed.	Reports clearly on education outcomes from evidence base. Discusses clearly accountability measures with evidence of how these are embedded in practice. Some discussion of reflection/evaluation processes.	Reports clearly on education outcomes from high quality evidence. Evaluation methods are embedded and included in the accountability process.
Focuses on improving literacy and numeracy	Focuses not at all or little on literacy or numeracy, or only during the current year.	Focuses on both literacy and numeracy outcomes during the current year	Focuses on improving literacy and numeracy outcomes and this is embedded in school planning over 2 years	Focuses on improving literacy and numeracy outcomes, which is embedded in planning and accompanied with regularly assessment of progress over at least 2 years.	Focuses on improving literacy and numeracy outcomes based on evidence, embedded in planning and accompanied with regular, high quality assessment of progress and achievement over 3 or more years.