Educational Outcomes of Children in Contact with the Child Protection System: A Longitudinal Population Study

Miriam Maclean
Bachelor of Psychology (Hons)
Master of Science (IO Psychology)

This thesis is presented for the Degree of Doctor of Philosophy at The University of Western Australia

School of Paediatrics and Child Health
2016
Abstract

Education is a fundamental child right as is their right to be safe (UN General Assembly, 1989). Numerous studies have documented the striking differences in educational outcomes for children who have been maltreated and/or entered out-of-home care, compared to the general population. These include worse outcomes for attendance, engagement, academic achievement, and attainment of qualifications, leading to unemployment or underemployment in adulthood.

Maltreated children and children in out-of-home care often have many other risk factors associated with adverse outcomes. These include child characteristics (such as disabilities, preterm birth, low birthweight, and ethnicity), as well as family and neighbourhood characteristics (such as poverty, low parental education, single parent families, young parenthood, and parental mental health problems, substance use or exposure to violence). Maltreatment and out-of-home care therefore need to be examined within a multiple-risks context.

This approach is necessary in order to understand the effects of multiple risks on this vulnerable population, and to control for multiple risk factors when drawing conclusions about the impact of maltreatment or out-of-home care. Yet the difficulty in obtaining reliable data about children’s child protection history in combination with education outcomes and prior risk factors means few studies have been able to do so.

Western Australia is the only State in Australia and one of the few places internationally that has a well-established data linkage system with the capacity to link administrative data from Government departments responsible for education, child protection, health, and disability services. Such linkage allows examination of children’s entire child protection history from birth, important characteristics of the child, family, and neighbourhood, and educational data including standardised achievement tests, attendance and suspension records.
The overarching aim of this thesis was to examine the educational outcomes and trajectories of children with different levels of child protection involvement (none, unsubstantiated maltreatment allegations, substantiated maltreatment, or out-of-home care following substantiated maltreatment) within a multiple-risks context. Specific objectives were to:

- Systematically review studies comparing outcomes for maltreated children placed in out-of-home care and maltreated children who remain at home
- Describe early reading outcomes (Year 3) for children with different levels of child protection contact
- Assess the role of adversity (child, family and neighbourhood risk factors), level of child protection involvement and school attendance in predicting early reading achievement
- Examine characteristics of children’s out-of-home care placement histories associated with low early reading achievement
- Describe Year 3-9 reading trajectories of children with different levels of child protection contact, and the influence of other risk factors
- Compare Year 9 educational outcomes for maltreated children who enter out-of-home care and those that do not.

The study cohort included all children born in Western Australia from 1999-2010 (N = 524,531). Analysis methods varied across the studies, and included propensity score matching, logistic and linear regression, and multilevel modelling for trajectory analysis.

Results showed approximately 1 in 3 children in the child protection system already had very low reading scores by Year 3. Over time, achievement more often declined rather than improving. The lowest levels of achievement were found for children with unsubstantiated maltreatment allegations by Year 3, who entered care between Year 3 and 9. Nevertheless, out-of-home care had no harmful effect on achievement or suspensions, and children who
had been in care had better attendance outcomes, after controlling for other risk factors in a propensity matched analysis. Many of the strongest risk factors for poor educational achievement reflect issues of social disadvantage: low parental education, living in a socially disadvantaged area, and Aboriginal status. Attendance was also an important predictor of differences in achievement.

This thesis has made several original contributions to the literature on outcomes for children in the child protection system. It contains a systematic review of the ‘effect’ of out-of-home care on maltreated children’s developmental wellbeing outcomes, highlighting mixed results and gaps in the literature. It also uses linked data to more comprehensively explore educational outcomes for children with different levels of child protection contact in a multiple-risk context, and disentangle multiple influences on educational outcomes. For research it highlights the need to take children’s complex backgrounds and experiences into account. For policy and practice it highlights an academically vulnerable population of students, and identifies risk factors that can be targeted in interventions.
Acknowledgements

There are many people I would like to thank and acknowledge for their valuable contributions throughout the completion of this thesis.

First, I have been fortunate to have a wonderful team of supervisors. Thank you to Melissa O’Donnell for your incredible generosity in sharing your time, knowledge and passion for this area, and for being unfailingly available to answer questions, read drafts and provide any support necessary even during international conference travel and two periods of maternity leave. Thank you to Cate Taylor for your encouragement and wisdom, for guiding this project with an eye on the ‘big picture’ and knowing when to let me explore tangents and when to give me a gentle nudge towards the finish line. Both of you have been an enormously valuable source of support, and your enthusiasm for the project, for quality research and for improving the developmental outcomes of children in Australia are an inspiration. Thank you to Sunalene Devadason, my coordinating supervisor at the University of Western Australia for all your help in seamlessly facilitating the processes involved during PhD candidature. I could not have asked for better supervisors and am immensely grateful.

I have also been fortunate to have had the opportunity to participate in collaborations with overseas researchers. Thanks especially to Ruth Gilbert, for adding so much to my learning in completing the systematic review.

Thank you to Rebecca Glauert, the Developmental Pathways Project (DPP) Project Coordinator for your support and good humour throughout my candidature, and for facilitating opportunities to present this research internationally. Your huge efforts in coordinating the many people and processes required for a data linkage project of this scope make this research possible. I am also grateful to Nick de Klerk and Scott Sims for their statistical advice throughout the project and always being willing to answer questions.

Thank you to our Government agency partners on the DPP for your valuable involvement, especially to Kaija Pay for sharing your expert knowledge of the child protection data. The
Data Linkage Branch who conduct the linkage are an essential part of the process and put many hours into linking data and answering questions. Anne McKenzie and Hayley Haines, and the members of the DPP Community and Consumer Reference Group thank you for your feedback on the research proposal.

Thank you to the University of Western Australia, the Graduate Research School, and the Developmental Pathways Project for providing funding including my scholarships and conference travel funding.

Colleagues and friends at the Telethon Kids Institute have contributed in numerous ways to this project, including support, ideas and advice. I am grateful to be surrounded by such a talented and dedicated group of researchers who have added so much to the PhD experience. Hu Nan, Janice Wong, Megan Bell, Melanie Hanson, Marcela Quintero, and Jeff Cannon, my officemates, you have all added so much to this experience. Thank you for sharing ideas, advice, many laughs and the “Unavoidable Good Times”. Thanks to Carrington Shepherd, Dan Christensen and Kristjana Einarsdottir for letting me ‘pick your brains’ on datasets and research methods. I have been fortunate to have conducted my PhD in such a vibrant research environment, and appreciate the feedback on my research at seminars and meetings.

On a personal note, I would like to thank the people who celebrated the completion of my Honours thesis 10 years ago, stuck by me through the juggle of post-graduate study combined with full time work, and still supported me to go back for yet another degree. My dear family, thank you for everything! Especially my mother Jessica, not only for your endless support and love, but also for putting everything in perspective – your ability to get through chemo with grace and a smile reminds me to appreciate so much in life including the joys within the trials and tribulations of a PhD.

And finally, thank you to Alan, my partner and my rock through it all. Thank you for your patience and support, I know it has not been easy. I can’t wait to celebrate the completion of this PhD journey with you, and am looking forward to our next chapter.
Statement of Candidature Contribution

This thesis has been completed during my period of candidature for the degree of Doctor of Philosophy at the University of Western Australia. The studies comprising Chapters 5-8 were designed by me in collaboration with my supervisors Dr Melissa O’Donnell and Professor Cate Taylor. The study in Chapter 3 was designed by me in collaboration with Dr Melissa O’Donnell and Professor Ruth Gilbert. I conducted reviews of the literature, statistical analysis and interpretation, preparation of manuscripts and revisions. Mr Scott Sims and Professor Nick de Klerk provided statistical advice for the analyses in Chapters 5-8, on interpretation of specific reviewed study results and the feasibility of pooling data in Chapter 3. Dr Melissa O’Donnell and I collaborated on screening studies for inclusion and assessing their bias risk in the systematic review in Chapter 3, as having two reviewers involved in this process increases the rigour of the study. Professor Ruth Gilbert advised on inclusion and bias risk decisions as required. I wrote the manuscripts and made revisions based on the recommendations from my supervisors, collaborators, and anonymous reviewers. Dr Melissa O’Donnell and Professor Ruth Gilbert provided recommendations for revisions to Chapter 3. Professor Cate Taylor and Dr Melissa O’Donnell provided recommendations for revisions to all other sections of this thesis. The work contained in this thesis has not been submitted for any other degree.
# Table of Contents

Abstract ................................................................................................................................. i

Acknowledgements ........................................................................................................... iv

Statement of Candidature Contribution ............................................................................ vi

Introduction to the Thesis ................................................................................................... 1

Chapter 1 Introduction to Educational Development Within a Multiple Risks Context ...... 4

Chapter 2 Literature Review – Educational Outcomes of Maltreated Children and Children Who Have Entered Out-of-Home Care ................................................................................................. 19

  Background ....................................................................................................................... 20

  Educational Outcomes of Maltreated Children ............................................................... 20

  Out-of-Home Care ......................................................................................................... 26

  Out-of-Home Care and Educational Outcomes ............................................................ 29

  Research Gaps, Directions and Methodological Approaches ........................................ 38

Chapter 3 Out-of-Home Care Versus In-home Care for Children Who Have Been Maltreated: A Systematic Review of Health and Wellbeing Outcomes. ........................................ 42

  Abstract ......................................................................................................................... 43

  Introduction .................................................................................................................. 44

  Method ......................................................................................................................... 45

  Results .......................................................................................................................... 46

  Discussion .................................................................................................................... 65

Chapter 4 Overview of Methodology ............................................................................... 68

  The Developmental Pathways Project ........................................................................... 69

  Study Cohort and Setting ............................................................................................... 69
Chapter 5 Pre-existing Adversity, Level of Child Protection Involvement, and School Attendance Predict Educational Outcomes in a Longitudinal Study

Abstract

Introduction

Method

Results

Discussion

Chapter 6 Relationship Between Out-of-home Care Placement History Characteristics and Educational Outcomes

Abstract

Introduction

Method

Results

Discussion

Chapter 7 Year 9 Reading Outcomes and Trajectories from Year 3-9 for Children with Different Levels of Child Protection Contact

Introduction

Method

Results

Discussion

viii
Chapter 8 Estimating the ‘Effects’ of Out-of-Home Care on Year 9 Reading, Attendance and Suspension Outcomes ................................................................. 169

Abstract .................................................................................................................. 170

Introduction ............................................................................................................. 171

Method ..................................................................................................................... 174

Results .................................................................................................................... 181

Conclusions ............................................................................................................. 185

Chapter 9 Discussion .............................................................................................. 188

Introduction ............................................................................................................. 189

Summary of Findings ............................................................................................... 189

Strengths of this Research ...................................................................................... 205

Limitations of this Research .................................................................................. 207

Implications ............................................................................................................. 209

Contribution ........................................................................................................... 221

References .............................................................................................................. 222

Appendices ............................................................................................................. 243
Introduction to the Thesis

Statement of the Problem

Educational outcomes are an important domain within child development, and create a pathway to employment opportunities and better health and wellbeing in adult life. Yet some children are at increased risk for adverse educational outcomes from an early age. One group at particularly high risk is children who have come into contact with child protection agencies after notifications of suspected maltreatment. Although there was a large body of research indicating worse outcomes for maltreated children, and especially for children who enter out-of-home care, research had often been hampered by methodological limitations such as small sample size, lack of information on co-existing risk factors, and absent or inappropriate comparison groups. At a State level, there was a need to understand how different subgroups of children in contact with the child protection system are faring educationally, and the characteristics and risk factors that affect their education. At an international level, there were important research gaps in understanding whether maltreatment and out-of-home care are still significant predictors of adverse educational outcomes after adequately accounting for co-existing risk factors. There was also scant research examining the educational trajectories of child-protection populations over time.

Overview of the Thesis

The broad aim of this thesis was to investigate the educational outcomes for children with different levels of involvement with the child protection system (no contact, unsubstantiated maltreatment allegations, substantiated maltreatment allegations, and maltreated children who had entered out-of-home care). The thesis used linked administrative data to explore educational outcomes (primarily reading achievement) within a multiple-risks context.

One theme in the research was to examine these multiple risks (such as characteristics of the child, family, neighbourhood or child protection history) and how they contribute to children’s educational outcomes. This was useful in identifying sub-groups of case children
with higher risk of poor educational outcomes, finding risk factors that may be useful in targeting interventions, and understanding the outcomes of these children in context. A second theme was causal effects of out-of-home care, as the use of linked datasets and propensity score matching can reduce the issue of selection bias and confounding, allowing us to come closer to understanding causal effects of out-of-home care placement.

The thesis resulted in five manuscripts that investigated the gaps in current understanding and knowledge in the area, with the overall goal of improving our understanding of the risk and protective factors that shape the educational outcomes of children in contact with Child Protection and Family Support. This thesis is presented as a combination of published (Chapter 5) and unpublished papers that are under review or in preparation for submission to peer reviewed journals (Chapter 3, 6 and 8). The fifth manuscript (Chapter 7) will be adapted for publication subsequently. All of the manuscripts have been co-authored with supervisors and sometimes other specialist advisors. At the time of submission, Chapter 5 had been accepted for publication by the Child Abuse and Neglect journal, and Chapter 3 had been submitted for publication and was under review and undergoing minor changes requested by Child Abuse Review.

Chapter 1 provides a brief background regarding the importance of educational outcomes, theoretical frameworks for understanding influences on children’s educational development, and factors that affect children’s likelihood of good educational outcomes.

Chapter 2 reviews existing research on educational outcomes among maltreated children and child protection populations. Gaps and limitations in the literature are identified, providing a rationale for the studies in this thesis.

Chapter 3 provides a systematic review of the literature focusing specifically on the issue of the effects of out-of-home care on maltreated children. It reviews studies that specifically compare outcomes for maltreated children who have entered out-of-home with maltreated children who remain at home, and examines issues such as risk of bias. It identifies methods that have been used to address these issues and provides the rationale for Chapter 8.
Chapter 4 outlines the general methods common across the data linkage papers (methodology details for specific studies are provided in the individual chapters).

Chapter 5 is the first of the studies using the linked data, and examines prevalence of low reading achievement among the child protection population and influences on early reading achievement (Year 3), including maltreatment, level of child protection system involvement, pre-existing adversity (child, family and neighbourhood risk factors) and school attendance.

Chapter 6 builds on findings regarding children who had entered out-of-home care by exploring the relationship between out-of-home care placement history characteristics and Year 3 reading achievement.

Chapter 7 also builds on the findings from Chapter 5, but with a focus on older children and development over time. It consists of a series of sub-studies that explore risk factors and educational outcomes for older children (Year 9) and the trajectories of children through the child protection system as well as their reading achievement trajectories as they move from Year 3 to Year 9 of school.

Chapter 8 builds most closely on the issues raised in the systematic review in Chapter 3 using propensity score matching to create much more comparable groups of maltreated children with and without out-of-home care placements. Whereas Chapters 5-7 explore a range of risk factors and how they affect the child protection population, Chapter 8 specifically sets out to address selection bias issues and reduce the effect of selection bias in order to estimate the effect of out-of-home care on maltreated children’s educational outcomes.

Chapter 9 provides a summary of the main findings of the thesis and discussion of the contribution of the results to the field as well as the implications of the results for policy and services.
Chapter 1 Introduction to Educational Development Within a Multiple Risks Context

The Importance of Educational Outcomes

The right to education is recognised under the United Nations Convention on the Rights of the Child, with education directed to “the development of the child's personality, talents and mental and physical abilities to their fullest potential” (UN General Assembly, 1989). Early educational achievement is often associated with later educational achievement (Duncan et al., 2007), which in turn is required for higher education and improves employment outcomes and income in adulthood (Baum, Ma, & Payea, 2013). Education provides access to a greater range of jobs, is associated with higher lifetime earnings (Rouse, 2007) and inversely related to unemployment (Ashenfelter & Ham, 1979).

Importantly, education provides opportunities for social mobility, allowing individuals to increase their socio-economic status (SES) (Baum et al., 2013). Although many studies do not address possible confounders in this relationship, Ritchie and Bates (2013), found that achievement in reading and mathematics at seven years old predicted socioeconomic status at the age of 42, even after controlling for childhood SES, intelligence, academic motivation and education duration. As the detrimental effects of low SES appear to accumulate over the life-course, research has found that higher adult SES is beneficial (Everson, Maty, Lynch, & Kaplan, 2002). Increasing an individual’s SES is likely improve numerous aspects of their lives in adulthood.

In addition to providing a direct pathway to better employment opportunities and SES in adulthood, positive educational outcomes have been linked to a range of other desirable outcomes throughout adolescence and adulthood. These include less likelihood of substance abuse (Fothergill et al., 2008) and offending behaviours (Blomberg, Bales, & Piquero, 2012; Williamson, 1992) as well as better health status and mortality rates (Christenson & Johnson, 1995; Everson et al., 2002).

The benefits of education for individuals, and to strengthen countries’ social and economic advancement are well recognised. The Melbourne Declaration, released by
Australia’s Education Ministers in December 2008, stated two national goals: 1) Australian schooling promotes equity and excellence; and 2) that all young Australians become successful learners, confident and creative individuals, and active and informed citizens (Ministerial Council on Education Training Employment and Youth Affairs, 2008). These goals are central to Australia’s education policy context, underpinning education strategies and the education measurement framework.

The Closing the Gap strategy aims to reduce the inequities in Aboriginal health and wellbeing outcomes, with some of the specific areas including early childhood education, literacy and numeracy, Year 12 attainment and employment outcomes (Council of Australian Governments, 2009). The Aboriginal and Torres Strait Islander Education Action Plan 2010-2014 (Ministerial Council for Education Early Childhood Development and Youth Affairs, 2011) was endorsed by the Council of Australian Governments (COAG) in 2011, and the National Aboriginal and Torres Strait Islander Education Strategy 2015 has recently been released (Education Council, 2015). COAG also endorsed the National Framework for Protecting Australia’s Children (2009) which takes a public health approach to child protection and includes six outcome areas under which strategies are outlined. Outcome four states “children who have been abused or neglected receive the support and care they need for their safety and wellbeing” and one of the indicators of this outcome is “the proportion of children on guardianship and custody orders achieving at or above the National Minimum Standards for literacy and numeracy”. The need to address education gaps in the child protection population has also been recognised locally. The WA Department for Child Protection and Family Support introduced Individualised Education Plans in 2009 for all children in care of compulsory school age.

State and territory governments are working hard to improve outcomes for children in the Child Protection system. Nevertheless, many children remain at high risk of educational failure. A number of factors relating to the child, their family, their school and their community can affect their ability to learn and achieve. The following section outlines some of the relevant theoretical frameworks for considering influences on the educational development of children with or without child protection involvement.
Theoretical Framework

A Sociobioecological Approach to Child Development

Several models and theories provide a useful framework for studying developmental outcomes including educational outcomes. Child development takes place over time, and within a context. Consequently, application of ecological-developmental theory to researching the impacts of maltreatment on child development has been recommended (Fantuzzo, Perlman, & Dobbins, 2011). Bronfenbrenner’s original ecological model (Bronfenbrenner, 1977) emphasised the importance of context, and the need to study factors at multiple levels, from the developing child, its immediate settings such as the family, school and community groups (microsystems), the links and inter-relations between these settings (mesosytems), settings and institutions that indirectly affect the child, such as parents’ work, the broader neighbourhood, government agencies including policies (exosystems) and cultural/subcultural values and beliefs and the systems these values underpin (macrosystems), taking into account the interactions between these levels. In later versions, Bronfenbrenner expanded the theory to a bio-ecological approach, putting more emphasis on ‘person’ factors such as biology and genetics as well as demographic and personal characteristics, and in addition increased the emphasis on the role of time (Bronfenbrenner, 1986; Tudge, Mokrova, Hatfield, & Karnik, 2009).

In order to apply the sociobioecological model, Bronfenbrenner (1999) recommended research designs that incorporate the process-person-context-time model. Process refers to ‘proximal processes’, or regular activities or interactions that shape development (such as parenting behaviours). The person is included in the model as their individual characteristics and responses are also pivotal in shaping their own development. Context refers to relevant aspects of the environment, such as socio-economic circumstances. Time is central in the model as development can only occur and be shaped over time, and also provides further context for development when one considers significant historical events (e.g. World War II, the Great Depression), or the normative or non-normative timing of developmental transitions (Bronfenbrenner, 1999).
Ecological approaches to understanding maltreatment and its effects on educational development (e.g. Belsky, 1980; Cicchetti & Lynch, 1993) are similar to Bronfenbrenner’s in examining multiple levels (microsystems, exosystems, and macrosystems), but emphasise ontogenic development – how the parents have been shaped by their histories (and what they bring to the family setting that potentiates maltreatment), and in turn how maltreatment shapes the child’s development. Cicchetti and Lynch (1993) outline a series of developmental tasks, such as attachment formation, emotion regulation, development of self-concept, forming relationships with peers, and aspects of school readiness such as motivation and independence, all of which have been found to be disrupted by maltreatment. By drilling down further into the ‘person’ component of model, the focus on ontogenic development is useful in highlighting specific ways in which maltreatment affects the developing child and their outcomes.
In summary, ecological based models have provided a useful framework for studying child development over the last four decades because of their emphasis on not only the child but the multi-layered context which contributes to their development. This study draws upon these models through the direct inclusion of risk factors at a child, family, and neighbourhood level, as well as examining influences over time. Other aspects such as the effects of policies regarding use of out-of-home care and educational supports such as Individualised Education Plans were not directly studied, but are acknowledged as deeply relevant to children’s outcomes.

**Life-Course Approaches**

Life-course approaches are also useful to draw on, given the longitudinal nature of this research project. Researchers such as Elder (1998, p1) focus on the way that “changing lives alter developmental trajectories.” Life-course epidemiology emphasises temporal influences on development, and incorporates concepts such as trajectories, transitions and turning points in development (Kuh, Ben-Shlomo, Lynch, Hallqvist, & Power, 2003). All children experience life events and changes, but children in contact with the child protection system are likely to experience particularly significant events, such as traumatic maltreatment experiences, and changes in living arrangements such as foster care and reunification that could markedly affect their trajectories.

**Developmental Health Approaches**

Developmental health researchers have built on these concepts in examining the interplay between social influences and biology (e.g. epigenetics) in shaping children’s trajectories. They also highlight three relationships between exposures and outcomes: latency relationships, where the outcome occurs quite some time after the exposure, regardless of events in between, cumulative relationships, where multiple experiences of the same or different risk factor result in the outcome, and pathway relationships, where exposure sets the individual on a trajectory that leads towards the outcome (Hertzman & Boyce, 2010). Life-course developmental health frameworks incorporate both approaches.
Summary of Theoretical Models and Frameworks

These theories, models and approaches are not inconsistent with one another. Ecological models, for instance are widely embraced and integrated by other theorists, for example working in life-course research (Elder & Rockwell, 1979). Indeed, models of life-course developmental health synthesise all of the models above, and others, into a comprehensive framework covering biological, genetic, psychological and social influences and their interactions to produce health outcomes across the lifespan (Halfon, Larson, Lu, Tullis, & Russ, 2013), showing their compatibility. Nonetheless, although they can be integrated into one overarching framework, the separate models and theories presented are valuable for their focus or expansion on particular concepts relevant to exploring maltreated children’s educational development over time.

Over the years, theoretical models and frameworks have become increasingly complex and comprehensive as knowledge regarding the many influences on child development have become better understood. The nature versus nurture debate has given way to epigenetic models that look at the interplay between both. Researchers tend to recognise the value of different models that expand on particular aspects of developmental influences, such as time, or individual characteristics, or multiple ecological systems, and seek to integrate them into ever larger, more comprehensive models. From a practical perspective, it is often not possible to incorporate every aspect of the most comprehensive models into every study, yet they provide an important backdrop for knowledge expansion, reminding us which aspects of a research problem we have been able to account for, and where potential gaps and explanatory factors may lie. These models provide a useful framework for this study, providing an understanding of the ways that child development outcomes are shaped by a range of influences (characteristics of the child, family and neighbourhood, as well as education and child protection policies), that may affect development in different ways over time.

This thesis uses a life-course developmental health framework, which integrates sociobioecological, life-course and developmental health approaches. The analysis of influences on educational outcomes reflects different levels of the sociobioecological context including the child (through a range of characteristics such as age, gender,
Aboriginality, disabilities, as well as examining individual developmental trajectories), their family (e.g. characteristics of their parents and living arrangements), and their neighbourhoods (such as remoteness and social disadvantage). Characteristics of children’s out-of-home care placement history reflect both the immediate settings children experience, and the policies and practices of Government agencies that determine when and how out-of-home care is used.

Although the sociobioecological model recognises the importance of time in shaping development, the life-course and developmental health frameworks are particularly useful in shaping this research via concepts relating to development over time. As events can mark turning points and times of transition in children’s lives, and these events may have an influence that is cumulative, latent, or sets children on a pathway to particular outcomes, the role of time is explored in a number of ways in this thesis. Age is examined as a risk factor in multiple ways, including age at the time of the reading test, age at the occurrence of an event such as substantiation of maltreatment or first entry to out-of-home care. Age at the outcome is also examined, both via comparisons of the impact of risk factors on Year 3 versus Year 9 outcomes, within year cohorts to address developmental differences of children being slightly older or younger than their peers, and via trajectory analysis.

In keeping with the developmental health approach, cumulative relationships are explored, such as whether children who have experienced multiple out-of-home care placements have different outcomes than children with fewer placements. The entry to out-of-home care is a major transition and potential turning point in the life of maltreated children that is examined throughout this thesis. Transitions are also examined in this thesis by looking at whether educational outcomes vary depending on the timing of a change in living arrangements (such as reunification or entering care). Although the primary focus of this research is application to policy and practice, it will also shed light on how useful each of these theoretical approaches are in understanding the educational development of children with different levels of child protection involvement.
Factors Associated with Adverse Educational Outcomes

As noted above, children’s educational outcomes may be influenced by a range of risk factors at the child, family and neighbourhood level. Some of the major risk factors are outlined below.

Children Involved in the Child Protection System

Studies have found very poor educational outcomes for children involved with the child protection system, a group which often have multiple risk factors that may affect their likelihood of succeeding in school (Berger, Bruch, Johnson, James, & Rubin, 2009). Many have experienced maltreatment as well as facing numerous difficulties and disadvantages within their family and community contexts. Interactions with the child protection system, and indirectly the policy-level decisions that shape these interactions also influence the context in which children develop. Chapter 2 provides a more detailed review of the literature regarding educational outcomes for maltreated children and children who have entered out-of-home care. Throughout this thesis, these multiple risks are examined in different ways to facilitate an increased understanding of the influences on educational outcomes of children involved with the child protection system. Many of the same risk factors are associated with educational risk when they occur in the general population.

Child Characteristics

Gender and age. Gender gaps in achievement have been found in many countries including Australia. Girls generally achieve better in reading, whereas boys tend to achieve better in numeracy (Marks, 2014).

Several different types of age effects have been found for educational outcomes. Over time, children develop increasing skills, so older children have an advantage. For instance, among young children each extra month of age is associated with increased vocabulary development (Taylor, Christensen, Lawrence, Mitrou, & Zubrick, 2013) or reading achievement (Wong, 2015). When comparing older and younger children on the same test, age is therefore an advantage. Conversely, older children are much more likely to have worse behaviour-related outcomes such as suspensions or low attendance rates.
For children with certain risk factors, such as low socio-economic status backgrounds, performance gaps compared to other children may increase over time, thus showing worse outcomes associated with older age (Caro, McDonald, & Willms, 2009).

Aboriginality. Belonging to disadvantaged ethnic minority groups is associated with worse educational outcomes in many countries. The massive achievement gap between Aboriginal and non-Aboriginal students is widely recognised. An example of this discrepancy is that only 66.6% of Aboriginal students met the National Minimum Standard of Year 3 reading achievement in 2015 compared to 95.1% non-Aboriginal students (ACARA, 2015a).

Pregnancy and birth risks. Maternal smoking during pregnancy, and being born preterm or small for gestational age are associated with lower academic achievement (Moore et al., 2014).

Health issues. A variety of health issues are associated with worse educational outcomes. Children with a physical or mental health problem have been found to be at greater risk of academic difficulties (Wong, 2015).

Intellectual disability. Cognitive ability or intelligence tests are strongly correlated with achievement (Marks, 2014). Children with mild, moderate or severe intellectual disabilities, which are defined based on IQ scores, are more likely to have academic difficulties. Severe disabilities are grounds for exemption from Australia’s national achievement tests, but children with milder intellectual disabilities participate.

Other factors. A range of psychological characteristics such as temperament (low persistence and high reactivity) are associated with worse outcomes (Taylor et al., 2013). School readiness, which involves having the early skills and behaviours that enable children to participate successfully in classroom activities is also associated with better academic achievement (Brinkman, 2012).
**Parent or Family Characteristics**

A range of parent and family characteristics including demographic factors, resources, family functioning and parenting practices are associated with children’s educational outcomes.

**Young age of the mother or parents.** Young parents, particularly teenagers can face many challenges in parenting related to their young age or a lack of resources. People from disadvantaged backgrounds are also more likely to have children at an early age, so young parenthood can be an indicator of other risk factors. Young age of the mother (Malacova et al., 2008), or of either parent (Wong, 2015) has been linked to lower reading scores, even after adjusting for a number of other risk factors.

**Family structure.** Single parent status (Malacova et al., 2008), father absence (Gutman, Sameroff, & Cole, 2003) or changes in family (Boden, Horwood & Fergusson, 2007) have all been linked to lower academic achievement or attainment.

**Parents’ education level.** Higher education levels attained by the parents are predictive of higher educational achievement among children (Boden, Horwood, & Fergusson, 2007; Gutman et al., 2003). Parents’ education level may affect children’s outcomes in a number of ways, for instance via increased financial resources and also via parenting practices.

**Stressful life events.** Family exposure to a large number of stressful events is also a risk factor for worse educational achievement (Gutman et al., 2003).

**Psychological distress, mental health issues, or substance abuse.** Lower language and literacy achievement have been found for children whose parents report symptoms of psychological distress (Taylor et al., 2013) have a used mental health services (Wong, 2015) or used illicit drugs (Boden et al., 2007).

**Violence.** Parents’ experiences of violence, whether measured as hospital admissions for assault injuries (Wong, 2015) or retrospective reports of inter-parental violence (Boden et al., 2007) were also linked to worse educational outcomes for children.

**Parenting behaviours.** Parenting beliefs and behaviours influence children’s academic achievement. For instance, rigid parenting beliefs, negative parent-child interaction style,
maternal parenting qualities (low consistency and warmth, high hostility), and not reading to the child have all been found to be related to children’s educational development (Gutman et al., 2003; Taylor et al., 2013). At the extreme end of the parenting spectrum, child maltreatment is associated with worse educational outcomes (Wong, 2015).

**Community Characteristics**

Community level characteristics previously identified for Western Australian students include living in socially disadvantaged neighbourhoods, and living outside of the metropolitan area, including regional, remote, and very remote areas (Wong, 2015).

**School-Related Factors**

Characteristics of the child’s participation and behaviour at school are associated with achievement outcomes. School attendance gives children greater exposure to opportunities to learn, and predicts better achievement (Hancock et al., 2014). Being suspended from school is associated with worse achievement outcomes, which may be a result of reduced exposure to learning opportunities, disengagement, or behaviour problems affecting both learning and the likelihood of being suspended (Noltemeyer, Ward, & Mcloughlin, 2015). Other aspects of the school environment that may influence children’s educational outcomes are teaching quality and relationships with teachers (Darling-Hammond, 2000; McCormick, O’Connor, Cappella, & McClowry, 2013), peer influences and bullying (Totura, Karver, & Gesten, 2014). Additional factors may include school-level SES, and programs that meet specific needs of children at educational-risk, for example educational supports for children with special education needs and programs that make it easier for young mothers to stay in school. The education system’s policy context and funding decisions influence the educational environment within which children develop.

**Effects of Risk Factors Over Time**

Longitudinal studies have found that the impact of risk factors can vary depending on the timing of the risk factor (Wong, 2015), and that different risk factors can affect children’s trajectories in different ways. Some risk factors affect early development but are followed by a period of catch-up growth that reduces the gap (Taylor et al., 2013), others affect
children’s early skills and they remain at a constant level of reduced performance. Low SES (Caro et al., 2009) and multiple risk factors (Gutman et al., 2003) have been linked to a lower rate of growth and consequently a widening gap between students with and without these exposures.

The Australian Education System

In Western Australia, the age at which compulsory schooling starts was lowered in 2013 with a pre-primary year becoming mandatory. Children enrol in pre-primary if they will turn five years old by the middle of the school year. The pre-primary year is followed by Years 1-6 at primary school. Until recently, Year 8 through Year 12 comprised the secondary school years, with Year 11 and 12 optional. A number of changes have been implemented, including shifting Year 7 from being the final year of primary school to now being the first year of secondary school. Another recent requirement is that students aged 16, 17 or 18 stay enrolled in school until Year 12 unless they have other training or employment activities in place. This thesis focuses on students from Year 3 (typically around 8 years old) to Year 9 (typically around 14 years old) of school. The majority of students attend Government run schools, however parents can choose to enrol their children in independent or private schools, which often have substantial fees.

Educational Outcomes for Aboriginal and Non-Aboriginal Children

The educational outcomes of Aboriginal children are an area of particular national concern. Aboriginal children have consistently been found to be at high risk of poor educational outcomes (ACARA, 2015a; Wong, 2015). Although being Aboriginal is included as a risk factor in many studies, including this one, the risk of course does not come from race, but rather the legacy of a complex and difficulty history that includes colonisation, genocide, forced removal of children, racism and discrimination, and a long period of exclusion from rights such as the right to vote (Shepherd, 2012). These events and policies contribute to entrenched social disadvantage and intergenerational trauma that continue to affect families today. Although some Aboriginal families enjoy a good standard of living, Aboriginal families are over-represented in the lower quintiles of social disadvantage, and are more likely to experience high levels of stressful life events (Shepherd, 2012). Aboriginal families are also more likely to experience many of the risk
factors outlined in the previous section (O’Donnell et al., 2010). A number of Government policies and strategies (including the Closing the Gap strategy, and the educational strategies associated with the Melbourne Declaration goals) aim to close the gaps in Aboriginal disadvantage, across domains such as health, employment and education. Despite ambitious goals, and the implementation of a number of initiatives, progress has been limited with regards to reducing the achievement gap between Aboriginal and non-Aboriginal students (Commonwealth Government of Australia, 2015). Improving educational outcomes for Aboriginal children and other educationally-disadvantaged groups at a population level is clearly not an easy task, however it is a necessary one.

**Measuring Educational Outcomes**

Measuring educational outcomes is a necessary part of accurately identifying educationally vulnerable groups at a population level, and over time can allow monitoring of increasing or decreasing educational gaps and evaluation of strategies implemented. There are a range of educational measures that can be examined over the course of a child’s schooling. This section outlines some key measures of educational outcomes. National key performance measures for education include attainment, achievement and participation (ACARA, 2014).

**Educational Achievement**

Educational achievement (or academic achievement) is how well children perform at school. It is measured in various ways. Weaker measures include self-reported achievement (e.g. Font & Maguire-Jack, 2013) which may be subject to biases reflecting students’ lack of knowledge of their actual grades or what they mean, or by a desire to report more positive outcomes. Grades are a somewhat stronger measure, however there may still be substantial variation across teachers and schools. For this reason, a number of countries including Australia have introduced State, national or international achievement tests that are designed to provide an objective, standardised and consistent measure of achievement (Marks, 2014).
Educational attainment such as completing high school or gaining qualifications, generally is measured at the end of secondary school. Although educational attainment is a very important measure of educational outcomes, it can only be measured at the end of the child’s school career. For this reason, the current study focusses on achievement, which can be measured throughout childhood.

**Measures of School Participation, Engagement and Commitment**

A variety of other measures have been used to examine children’s school related attitudes and behaviours. For example Font and Maguire-Jack (2013) asked children about their feelings about school (emotional engagement), their attention and efforts (cognitive engagement) and misbehaviour (behavioural engagement). One routinely collected measure of school participation is attendance. Attendance is an important predictor of achievement in the general population (Hancock et al., 2014) and in vulnerable groups (Ready, 2010). Another routinely collected measure of children’s participation in school is suspensions. Although there are limitations in this measure (as some schools use suspensions more frequently for behavioural issues, whereas others have a policy of strenuously avoiding suspending a student), they are inversely related to achievement, and are an indicator of behaviour problems at school (Noltemeyer et al., 2015). Measures such as attendance and suspensions can be examined as outcomes in their own right, or as risk or protective factors that contribute to educational achievement and attainment.

The current study focusses primarily on reading achievement, using standardised tests that are conducted in Year 3, 5, 7, and 9 of school. This allows examination of children’s reading progress over time, and the effects of risk factors on early reading outcomes when children are aged around 8 years old, versus when children are in high school and aged around 14 years old. Reading achievement has been selected as the development of language and literacy skills are of central importance in education and life (Taylor et al., 2013), and as a commonly studied measure allows this research to sit within the context of a solid body of empirical study on language and literacy development in the general population. Attendance is primarily included as a risk factor for low reading achievement, however in Chapter 8 both attendance and suspensions are examined as outcome
variables. NAPLAN achievement tests and school attendance are both key performance measures at a national level (ACARA, 2014).
Chapter 2 Literature Review – Educational Outcomes of Maltreated Children and Children Who Have Entered Out-of-Home Care

Preamble

The previous Chapter provided a brief outline of the importance of educational outcomes, useful frameworks for examining children’s educational development, established risk factors that influence educational outcomes, and some of the commonly used measures of educational outcomes. The current Chapter provides a review of the literature on educational outcomes for maltreated children and children who have been in out-of-home care. These two groups have often been studied separately, and without accounting for the potential impact of maltreatment (on children in care) or the impact of out-of-home care (for maltreated children). Both sets of literature are very relevant to the study population of children with child protection involvement following a maltreatment allegation. This chapter is the first of two that review the literature. This chapter focuses on the general body of knowledge regarding how maltreated children and children in out-of-home care fare in school, including studies that examine multiple risk factors. It also outlines existing research gaps, leading to the rationale behind the studies within this thesis. The next Chapter has a narrower aim: to systematically review research comparing outcomes for maltreated children who enter care versus those who remain at home.
Background

Child maltreatment is a significant public health issue. Maltreatment can include neglect, or physical, sexual, or emotional abuse. In Western Australia, substantiated maltreatment refers to instances where the Department of Child Protection has received a report that maltreatment may be occurring (a ‘notification’) and has subsequently conducted an investigation and determined that there is reasonable cause to believe that the child has been, is being or is likely to be abused, neglected or otherwise harmed (AIHW, 2012). Across Australia in the 2013-14 financial year, 143,023 children received child protection services including investigations of alleged maltreatment, care and protection orders, or out-of-home care. There were 40,844 children with substantiations of child maltreatment, an increase of 31% since 2009-10 (AIHW, 2015a).

When it is determined that a child cannot remain safely at home, they may be removed and placed in out-of-home care (alternative living arrangements such as foster care). As noted by Stone (2007), educational research on maltreatment and on out-of-home care have developed largely as separate fields despite overlapping populations, and there is a need for greater integration of the two in order to avoid confounding between the effects of maltreatment and the effects of out-of-home care. As these research literatures have developed somewhat separately, this chapter first reviews research regarding educational outcomes for maltreated children (who may or may not have come to the attention of child protection services and may or may not have entered out-of-home care). It then reviews literature relating to the educational outcomes of children who are or who have been in out-of-home care (many but not all of whom have experienced maltreatment). Research gaps and methodological issues are discussed, and integrated to provide a rationale for the studies in this thesis.

Educational Outcomes of Maltreated Children

Children who have experienced abuse or neglect suffer not only the immediate harm from maltreatment, but are also at increased risk for a constellation of poor outcomes such as poor mental and physical health, low educational achievement, underemployment, criminality and substance use (Batten, Aslan, Maciejewski, & Mazure, 2004; Fergusson,
Within the educational domain, children who have been maltreated are at risk of lower levels of cognitive functioning, achievement in reading and maths, grades, school attendance, and personal expectations of attending college, along with increased suspensions (Lansford et al., 2002; Leiter, 2007; Rowe & Eckenrode, 1999; Stone, 2007). Maltreated children are also less likely to finish high school and gain university qualifications, which in turn leads to unemployment and lower incomes (Mersky & Topitzes, 2010).

There are numerous potential pathways through which maltreatment may impact on children’s likelihood of succeeding in school. These include the absence of various positive factors (such as nutrition, healthcare, exposure to enriching learning experiences, positive social interactions, responsive parenting and secure attachments) that support cognitive, social and emotional development (De Bellis, 2005; Martin, Ryan, & Brooks-Gunn, 2010; Taylor, Clayton, & Rowley, 2004; Welsh, Nix, Blair, Bierman, & Nelson, 2010). In addition, maltreatment may create physical or neurological problems that impact on children’s learning. For example maltreatment may cause brain injury (Keenan et al., 2003), or more commonly emotional stress or trauma leading to disturbances in the hypothalamic–pituitary–adrenal system (Tarullo & Gunnar, 2006).

It has been suggested that the mediating factors that lead to decreased academic success in maltreated children may include both cognitive deficits and various psychological factors such as reduced self-esteem (McFadyen & Kitson, 1996), internalising and externalising behaviours and disrupted social information processing patterns that can lead to behaviour problems in school (Keiley, Howe, Dodge, Bates, & Pettit, 2001). Research also suggests that maltreated children have poorer language development compared to non-maltreated children from similar socio-economic backgrounds, which may lead to or exacerbate other developmental delays (Eigsti & Cicchetti, 2004).
Maltreatment-Related Factors Associated With Educational Outcomes

Level of Child Protection Involvement

Maltreatment is often examined as a single risk factor, however it is also acknowledged that outcomes are likely to vary across subgroups of children with different maltreatment experiences. First, results may differ for children with unsubstantiated maltreatment reports and substantiated maltreatment. One might assume that children with unsubstantiated allegations would have better outcomes, however a study by Fantuzzo et al., (2011) found poor educational outcomes were more consistently associated with unsubstantiated maltreatment reports than substantiated maltreatment. Unsubstantiated reports may be an indicator of chronic adverse conditions, and may also be less likely to receive family support interventions.

Of children with substantiated maltreatment allegations, some children remain at home and others enter out-of-home care. A review found that children placed in out-of-home care are at high risk for poor educational outcomes (Trout, Hagaman, Casey, Reid, & Epstein, 2008), however more recent studies that control for multiple risk factors suggest the impact of out-of-home care may not be as negative as early studies suggested (Berger, Cancian, Han, Noyes, & Rios-Salas, 2015; Fantuzzo et al., 2011; Font & Maguire-Jack, 2013). Outcomes for children who have been in out-of-home care will be more comprehensively addressed in the latter half of this chapter.

Nature of the Maltreatment

Research has also begun to explore the relationship between the nature of the maltreatment and educational outcomes. The results regarding type of maltreatment have been mixed, but there is a general pattern of neglect being associated with general academic difficulties, and physical abuse being linked to school-related behaviour problems (Stone, 2007). A comparatively large study that accounted for multiple risk factors found neglect, but not physical abuse, was associated with poor educational achievement (Fantuzzo et al., 2011). Sexual and emotional abuse were not assessed in the study. None of the larger-scale studies that account for multiple risk factors in examining educational outcomes for maltreated children (Boden et al., 2007; Fantuzzo et al., 2011;
Mersky & Topitzes, 2010; Rouse & Fantuzzo, 2009) examined all four types of maltreatment (neglect, physical, sexual and emotional abuse). Furthermore, none assessed the relationship between emotional abuse and educational achievement. In a survey assessing outcomes for young people, those whose self-reports included more severe abuse had worse educational outcomes than those reporting no abuse or less severe abuse (Boden et al., 2007).

**Timing of Maltreatment**

Early maltreatment is generally considered to pose greater risks to children resulting from disruption to important developmental processes that take place in early childhood, (Fantuzzo et al., 2011; Rowe & Eckenrode, 1999), however more rapid behavioural declines have been recorded for children maltreated at a later age, perhaps because of their greater understanding of the maltreatment (Keiley et al., 2001). There is also some evidence suggesting a proximal effect of educational declines close to the first reported maltreatment (Conger & Rebeck, 2001). Chronic maltreatment has also been linked to worse educational outcomes (Coohey, Renner, Hua, Zhang, & Whitney, 2011).

**Maltreatment Within a Multiple Risks Context**

Maltreated children often come from backgrounds characterised by multiple adversities at the child, family and neighbourhood level. Many of the risk factors for poor educational outcomes described in Chapter 1 are prevalent among maltreated children (Boden et al., 2007; MacKenzie, Kotch, & Lee, 2011). A Western Australian cohort study found risk factors for substantiated child maltreatment include parental hospital admissions related to mental health, substance abuse and assault, along with social disadvantage and younger parental age. A higher proportion of Aboriginal children had substantiated maltreatment reports compared to non-Aboriginal children (O’Donnell et al., 2010).

Researchers such as Boden at al., (2007) have highlighted the need to examine the relationship between maltreatment and educational outcomes taking into account other risk factors that are often present, in order to disentangle the effects related to maltreatment and the effects of other risk factors. The theoretical frameworks outlined in
Chapter 1 also emphasise that child development is best understood when it is studied over time (longitudinally) and within the context of multiple influences (multifactorially).

**Multifactorial, Longitudinal Studies of Maltreatment and Educational Outcomes**

Relatively few large, multifactorial, longitudinal surveys or data linkage studies have been conducted. Boden et al., (2007) analysed data from a longitudinal cohort study of over a thousand children. The children were surveyed on a range of topics during childhood and adolescence, with questions about physical and sexual abuse asked retrospectively at ages 18 and 21. The study found that occurrence and severity of abuse were significant predictors of high school and university qualifications. Nevertheless, they found that parent, child and socioeconomic factors that commonly co-vary with maltreatment explained a large portion of the poorer educational outcomes among abused children, to the extent that abuse was rendered non-significant in most of the analyses. The findings from the study suggest that it may be the general family disadvantage and dysfunction that results in the worse educational outcomes commonly seen in abused children, rather than the maltreatment itself. Further research is needed to assess whether this finding is robust, and better understand which aspects of family dysfunction and disadvantage impact on educational outcomes.

A similarly sized longitudinal study of disadvantaged African American and Hispanic children in Chicago also examined high school and university outcomes (Mersky & Topitzes, 2010). The study used any type of maltreatment, rather than abuse only, however included less detail on maltreatment type experienced by participants. Like Boden et al.’s, (2007) research, the study controlled for a range of sociodemographic risk factors. Mersky and Topitzes’ study included control for early educational achievement, and Boden et al. included control for out of home care placement. Unlike Boden et al., the Mersky et al., study did find maltreatment remained significantly associated with negative educational outcomes after controlling for sociodemographic risk. However, the results of the study may not be as generalisable, as the sample was quite specific (93% African American, entirely disadvantaged, and 65% drawn from a special educational and family support service). Similar research using population samples is required.
Fantuzzo, Perlman, & Dobbins (2011) used linked data for a cohort of 11,835 second grade students from a county in the USA to examine the impact of maltreatment type and timing on early academic achievement. After controlling for a range of sociodemographic risk factors they found that neglect, but not physical abuse, was significantly associated with worse educational achievement. In addition, adverse outcomes were found more consistently across a range of measures for children with unsubstantiated maltreatment reports than those with substantiated reports. This finding warrants further investigation.

These comparatively large, well-controlled studies have provided valuable information regarding educational outcomes for maltreated children, but also raise many important questions. Furthermore, they focussed on either short term or long-term educational outcomes. Although both are important, Stone (2007) pointed out that there is also a need to focus on mid-range educational outcomes and the educational trajectories of maltreated children that may act as pathways to longer-term school or university qualification outcomes.

Exploring Time and Maltreated Children’s Educational Trajectories

There are two types of longitudinal studies. The first, like the studies above, incorporate risk factors that occur earlier in life to predict outcomes that occur later. The second type, collects repeated measures of the same outcome over time (such as achievement test scores across several years of follow-up). This can provide an understanding not only of how outcomes vary for different age groups, but also intra-individual change - how children progress over time and the risk factors and events that influence changes in trajectories for better or worse (Zubrick, 2015). Trajectory approaches are also used to identify whether children in certain situations or disadvantaged groups maintain a level of achievement that is consistently behind those of other students, whether they catch up or fall further behind over time.

Trajectory approaches are common in the mainstream educational research field (e.g. Caro et al., 2009; Gutman et al., 2003; Jordan, Kaplan, Locuniak, & Ramineni, 2007). There have also been a number of papers published in the last five to six years (including those from the LONGSCAN study) that have used a trajectory approach for other aspects
of maltreated children’s development including behaviour problems (Lewis et al., 2011; Proctor, Skriner, Roesch, & Litrownik, 2010) or risky behaviours (Jones et al., 2010).

Although looking at a series of outcomes over time has become increasingly common in maltreatment research and education research, this approach has seldom been used to look at educational outcomes among maltreated children. One study that has focussed on maltreated children’s educational pathways over time used an event-history approach to examine declines in school performance following a maltreatment report, and found recency and early onset effects of maltreatment on school outcomes (Leiter & Johnsen, 1997). Leiter (2007) subsequently modelled the shape of children’s educational trajectories and found maltreatment had a gradual impact that accumulated over time. A different approach for considering the relationship between harm and outcomes over time, discrete hazard modelling, was used by Rowe and Eckenrode (1999) to examine the grades at which there was the greatest risk for grade repetition among maltreated children.

There is a great deal of scope for more research examining how maltreated children progress over time, for example which factors are associated with maltreated children showing positive trajectories (maintaining achievement or showing improvement) and which are associated with negative trajectories (maintaining low levels of achievement or showing declines). Such research can also be valuable in identifying temporal relationships between time-varying risk factors and a maltreated child’s educational progress. Increased use of trajectory approaches will increase the depth of understanding about how and when maltreatment and out-of-home care affect children’s educational pathways over time.

Out-of-Home Care

The Use of Out-of-Home Care as an Intervention for Maltreated Children in Australia and Internationally

Recognising the need to protect children from harm, child protection services use a number of interventions, including out-of-home care. Out-of-home care is the main intervention used in Australia to protect children from harmful maltreatment when it is considered unsafe for them to remain at home (i.e. where in-home support is not a
sufficient option). At June 30th 2014, a total of 43,009 children were in out-of-home care, and 51,539 children were in out-of-home care at some point during the year (AIHW, 2015a). Some children enter out-of-home care for other reasons, such as the death, incarceration or ill health of their parents or caregivers, but maltreatment is the most common cause. This thesis focusses on children who enter out-of-home care because of maltreatment.

Rates of out-of-home care have been growing in Australia, and in a number of other developed countries (Gilbert et al., 2012). However, there are concerns that the disruption and trauma of removing the child from their family may in itself have negative impacts on the child’s development and wellbeing (Geroski & Knauss, 2000). Many children in out-of-home care experience multiple placements, creating instability in their home lives and schooling (Newton, Litrownik, & Landsverk, 2000; Sammut, 2011). The United Nations Guidelines for the Alternative Care of Children emphasises family preservation, stating that “removal of a child from the care of the family should be seen as a measure of last resort and should, whenever possible, be temporary and for the shortest possible duration” (p4, UN General Assembly, 2010). The guidelines also emphasise the importance of providing a permanent solution where family preservation attempts fail, in order to meet the child’s need for stability and attachment relationships.

Policy surrounding child welfare is hotly debated. For example, a recent paper by Sammut (2011) has argued that Australia’s focus on family preservation has led to children remaining in damaging home environments for too long, followed by unstable foster care with multiple placements. He advocates for quicker removal and placement in a permanent home via adoption, which is more common in the US and UK than Australia. Some researchers argue that involvement in the care system has a detrimental effect on children’s development (Connelly & Chakrabarti, 2008), while others suggest the adverse outcomes result from children’s pre-existing risk factors (Stone, 2007).

Understanding the effects of out-of-home care is one important theme in this thesis, and is explored in more depth in the systematic review in Chapter 3. It is also picked up in the study in Chapter 8. The review in this section covers research on educational outcomes of children who have entered out-of-home care more generally. It outlines what is known
about educational outcomes for children who have been in care, along with aspects of out-of-home care and other risk or protective factors associated with educational outcomes. Understanding the educational outcomes of this group of children overall and within a multiple risks context is useful to identify the extent of educational gaps between children who have entered out-of-home care and comparison groups, and to identify risk and protective factors that can inform interventions to improve educational outcomes.

Issues in Defining Out-of-Home Care Samples

One issue that affects comparison between studies of children exposed to out-of-home care is that across studies, different inclusion and exclusion criteria are applied. Many studies focus on children’s outcomes while they are in care, with children who are reunified during the study period either excluded from follow-up data collections (e.g. Barber & Delfabbro, 2005) or excluded from the study entirely (AIHW, 2007, 2015b). Although it is beneficial to understand outcomes for those children in care at the time that outcomes are measured, we prefer the approach taken by Brownell et al. (2015) of assessing outcomes for children who have ever been in care. From a life-course perspective, a significant intervention such as out-of-home care may have ongoing effects on children’s outcomes regardless of subsequent changes. Furthermore, from a policy perspective it is useful to understand the outcomes of all maltreated children who enter out-of-home care, not just those who are in care continuously or at the time of outcome measurements.

Studies also differ in whether they use the broader population of children in care (e.g. Brownell et al., 2010) or focus on children who have been maltreated prior to placement. Some studies using the broader population of out-of-home care children account for maltreatment, but many do not. In Sweden, for instance, details of maltreatment or substantiations are not recorded as the focus is on service provision. A recent Canadian study does include substantiated abuse as a covariate, however acknowledges limitations in the data in that only abuse allegations, not neglect allegations are recorded in the data (Brownell et al., 2010). Only 1.3% had recorded substantiated maltreatment, which is likely to be an underestimate and limits the study’s ability to account for maltreatment. Other studies simply do not address the issue of maltreatment. Studies of out-of-home
care that do not account for maltreatment are leaving out an important variable that influences children’s outcomes, which reduces their ability to draw inferences about effects of out-of-home care or other risk factors. They can, however provide other valuable information such as overall educational gaps, and placement factors associated with higher or lower achievement.

Furthermore some studies focus on specific types of care (e.g. children placed with relatives in kinship foster care arrangements). Most of the research reviewed addresses outcomes for children across all major care types (foster care, kinship care and residential care), although some focus on foster or foster and kinship care (e.g. Farmer, 2009). Some studies, for methodologically sound reasons, exclude children who are placed in out-of-home care very quickly (before a data collection wave) or after a delay (Berger et al., 2009; Doyle, 2011). Some studies focus on children entering care for the first time, whereas others include any child entering care during the study period, and some focus on children who were already in care when the study began.

Despite these variations, inconsistencies and gaps, the research provides a valuable knowledge base regarding educational outcomes for children who have experienced out-of-home care.

**Out-of-Home Care and Educational Outcomes**

The educational outcomes of children in care is a topic of strong international interest. In the 12 months prior to submission of this thesis, reports on educational outcomes and out-of-home care were published in Australia (AIHW, 2015b), the UK (Sebba et al., 2015), and Canada (Brownell et al., 2015). These are included in the review below.

**Educational Outcomes of Children in Care in Australia**

In Australia, the educational achievement of children on guardianship and custody orders and children in out-of-home care are indicators to be reported at the national level, according to the National Framework for Protecting Australia’s Children 2009–2020 (2009) and the National Standards for Out-of-Home Care (DFHCSIA, 2011). There is
currently no ongoing data source for such reporting, and a national level data linkage was conducted using NAPLAN data and child protection data from six States and Territories.

Based on this linkage, a recent report examined the National Assessment Program Literacy and Numeracy achievement in 2013 of children in out-of-home care at the time of the test (AIHW, 2015b). Children in care were much less likely to achieve National Minimum Standards (ranging from 13–39 percentage points lower across academic domains and year levels). In the reading domain, 95% of all Year 3 students and 82% of Year 3 children in care met the National Minimum Standards. The gap was larger among Year 9 students, with 93% of all children but only 69% of children in care meeting the standard. The study including demographic information, as well as several placement characteristics from the child protection data.

Although the current study and the AIHW both use linked child protection and education data, they have distinct aims and strengths, and complement each other in increasing knowledge regarding outcomes for children who have entered out-of-home care. The AIHW offers the potential for ongoing monitoring of educational outcomes for children in care at a national level, which could be extremely useful in assessing progress towards closing achievement gaps. The current study includes longitudinal data, data on attendances and suspensions and a much broader range of risk factors and additional comparison groups with or without child protection involvement. These combine to allow a more in-depth examination of risk and protective factors, children’s educational trajectories over time, and progress towards estimating possible causal effects of out-of-home care. Findings from this thesis may highlight the additional variables that would be most useful to include in future national linkages.

**International Research**

There is a great deal of research showing negative outcomes for children who have been in out-of-home care. For example, one review by Trout, Hagaman, Casey, Reid, & Epstein (2008) found children in out-of-home care have lower standardised achievement scores and grades, and increased levels of grade retention, suspensions and school dropout. Educational problems among children who have been in the care system have been highlighted in multiple reviews (Forrester, Goodman, Cocker, Binnie, & Jensch,
A study of foster care alumni found rates of tertiary education lower than in the general population, showing these problems continue into adulthood (Pecora et al., 2006). Post-school outcomes for care leavers such as low entry to higher education and unemployment have been found in Australia, the United States and the United Kingdom (Mendes & Moslehuddin, 2006). The consequences of low educational achievement do not end when young people exit the care or education systems.

Recent international research using linked data shows these educational issues continue to affect children in care. A Canadian study of all children in Manitoba who had spent at least 1 day in care between the financial years of 2009-10 through to 2011-12 found consistently worse educational outcomes across many measures for children ‘ever in care’ compared to children who never entered care (Brownell et al., 2015). A range of educational outcome measures were included from the Early Development Index measuring school readiness in Kindergarteners, measures of achievement such as standardised reading and numeracy assessments in Grade 3 and earning eight or more credits in Grade 9, through to completion of high school. Student engagement in Grade 7 was also assessed. Worse educational outcomes were found for children who had been in care compared to children who had received services from Child and Family Services. Children who had received services in turn had worse outcomes than children who had not received services or been in care.

Similar outcomes for children in care (referred to as looked-after children in the United Kingdom) were reported in a recent English study (Sebba et al., 2015). In addition to using quantitative data to explore a range of questions regarding educational outcomes, qualitative interviews also identified issues in the young people’s care experiences that they felt supported or hindered their education.

**Out-of-Home Care and Educational Trajectories**

There are mixed results regarding children’s educational trajectories after entering care. An Australian study found that the educational outcomes of children continuously on guardianship or custody orders over a two year period were significantly below average and more likely to worsen than improve over time (AIHW, 2011). Although the AIHW
study showed educational declines were more common than improvements while in care, a number of studies have found contrasting results. Two studies that included pre-placement measures of educational performance found results more supportive of out-of-home care. Conger and Rebeck (2001) found that contrary to their expectations, out-of-home care placement was associated with a slight improvement in maltreated children’s maths scores and attendance, with more positive results associated with remaining in care for the entire semester. The children in out-of-home care in Runyan and Gould’s (1985a) study also showed improved attendance compared to pre-placement and compared to a matched group of maltreated children who remained at home. Positive outcomes were also found in two Australian studies that each looked at ratings of children’s academic performance and school-related behaviours as well as children’s adjustment or satisfaction (Barber & Delfabbro, 2005; Fernandez, 2008). Both focussed on foster care that was intended to involve long-term care or permanent placements, and both indicated good emotional adjustment or positive feedback from the children about foster care in addition to improvements in educational outcomes. Another study that took into account multiple other risk factors found an improvement in school engagement among children who entered care before the second of two assessments, but not for children continuously in care (Font & Maguire-Jack, 2013). The same study found no change in self-rated academic performance.

Overall, there were more studies showing educational improvements for children in care rather than declines, however results were mixed. The studies tended to focus on children in comparatively stable placements. In addition, most of the studies had follow-up durations of two years or less. There is a need for further examination of children’s trajectories over a longer duration of time, and taking into account maltreatment and risk factors at the child, family and neighbourhood levels that may influence trajectories. Including children with a broader range of care experiences (e.g. shorter placements or reunification) will also provide a fuller picture of outcomes for children who have been placed in care.
Out-of-Home Care Factors Associated With Educational Outcomes

Children’s out-of-home care experiences can vary greatly. Educational outcomes for children placed in care may differ depending on the characteristics of the child’s placement experiences.

Placement Stability

One of the most common measures of placement stability is the number of different placements a child experiences. Although worse behavioural outcomes have been observed for children with multiple placements (Runyan & Gould 1985b; Widom, 1991; Lee, 2009), evidence has been mixed regarding educational outcomes. An 18% increased odds of academic skills delay with each additional placement was found in one study (Zima et al., 2000). Another found worse educational outcomes among children with long term but unstable out-of-home care histories compared to those with long term stable care, or short-intermediate term care (Vinnerljung, Öman, & Gunnarson, 2005). Conversely, there was no difference in school failure rates associated with the number of placements children had experienced in studies by Runyan and Gould (1985a), or the Australian Institute of Health and Welfare (AIHW, 2015b). Brownell et al., (2015), in series of analyses that accounted for other risk factors found number of placements was only associated with two of their educational outcomes: Kindergarten school readiness, and credits earned in Grade 9.

Placement stability can also be examined by looking at the duration of placements. Time in current placement and time in a continuous period of care (which could include multiple placements) were each only significantly associated with educational achievement in one of four analyses (AIHW, 2015b). Runyan and Gould (1985b) also found no difference in school failure rates between foster care children based on whether the current placement was longer than three years. Some studies have suggested that educational improvements are likely to happen in the early period after placement, and then either be maintained (Barber & Delfabbro, 2005) or prove to be short-lived (Font & Maguire-Jack, 2013).
**Time in Care**

Increased time in care exposes children to a larger ‘dosage’ effect which could be positive or negative. On one hand, children are away from a potentially harmful home environment for longer, which may allow them to settle into care and recover from past trauma. Alternatively, longer duration in care may constitute a longer separation from family members including siblings as well as parents, and expose children to a greater chance of multiple placements changes. Total amount of time spent in care was non-significant in the study by Brownell et al. (2015).

**Reunification**

Australian policy supports reunification of children with their families when it is considered safe to do so after a period of out-of-home care. Children who have been reunified are often excluded from studies of out-of-home care, and there is far less research on outcomes of reunified children than other children in care. There is some evidence that compared to children who stay in care, children who have been reunified have worse educational outcomes such as low grades, more behaviour problems and increased rates of school drop-out (Taussig, Clyman, & Landsverk, 2001). More research is needed to assess outcomes for this group, and to examine whether outcomes vary depending on the duration of time since reunification.

**Placement Type**

The main out-of-home care placement types include residential facilities, kinship foster care (fostering by relatives or friends), and non-kin foster care (fostering by others). Kinship foster care is as common as non-kin foster care in Australia (46% and 45% of out-of-home care placements respectively) (AIHW, 2012), yet is under-researched (McDonald, Higgins, Valentine, & Lamont, 2011). Residential care is less common, with 7.3% of children in out-of-home care in Western Australia living in residential care including family group homes (AIHW, 2015a). There have been marked changes in the use of different care types. In Australia, kinship care is increasingly being used, especially for Aboriginal children as part of the Aboriginal Child Placement Principle (Monohan, 2002). Conversely, the use of residential care has declined sharply for several decades,
though this trend has levelled off over the most recent decade and there is some interest in residential care with extra services as an option for a small sub-group of the care population (Ainsworth & Hansen, 2005; Smyth & Eardley, 2008).

A systematic review found kinship care was related to better outcomes in areas such as placement stability, behaviour and mental health, but found no differences in educational outcomes between kinship and foster care (Winokur, Holtan, & Batchelder, 2014). All studies included in the review that looked at educational outcomes were from the United States. A 2007 Australian study found no difference in NAPLAN scores for children by placement type, however residential care was aggregated into a broader ‘other living arrangements’ category for comparison with kinship and foster care (AIHW, 2007). A more recent Australian study found that compared to children in foster care, reading and numeracy outcomes were significantly better for children in kinship placements and worse for children in residential placements (AIHW, 2015b). Further research is needed to assess the outcomes of children with different placement types taking into account a broader range of child, family and neighbourhood levels risk factors that might influence educational outcomes.

**Age at Entry to Care**

Research shows that age at placement is an important consideration, with more positive outcomes for children placed at a younger age. Children who enter care at an older age have been found to be at increased risk for placement breakdowns (Farmer, 2010), juvenile offending and running away (Lee, 2009), and adult arrests (DeGue & Widom, 2009). Recent research from the UK and Canada suggests that this relationship extends to educational outcomes (Brownell et al., 2015; Sebba et al., 2015).

**Out-of-Home Care Within a Multiple Risks Context**

Like the issues outlined previously for maltreated children, children in out-of-home care typically have experienced many risk factors prior to entering care that may affect their educational outcomes (Welbourne & Leeson, 2012). In addition, many are in care because of maltreatment, which may also impact on their education. There is increasing recognition of the need for research that takes into account these multiple risk factors in
order to better understand the influences on educational outcomes among children in out-of-home care. Studies that rigorously control for multiple risk factors have tended to suggest that educational gaps between children in out-of-home care and the general population may be accounted for by factors other than being in care (Berger et al., 2015; Berzin, 2008). In addition, studies that examine out-of-home care in the context of selected important risk factors have highlighted specific aspects of children’s backgrounds or care experiences that are associated with increased risk of poor outcomes (e.g. Brownell et al., 2015).

There has been significant progress in this area of research, however a number of important issues require further investigation. The three recent reports using linked child protection and education data highlight the value of data linkage and each shed light on important risk factors for children in care. However they also mention important risk factors they were not able to examine, such as neglect, abuse and parental addictions (Brownell et al., 2015), school attendance, maltreatment, poverty, family dysfunction and a broader range of demographic factors (AIHW, 2015b). The inclusion of information on children’s maltreatment histories, health data for the parents (such as mental health, substance and assault related hospital contacts) and for the children (such as birth risks), along with social disadvantage and attendance is an important next step for linked data studies in this field.

**Assessing the Effects of Out-of-Home Care as an Intervention**

As noted earlier in this chapter, one area that is vigorously debated is the extent to which out-of-home care should be used as an intervention for maltreated children. Most people would agree that there are situations where it is absolutely necessary to remove children from their families to protect them from severe and chronic maltreatment, which at its worst can be fatal. The threshold for determining that out-of-home care should be used, however, varies greatly. Decision-making and rates of out-of-home care have been shown to vary markedly across case-workers and judges, as well as regions or countries (Britner & Mossler, 2002; Doyle, 2011; Gilbert et al., 2012; Lindsey, 1992).

One difficulty in determining the extent to which out-of-home care should be used is that there are conflicting opinions regarding whether out-of-home care has a beneficial or
harmful effect on children. Twenty years ago, Jackson (1994) suggested that the care system failed to make much effort to overcome the educational disadvantages common among children in care, and indeed tended to place more obstacles in their way. Examining the level of underachievement among children in care led Connelly and Chakrabati (2008, p347) to conclude there is a “devastating impact of being in care on young children’s attainment in reading, writing and mathematics”. However other researchers have suggested that the achievement gaps for children in care are more likely to result from their pre-care experiences of maltreatment and social disadvantage. Forrester and colleagues (2009, p439) for instance conclude that while care is not always good, it is often good, and “attempts to reduce the use of public care are misguided, and may place more children at serious risk of harm”.

At the heart of this controversy is a lack of sufficient research to accurately assess the effects of out-of-home care. Although research has regularly found poor educational outcomes for maltreated children, and those who are placed in out-of-home care, methodological difficulties mean that the effects of maltreatment and out-of-home care are “almost always confounded” (Stone, 2007). Much of the research has been cross-sectional, used small sample sizes, and it has not always been possible to account for important covariates. Longitudinal studies that assess children at intake and then after being in care for a period of time have tended to show more positive “effects” of care, but it is possible that the disruptions around the time of entry to care (a maltreatment event, investigation, removal from home and a new living environment) could quite plausibly cause a temporary decline in children’s usual level of performance. As children who enter care are likely to be a particularly vulnerable subset of maltreated children, other risk factors (child and family adversity as well as maltreatment) must be rigorously controlled for in order to come closer to an understanding of possible causal effects of out-of-home care. Although many studies have reviewed outcomes for children in care, there has not previously been a systematic review focussing on the body of research literature that compares wellbeing and developmental outcomes (such as educational outcomes) for maltreated children who are or are not placed in care, taking into account potentially confounding risks.
Research Gaps, Directions and Methodological Approaches

Maltreatment has traditionally been a difficult area to research, for numerous reasons. Firstly, parents who maltreat their children are a hard to reach population – they may be unlikely to participate in research (Chapple & Vaske, 2010), and more likely than non-maltreating parents to drop out of the study due to factors such as poverty, stress and high mobility which are more common among families at risk of maltreatment (Berger et al., 2009). In addition, identifying children who have been maltreated can be difficult. It is recognised that whether studies use substantiated maltreatment reports, or self-reported maltreatment, studies are likely to under-represent the occurrence of maltreatment. There are also ethical issues around prospectively studying maltreated children, so retrospective studies are often used instead. However, surveying adults about their childhood experiences can have issues around recall (Coohey et al., 2011). Using clinical population samples may not represent the general population of maltreated children. Using child protection services data is generally recognised as one of the better methods of measuring child maltreatment (McDonald et al., 2011), although it does represent only the more serious end of maltreatment, and not every maltreated child is brought to the attention of child protection services. Giant strides have been made in identifying educational outcomes and their risk factors among maltreated children and those in out-of-home care, however, there is a great deal that requires further investigation.

Understanding Outcomes at a Population Level, Over Time, in a Multiple Risks Context

Understanding maltreatment and its impacts on developmental outcomes at a population level is important for appropriate cross-jurisdictional policy planning. Using population data allows a more comprehensive understanding of the extent of problems related to educational outcomes among high-risk groups, and reduces issues of sampling bias and non-random sample attrition. Using available Western Australian population data also provides a sufficient sample size to allow a range of multifactorial analyses and facilitate more accuracy in techniques such as propensity matching. The proposed research will build on recent Australian and international studies by including child, family and maltreatment-related data prior to placement, extending the number of data collection
points used in the analysis, including comparison groups of maltreated children who remained at home and those with unsubstantiated maltreatment reports, and inclusion of outcomes for children after reunification with the family had occurred.

This will allow the examination of several research objectives that fit within the theme of exploring multiple risks (including characteristics of the child, their family, neighbourhood, and child protection history) and how they contribute to children’s outcomes. These objectives are:

- Describe early reading outcomes (Year 3) for children with different levels of child protection contact, and assess the role of adversity (child, family and neighbourhood risk factors), level of child protection involvement and school attendance in predicting early reading achievement (Chapter 5)
- Examine characteristics of children’s out-of-home care placement histories that are associated with low early reading achievement (Chapter 6)
- Describe Year 3-9 reading trajectories of children with different levels of child protection contact, and the influence of other risk factors (Chapter 7)

These studies contribute to identifying vulnerable subgroups and factors that may be useful in targeting interventions, and understanding the outcomes of these children in context.

There is a lack of information about specific populations at increased risk for poor educational outcomes. Aboriginal and Torres Strait Islander children are known to be at increased risk of poor educational outcomes and are over-represented in the child protection system (AIHW, 2011), and yet little research exists on Aboriginal child abuse and neglect, out-of-home placement, and their relationships with educational outcomes. This project will include several sub-group analyses examining educational outcomes, trajectories and risk factors for Aboriginal children.

**Examining the Impact of Placement Versus Selection Bias Effects**

A second theme that is facilitated by data covering multiple risk factors is estimating the causal effects of out-of-home care. Although most interventions require an empirical
evidence base, ethical constraints have precluded randomising children into foster care (Doyle, 2011). Consequently, comparisons between groups of maltreated children who are either placed or not placed into out-of-home care are plagued by selection bias issues (Stone, 2007). Children placed in care are likely to be a particularly vulnerable subset of maltreated children prior to placement, and differ on a range of observed and unobserved factors (Berger et al., 2009; Doyle, 2011). Therefore differences in the outcomes of maltreated children in out-of-home care, compared to those that remain in in-home care, may be a result of pre-placement differences rather than the experience of out-of-home care. Within the field of out-of-home care outcome research (primarily justice and mental health outcomes) there has been a move towards the use of sophisticated propensity matching techniques and analysis that controls for covariates (Berger et al., 2009). There is also an increased use of comparison samples of children from the same child protection services whose reports were not substantiated (e.g. Fantuzzo, et al. 1998). Inclusion of pre-placement (baseline) measures of the outcome variable are also useful in improving the comparability of in-home care and out-of-home care groups (Berger et al., 2009). Inclusion of educational measures prior to child welfare involvement has only been used in a handful of studies (e.g. Runyan and Gould (1985a), for out-of-home care research, and Leiter and Johnson (2001) and Mersky and Topitzes (2010) in maltreatment research), but is a useful method for reducing potential confounding from genetic and physiological differences, early childhood experiences of family dysfunction, as well the maltreatment that led to removal from the home.

Another objective of this thesis is to:

- Conduct a systematic review of studies comparing the outcomes of maltreated children placed in out-of-home care and maltreated children who remain at home

The systematic review provides a comprehensive collation of comparison research on this important topic. It also is useful in informing the design of the final study in this thesis, with the objective of:

- Compare Year 9 educational outcomes for maltreated children who enter out-of-home care and those that do not
Summary

Research plays a vital role in informing evidence-based policy. Although child welfare is a difficult area to research, often because of the difficulties in obtaining sufficient data and sample sizes, it is nonetheless essential to build a solid foundation of knowledge to underpin decision-making that affects tens of thousands of Australia’s most vulnerable children every year. The use of linked government administrative data from Child Protection, Health, Education and Disability Services will greatly extend what is known about the educational outcomes of maltreated children and those in out-of-home care.

Preamble

Whereas Chapter 1 and 2 briefly discuss issues of causality and the impact of out-of-home care, these issues form the central focus of Chapter 3. This Chapter systematically reviews the evidence regarding harms or benefits caused by out-of-home care. The systematic review takes a broader view than the rest of this thesis, focusing on not only educational outcomes but the full range of developmental health and wellbeing outcomes that may be affected by out-of-home care placement. This provides a context for the education-related findings. At the time of submission, the paper is under review and undergoing minor changes as requested for publication in Child Abuse Review.
Abstract

We systematically reviewed quantitative research that compared developmental health or wellbeing outcomes for maltreated children placed in out-of-home care (OoHC) with those cared for in their home. Randomised, quasi-randomised, and cohort studies that met detailed criteria were eligible. Study results and bias risk information were extracted by two authors using predefined data fields. Narrative synthesis was used because of the diversity of studies. No randomised studies were found. Thirty-one studies were included, of which three had a relatively low risk of bias. The studies covered 15 developmental health or wellbeing outcomes (63 distinct comparisons). Of 40 significance-tested comparisons, 29 were consistent with no evidence of benefit or harm of OoHC, 7 were consistent with harm and 4 with benefit. Three studies with low risk of selection bias showed no evidence of significant differences, or found worse outcomes for OoHC. Overall, evidence from cohort studies shows limited evidence of improved outcomes, and some evidence of worse outcomes associated with OoHC. These results may be explained by selection bias favouring placement of children likely to have worse outcomes in OoHC rather than in-home care. Further research, including randomised controlled trials, is needed to determine the effectiveness of OoHC.

Key Practitioner Messages

1. Most research has high bias risk, as children who enter OoHC have more disadvantaged backgrounds and higher risk for poor outcomes than other maltreated children
2. Even allowing for significant bias risk in the studies, there are mixed results for children entering OoHC, and the three strongest studies showed no difference or worse outcomes for OoHC
3. More good quality studies comparing wellbeing outcomes for maltreated children placed in OoHC or in-home are needed
Introduction

Child maltreatment is a significant global problem (World Health Organisation, 2006) associated with serious adverse outcomes. In addition to the immediate harm caused by abuse or neglect, adverse outcomes include increased risks of behavioural, emotional, cognitive, and social problems (Lee, 2009; Manly, Kim, Rogosch, & Cicchetti, 2001) which can continue into adulthood (Mersky & Topitzes, 2010).

Removing a child from their home and placing them in out-of-home care (OoHC) is intended to provide safe, appropriate care for children who have been maltreated, although there is potential trauma for the family. The United Nations Convention on the Rights of the Child states that a child “shall not be separated from his or her parents against their will, except when competent authorities subject to judicial review determine … that such separation is necessary for the best interests of the child.” (p3, UN General Assembly, 1989). Despite this convention and policies focusing on intensive in-home support, many countries have rising rates of OoHC, with children entering care at an earlier age (Bromfield & Osborn, 2007; Gilbert, 2012; Gilbert et al., 2012).

Maltreatment recurs within two years in approximately one in four to one in five cases, after which risk reduces (Hindley, Ramchandani, & Jones, 2006; White, Hindley, & Jones, 2014). The immediate aim of OoHC is to remove children from a home environment deemed too harmful or risky for the child’s safety. It is reasonably self-evident that OoHC works when focusing on this aim alone, providing the OoHC is itself safe. It is less self-evident that OoHC is effective in improving child wellbeing. Wellbeing includes emotional, cognitive, physical and social domains (Pollard & Lee, 2003), and is increasingly recognised as among the responsibilities and goals of child protection services (Stone, 2007; Winokur, 2009).

Although some decisions about whether or not to place a child in OoHC are straightforward, in many cases the best option is uncertain. There is clear evidence that the use of OoHC varies according to policies, practices and individual staff members (Britner & Mossler, 2002; Doyle, 2011; Gilbert et al., 2012; Lindsey, 1992). Safety is a central consideration in placement decisions, and systematic reviews have been
conducted on the prevalence and risk of maltreatment recurrence (Hindley et al., 2006; White et al., 2014). Less is known about the wellbeing and developmental outcomes associated with placement. Governments need to know whether, on average, the impact of OoHC on child wellbeing is positive or negative compared to remaining at home. A systematic review is an essential step towards informing policy, practice and future research directions. The purpose of this review was to determine the association between OoHC compared with in-home care and developmental health and wellbeing outcomes for children who have been maltreated.

Method

Identification of Relevant Studies

Table 1. Eligibility criteria for inclusion of studies

<table>
<thead>
<tr>
<th>Participants</th>
<th>Children (0-18 years old) assessed by a child protection agency for child maltreatment prior to a decision about placement in out-of-home or in-home care.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventions</td>
<td>Any form of OoHC (including foster, kinship, group homes), for at least 1 month on average.</td>
</tr>
<tr>
<td>Comparator</td>
<td>The comparison group could involve any form of in-home care, for at least 1 month on average.</td>
</tr>
<tr>
<td>Study types</td>
<td>Studies of maltreated children who were cared for in their own home prior to placement in OoHC or remaining at home. Included studies had concurrent comparison groups of maltreated children placed in OoHC and those cared for by their parents at home. We included any randomised or quasi-randomised controlled trial. Cohort studies were included if: a) the investigators enrolled more than 100 children – a pragmatic decision to allow for sufficient events and adjustment for covariates; b) study participants were ascertained from the same population of maltreated children before they were allocated to out-of-home or in-home care; and c) investigators took into account prognostic characteristics at baseline in at least one of four domains (i) socio-economic status or ethnicity, (ii) child’s age, (iii) type/severity of maltreatment prior to placement, and (iv) at least one prognostic factor based on child characteristics (e.g. behaviour, disability) or parents’ characteristics (e.g. substance abuse, mental health).</td>
</tr>
<tr>
<td>Primary Outcomes</td>
<td>Because of the breadth of influence of adverse childhood experiences (Hertzman, 1996; Stanley, 2001), we included any child health or wellbeing outcome, which were broadly grouped as child or adult functioning (e.g. cognition, educational achievement, behaviour and mental health assessments), risky behaviour (e.g. delinquency, running away, and suicide attempts), and health (e.g. physical development, and health problems).</td>
</tr>
<tr>
<td>Secondary Outcomes</td>
<td>Service use is an indirect marker of children’s needs but may also reflect differences in carers’ or service providers’ responses.</td>
</tr>
</tbody>
</table>
Electronic searches to August 2015 identified relevant studies from 11 databases, and references in reviewed studies or suggested by experts were assessed. Eligibility criteria are shown in Table 1. Methods for the search, study selection and bias risk assessment are described in Appendices 1-4.

We assessed study quality by categorising studies as low or high risk for selection bias, performance bias, detection bias, attrition bias and reporting bias (criteria in Appendix 1). Selection bias is common in cohort studies because the most severely affected children in terms of type and severity of maltreatment, with the most adverse child or parent characteristics or deprived circumstances, are more likely to be placed in OoHC and to have the worst health and wellbeing outcomes (Stone, 2007).

**Data Synthesis**

As the included studies had a high level of heterogeneity in measures, outcomes, analysis methods and study design, we did not undertake a meta-analysis (Higgins & Green, 2011). We used narrative synthesis (Higgins & Green, 2011) and summarised results based on whether reported outcomes differed according to out-of-home or in-home care at the 5% level. We acknowledge the limitations of summarising by significance levels (which may bias the reader towards findings from larger studies). Nevertheless, it provides a means of concisely summarising information from all included studies when meta-analysis is inappropriate (Popay et al., 2006). We also present separately the results from comparisons with lower bias risk, which provide the most valid comparisons available. Adjusted results reported from multivariate analysis were used when available to minimise bias.

**Results**

**Included Studies**

Comprehensive searches of 11 electronic databases yielded 2,422 titles and abstracts (see Appendix 2). In total 31 met the inclusion criteria. The 31 included papers were from 11 cohort studies. No randomised trials were found. Cohorts included the National Survey of Child and Adolescent Wellbeing (NSCAW, Berger, 2009; Casanueva, 2014; Cheng,
2012; Hurlburt, 2004; Kolko, 2010; Leslie, 2005; Leslie, 2010; Raghavan, 2014; Ringeisen, 2009; Stacks, 2011; Stahmer, 2009; Traube, 2012; & Wall, 2007), and NSCAW-II (Font, 2013; Fowler, 2015; & Horwitz, 2012), a dataset developed by Widom (DeGue, 2009; McMahon, 2002; & Widom, 1991), Swedish registry data (Berlin, 2011; Vinnerljung, 2007; & Vinnerljung, 2006), Runyan’s historical cohort (1985a; 1985b), a cohort used by Mennen, (2010) and Negriff, (2015) and five separate cohort studies (Baskin, 2011; Doyle, 2011; Goodkind, 2013; Lee, 2009; & Pinto, 2013). Nine of the 11 cohort studies (27 of 31 papers) were conducted in the USA. One cohort study (three papers) was conducted in Sweden, and one in Portugal (Pinto, 2013). We discuss the 31 papers separately, as they included different subsamples (e.g. age groups) and outcomes.

Age at recruitment and duration of follow-up varied widely across the studies (Tables 2 and 3). We excluded studies or sub-groups of Swedish adolescents entering care, as a high proportion of cases reflected behavioural or juvenile justice issues rather than maltreatment (Vinnerljung, 2006). The studies were heterogeneous in how type, number or duration of placements were coded and recorded, and classification of children with previous placements.

**Risk of Bias**

Only 3 of the 31 papers (Lee, 2009; Doyle, 2011; & Berger, 2009) were rated as low risk for selection bias (Appendix 3), their characteristics are shown in Appendix 5. Berger (2009) controlled for 14 variables at the baseline assessment using a series of analytic techniques, including propensity matching, to increasingly address risk of bias. Limiting the sample to children placed in OoHC after baseline measurements ensured baseline data were measured prior to placement in this NSCAW sample. Lee (2009) also used propensity matching to adjust for 13 covariates.

The third study, (Doyle, 2011) used an ‘instrumental variable’ approach. Caseworkers were analysed as the instrumental variable because of their variable thresholds for placing children in OoHC, thereby creating a natural experiment. By assessing the difference in outcomes for children allocated to high-threshold-to-place caseworkers versus low-threshold-to-place caseworkers, effects of OoHC placement could be measured for the ‘marginal cases’ where decisions varied between caseworkers.
An important challenge for cohort studies is timing of baseline assessments as reporting may be biased by the trauma of judicial processes, or differing reporting of the child’s characteristics by foster carers versus parents. Although the NSCAW provided valuable data from a large, longitudinal survey that addressed many outcomes, the ‘baseline’ assessments were not undertaken until months after the maltreatment investigation. By this stage, many children in out-of-home care had already been placed for some time, potentially biasing baseline assessment measures (only Berger, 2009 dealt with this issue). Font (2013) used propensity matching, but was still at risk of selection bias as important covariates used for matching were measured after the intervention began.

Unequal provision of services between out-of-home and in-home care could create performance bias. Generally, this is likely to favour additional services to children placed in OoHC. Resulting performance bias would improve outcomes for children in OoHC. Three studies (Leslie, 2005; Stahmer, 2009; & Horwitz, 2012) partially addressed the issue of services subsequent to placement by separating results for in-home children whose families received additional support services and those who did not. Leslie (2010), Font (2013) and Goodkind (2013) accounted for services in their analyses. Lee (2009) included comparisons where both in-home and OoHC groups received intensive family support. These studies were rated low/unclear on performance bias. Most studies (24 of 31) did not report on additional services aside from placement.

In total, 50 of 72 outcomes were rated low risk for detection bias. Detection bias risk is sometimes difficult to avoid. For instance, court appearances and decisions (Runyan, 1985b; Lee, 2009; & Goodkind, 2013) are important outcomes, yet it is virtually impossible to remove biases that may occur when a police officer or judge takes into account the child’s placement background. Similarly, high quality measures such as the Child Behaviour Checklist (Berger, 2009; & Stahmer, 2009) present risk of bias when completed by different caregivers (parents and foster parents) who may have different levels of expectations and familiarity with the child, as well as different motivations and concerns in completing such assessments.

We categorised ten studies as low risk for attrition bias. Most used population record-linkage which is less subject to loss to follow-up, or imputation, and approximately half
adjusted for differences in follow-up time. The remaining studies did not address differences in attrition between the two groups. We also examined reporting bias. As far as it was possible to tell, all the studies appeared to report all intended outcomes, however none reported protocols.

**Effects of Interventions**

For each outcome, evidence with low risk of selection bias is reported first, followed by studies providing weaker evidence. A summary of results is provided in Tables 2-3, with sample size and assessment of bias risks (see also Appendices 1 & 3).

**Outcome Group 1: Child/adult functioning**

*Cognitive and Language Skills*

Cognitive and language skills were reported in three NSCAW studies (Table 2). The Kaufman Brief Intelligence Test (1990) was used by Berger (2009) for children aged 4-14 at recruitment, and with the Battelle Developmental Inventory for children under 4 years old by Stahmer (2009) among children aged 12-47 months at recruitment. The Preschool Language Scales-3 (PLS-3,1992) were used by Stahmer (2009) and Stacks (2011).

One study with low risk of selection bias (Berger, 2009) reported cognitive and language skills after 3 years follow-up. Because objective, standardised measures were used, risk of detection bias was low. This study thereby provided some of the highest quality evidence for the review. From the fully adjusted multivariate analysis, there were no significant differences between in-home care and OoHC groups on cognitive tests. For this domain, there was no significant change in outcomes depending on the analytic methods used to address potential selection biases. Two studies with high selection bias risk also reported no significant group differences (5% level): Stahmer (2009) for language and cognitive outcomes and Stacks (2011) for language development to age six.

There was consistent evidence suggesting no significant association between OoHC placement and language and cognitive outcomes. However all studies used NSCAW data, and only one paper was low risk for selection bias.
Table 2. Child/adult functioning: Main effect of out-of-home versus in-home care (studies at low risk of selection bias in bold)

<table>
<thead>
<tr>
<th>PANEL A: Child/adult functioning wellbeing outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDY 1st author, Country year published, cohort year(s) inception</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><strong>COGNITIVE AND LANGUAGE SKILLS</strong></td>
</tr>
<tr>
<td>Stacks, 2011 USA 1999-2000</td>
</tr>
<tr>
<td><strong>ACADEMIC ACHIEVEMENT</strong></td>
</tr>
<tr>
<td>Berlin, 2011 Sweden 1972-1981</td>
</tr>
<tr>
<td>Font, 2013 USA 2008-2009</td>
</tr>
<tr>
<td>Runyan, 1985 USA 1969-1977</td>
</tr>
</tbody>
</table>

¹ Results taken from fully adjusted model. Notes: NSCAW = National Survey of Child and Adolescent Wellbeing NA= Not applicable ND = No difference RE = Reported elsewhere (another included study) FPS = Family-preservation services Sign Direction = direction of effect favourable (+) or unfavourable (-) results for OoH
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USA</strong> 1991-1994</td>
<td>Prospective cohort Linked official data 0 to 12y</td>
<td>Prospective cohort (NSCAW-II) 6y+ Mean 12y</td>
<td>Retrospective cohort Approx. 3-8y</td>
<td>Prospective cohort Swedish national registers 0y</td>
<td>Prospective cohort (NSCAW) 1-4y</td>
<td>Prospective cohort 9-12y (Same as Mennen, 2010)</td>
</tr>
<tr>
<td><strong>OoH: 510</strong></td>
<td><strong>IH: 442</strong></td>
<td><strong>OoH: 642</strong></td>
<td><strong>IH: 69</strong></td>
<td><strong>OoH: 5224</strong></td>
<td><strong>IH: 788</strong></td>
<td><strong>OoH: 87</strong></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td><strong>Low</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
</tr>
<tr>
<td><strong>+</strong></td>
<td><strong>ND</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
</tr>
<tr>
<td><strong>USA</strong> 1969-1977</td>
<td>Prospective cohort</td>
<td>Prospective cohort</td>
<td>Prospective cohort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OoH: 96</strong></td>
<td><strong>IH: 69</strong></td>
<td><strong>OoH: 96</strong></td>
<td><strong>IH: 69</strong></td>
<td><strong>OoH: 87</strong></td>
<td><strong>IH: 154</strong></td>
<td><strong>OoH: 87</strong></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
</tr>
<tr>
<td><strong>Welfare dependency (low)</strong></td>
<td>Follow-up at age 25y</td>
<td>Welfare dependency (low) Follow-up at age 25y</td>
<td>Welfare dependency (low) Follow-up at age 25y</td>
<td>Welfare dependency (low) Follow-up at age 25y</td>
<td>Welfare dependency (low) Follow-up at age 25y</td>
<td>Welfare dependency (low) Follow-up at age 25y</td>
</tr>
<tr>
<td><strong>+</strong></td>
<td><strong>ND</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
</tr>
<tr>
<td>DAILY LIVING SKILLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>USA</strong> 1999-2000</td>
<td>Prospective cohort</td>
<td>Prospective cohort</td>
<td>Prospective cohort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OoH: 261</strong></td>
<td><strong>IH: 788</strong></td>
<td><strong>OoH: 261</strong></td>
<td><strong>IH: 788</strong></td>
<td><strong>OoH: 87</strong></td>
<td><strong>IH: 154</strong></td>
<td><strong>OoH: 87</strong></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
</tr>
<tr>
<td><strong>Adaptive behaviour (high)</strong></td>
<td>M=21.3 m after investigation onset</td>
<td>Adaptive behaviour (high) M=21.3 m after investigation onset</td>
<td>Adaptive behaviour (high) M=21.3 m after investigation onset</td>
<td>Adaptive behaviour (high) M=21.3 m after investigation onset</td>
<td>Adaptive behaviour (high) M=21.3 m after investigation onset</td>
<td>Adaptive behaviour (high) M=21.3 m after investigation onset</td>
</tr>
<tr>
<td><strong>–</strong></td>
<td><strong>ND</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
</tr>
<tr>
<td>SOCIAL SUPPORT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>USA</strong> Not Stated</td>
<td>Prospective cohort</td>
<td>Prospective cohort</td>
<td>Prospective cohort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OoH: 87</strong></td>
<td><strong>IH: 154</strong></td>
<td><strong>OoH: 87</strong></td>
<td><strong>IH: 154</strong></td>
<td><strong>OoH: 87</strong></td>
<td><strong>IH: 154</strong></td>
<td><strong>OoH: 87</strong></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
</tr>
<tr>
<td><strong>Supportive social network members (low)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1. Supportive social network members (low)</td>
</tr>
<tr>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
<td><strong>Mixed</strong></td>
</tr>
<tr>
<td><strong>Main effects not reported</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1. Worse (foster)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. ND</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. ND</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4. Better (kinship)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MENTAL HEALTH AND BEHAVIOUR</strong></td>
<td><strong>Prospective cohort (NSCAW)</strong></td>
<td><strong>OoH: 342 IH: 2111</strong></td>
<td><strong>Low</strong></td>
<td><strong>1. Internalising behaviour (high)</strong></td>
<td><strong>2. Externalising behaviour (high)</strong></td>
<td><strong>At 3y follow up</strong></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------</td>
<td>----------------------</td>
<td>---------</td>
<td>-------------------------------------</td>
<td>-------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Berger, 2009 USA 1999-2000</td>
<td>Prospective cohort (NSCAW) 4-14y</td>
<td></td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Post-traumatic stress (low)</td>
</tr>
<tr>
<td>Kolko, 2010 USA 1999-2000</td>
<td>Prospective cohort (NSCAW) 8-14y</td>
<td>OoH: 483 IH: 1365</td>
<td>High</td>
<td>High</td>
<td></td>
<td>Internalising &amp; externalising behaviour (high)</td>
</tr>
<tr>
<td>Stahmer, 2009 USA 1999-2000</td>
<td>Prospective cohort (NSCAW) 1-4y</td>
<td>OoH: 261 IH: 788</td>
<td>High</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mennenn, 2010 USA Not stated</td>
<td>Prospective cohort 9-12y (Same as Negriff, 2015)</td>
<td>OoH: 138 IH: 164</td>
<td>High</td>
<td>High</td>
<td>1. Mental health (self-report) (low)</td>
<td>2. Mental health (carer report) (high)</td>
</tr>
<tr>
<td></td>
<td>Retrospective cohort &lt;12y</td>
<td>OoH: 86 IH: 50</td>
<td>High</td>
<td>High</td>
<td>Psychological distress (low)</td>
<td>At age 14-23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinto, 2013 Portugal 1999-2006</td>
<td>Prospective cohort Swedish national registers 0y</td>
<td>OoH:15855 IH: 6450</td>
<td>High</td>
<td>Low</td>
<td>1. Depression hospitalisation (low)</td>
<td>2. Psychosis hospitalisation (low)</td>
</tr>
<tr>
<td>Vinnerljung, 2006 Sweden 1973-1982</td>
<td>Prospective cohort</td>
<td>OoH:15855 IH: 6450</td>
<td>High</td>
<td>Low</td>
<td>1. Depression hospitalisation (low)</td>
<td>2. Psychosis hospitalisation (low)</td>
</tr>
<tr>
<td><strong>HEALTH</strong></td>
<td><strong>Cohort</strong></td>
<td><strong>N=15,681 OoH 27%</strong></td>
<td><strong>Low</strong></td>
<td><strong>Low</strong></td>
<td><strong>Emergency healthcare (high)</strong></td>
<td><strong>Increased</strong></td>
</tr>
<tr>
<td>Doyle, 2011 USA 1990-2000</td>
<td>Prospective cohort (Illinois Integrated database) 5-15y</td>
<td></td>
<td>Low</td>
<td>Low</td>
<td>Emergency healthcare (high)</td>
<td>Increased</td>
</tr>
<tr>
<td>Pinto, 2013 Portugal 1999-2006</td>
<td>Retrospective cohort &lt;12y</td>
<td>OoH: 86 IH: 50</td>
<td>High</td>
<td>High</td>
<td>Physical symptoms (low)</td>
<td>+</td>
</tr>
</tbody>
</table>
### PANEL B: Service Use

<table>
<thead>
<tr>
<th>Study</th>
<th>1st author, Country, year published, year(s) cohort inception</th>
<th>Study design, age at inception (years)</th>
<th>Sample: out-of-home (OoH) or in-home (IH)</th>
<th>Bias risk: Selection Attrition</th>
<th>Outcome (risk of detection bias), time of follow up</th>
<th>Sign direction OoH better, worse</th>
<th>Results: OoH better, worse, no difference (ND) at 5% level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horwitz, 2012 USA 2008-2009</td>
<td>Prospective cohort (NSCAW-II) 0-17.5y</td>
<td>N=3084 OoH 14%</td>
<td>High High</td>
<td>Mental health service use (high) ~2y after investigation onset</td>
<td>NA</td>
<td>Increased</td>
<td></td>
</tr>
<tr>
<td>Hurlbert, 2004 USA 1999-2000</td>
<td>Prospective cohort (NSCAW) 2-14y</td>
<td>OoH: 862 IH: 1961</td>
<td>High High</td>
<td>Mental health service use (high) At 13.5 m (mean) after investigation onset</td>
<td>NA</td>
<td>Increased</td>
<td></td>
</tr>
<tr>
<td>Leslie, 2005 USA 1999-2000</td>
<td>Prospective cohort (NSCAW) 2-14y</td>
<td>OoH: 708 IH: 2884</td>
<td>High Low</td>
<td>Mental health service use (high) At 20.5 m (mean) after investigation onset</td>
<td>NA</td>
<td>Increased</td>
<td></td>
</tr>
<tr>
<td>Leslie, 2010 USA 1999-2000</td>
<td>Prospective cohort (NSCAW) 2-15y</td>
<td>OoH: 627 IH: 1894</td>
<td>High Low</td>
<td>High or increasing psychotropic medication use (high)</td>
<td>NA</td>
<td>Increased</td>
<td></td>
</tr>
<tr>
<td>Raghavan, 2014 USA 1999-2000</td>
<td>Prospective cohort (NSCAW) 3-15y</td>
<td>Not stated</td>
<td>High High</td>
<td>Any psychotropic medication expenditure (high)</td>
<td>NA</td>
<td>Increased</td>
<td></td>
</tr>
<tr>
<td>Ringeisen, 2009 USA 1999-2000</td>
<td>Prospective cohort (NSCAW) &lt;1y</td>
<td>OoH: 450 IH: 509</td>
<td>High High</td>
<td>1. Special education service use (high) 2. Mental health service use (high) At 5-6y of age</td>
<td>NA</td>
<td>1. Increased 2. Increased</td>
<td></td>
</tr>
</tbody>
</table>

---

* Results taken from fully adjusted model. Notes: NSCAW = National Survey of Child and Adolescent Wellbeing NA= Not applicable ND = No difference RE = Reported elsewhere (another included study) FPS = Family-preservation services Sign Direction = direction of effect favourable (+) or unfavourable (-) results for OoH

53
**Academic Achievement**

Achievement was addressed in three papers from separate cohort studies. All were at high risk of selection bias, and reported no differences in school achievement or indirect evidence favouring OoHC. In a historical US cohort of maltreated children followed to 11-18 years old, Runyan (1985a), found the percentage of children with pass grades did not differ significantly between those ever in OoHC (44.2%) and those at home (31.8%). The analysis did not appear to control for the OoHC group’s higher social disadvantage and lower prior grades. Sample sizes for some analyses were small due to lack of pre-intervention school data for children who entered OoHC before starting school.

Font (2013) used NSCAW-II data to examine children’s self-rated academic performance, and found no significant differences between in-home and OoHC groups. The authors noted that self-report data may be inaccurate. This may be particularly the case for achievement: qualitative research found that children in OoHC often achieved poorly but reported they were doing well in school (Finkelstein, Wamsley, & Miranda, 2002).

The third paper, a Swedish study, Berlin (2011) provided limited evidence as it did not direct compare in-home care and OoHC samples, instead using a general population reference group. Compared to the general population, both child welfare groups were more likely to have no or low grades aged 15-16: OoHC: RR=1.64 (1.57-1.72), higher for in home care: RR=2.00 (1.92-2.08).

Overall there is no clear evidence of differences between academic achievement in out-of-home and in-home groups, however the studies were at high risk of selection bias, and other design issues weakened the evidence base.

**School Attendance and Engagement**

School attendance was addressed in two US studies. Overall, one study reported no difference in truancy while another provided weak evidence of improved school attendance in the OoHC group. Lee (2009), with low selection bias risk, examined court petitions for truancy, a rare event affecting 3.7% of the sample. No significant difference
between in-home care with family-preservation services and two OoHC groups on truancy petitions were found: OoHC with family-preservation services (HR=0.59, p=0.16); OoHC only (HR=0.57, p=0.11). Runyan (1985a) found the OoHC group had greater improvement in attendance than the in-home care group (at borderline significance, p=.048), in a study with high selection bias risk.

Self-reported school engagement was examined by Font (2013) using NSCAW-II data. Overall differences between OoHC and in-home groups were not compared, with the OoHC group divided into children who were in care only at survey wave one, wave two or both. Emotional and cognitive engagement were significantly higher for children placed after wave one compared to the in-home group, however no differences were found for the other OoHC groups compared to the in-home group

There is limited evidence regarding school attendance and engagement, however there are some indications of favourable results for children in OoHC.

**Employment**

One Swedish study, with high selection bias risk, assessed welfare dependency at age 25 (Berlin, 2011). The study used the general population as the reference group, and did not directly compare in-home and out-of-home groups. Both child welfare groups were more likely than the general population to be unemployed and welfare dependent as adults: In-home care (RR=2.45(2.10-2.85)), with OoHC even higher risk (RR=3.40(2.98-3.87)).

**Daily Living Skills**

One study, with high selection bias risk, assessed children on the Vineland Adaptive Behavior Scale-Screener (Stahmer, 2009). It found no significant effect of placement in improvement or deterioration of children’s daily living skills, from approximately 5.9 months after investigation onset to follow-up 15 months later.

**Social Support**

One study, with high risk of selection bias, examined social support (Negriff, 2015). Total OoHC results were not reported, however sub-group differences were found. Children in
foster care had smaller social support networks than children remaining at home. Conversely, kinship care appeared protective against having older friends, which can increase involvement in risky behaviours.

**Mental Health and Behaviour**


The one study with low risk of selection bias, Berger (2009), found no significant differences between OoHC and in-home care groups for internalising or externalising behaviour. Results for behavioural outcomes changed markedly, from significantly worse outcomes for OoHC to no difference, as controlling for selection bias increased. At baseline the OoHC group had significantly more behaviour problems. Detection bias from differential reporting by foster carers versus parents cannot be ruled out.

Five studies with high risk of selection bias reported mental health outcomes, and also found little difference between the groups on mental health outcomes including internalising and externalising behaviour (Stahmer, 2009), post-traumatic symptoms (Kolko, 2010), psychological distress (Pinto, 2013) or any clinical cut-off score (Mennen, 2010). Kolko (2010) found prior to adjustment for child and family characteristics and exposure to violence, children in in-home care had less trauma symptoms, but after adjustment, placement no longer predicted symptoms.

One study examined severe mental health problems (Vinnerljung, 2006). Direct comparisons were not made between in-home and out-of-home groups. Risk for children in OoHC appears somewhat higher than in-home care for ‘any psychiatric hospitalisation’ aged 13-17 (in-home RR=2.9(2.4-3.5), OoHC groups from RR=3.2(2.7-3.7) to RR=3.8(3.0-4.7)); but somewhat lower for psychosis hospitalisations aged 13+ (in-home
RR=2.7(2.0-3.6); OoHC RRs=2.0(1.5-2.5) to 2.6(1.9-3.6)), however confidence intervals overlapped. Outcomes appeared similar for ‘any psychiatric hospitalisation’ aged 19+ (in-home RR=2.4(1.7-3.2); OoHC RRs=2.3(1.6-3.3) to 2.9(2.2-3.7)), and depression aged 13+ (in-home RR=1.7(1.3-2.3), OoHC groups RR=1.9 (CIs for different durations in care 1.5-2.4;1.2-2.8;1.4-2.7).

Overall, we found no evidence of significantly different mental health outcomes after accounting for baseline characteristics.

**Health**

Two studies examined health outcomes. One US study with low selection bias risk assessed emergency healthcare use, comparing children whose caseworkers were more or less likely to use OoHC (Doyle, 2011). Children in the ‘more likely’ group experienced significantly more emergency healthcare than children in the ‘less likely’ group (controlled IV estimate=.156, SE.07, p<.01). This outcome is at high risk of detection bias because foster carers and maltreating parents are likely to differ in response thresholds for taking children to emergency healthcare. Consequently, results should be interpreted cautiously.

The second study (Pinto, 2013), was conducted in Portugal and found no significant group differences on physical health symptoms using the Rotterdam Symptom Checklist. Overall, no difference was found in physical symptoms, while children with caseworkers likely to use OoHC had increased emergency healthcare use (which may reflect either increased need for healthcare or higher responsiveness of caregivers).
Table 3. Risky behaviours: Main effect of out-of-home versus in-home care (studies at low risk of selection bias presented first in bold)

<table>
<thead>
<tr>
<th>STUDY 1st author, Country, year published, year(s) cohort inception</th>
<th>Study design, age at inception (years)</th>
<th>Sample: out-of-home (OoH) or in-home (IH)</th>
<th>Bias risk: Selection, Attrition</th>
<th>Outcome (risk of detection bias), time of follow up</th>
<th>Sign direction</th>
<th>Results: OoH better, worse, no difference (ND) at 5% level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doyle, 2011 USA 1990-2000</td>
<td>Prospective cohort (Illinois Integrated database) 5-15y</td>
<td>N=15,681 OoH 27%</td>
<td>Low Low</td>
<td>Juvenile court appearance (low)</td>
<td>–</td>
<td>Worse</td>
</tr>
<tr>
<td>Baskin, 2011 USA 1990-1993</td>
<td>Prospective analysis of official record data 0-12y</td>
<td>OoH: 817 IH: 418</td>
<td>High Low</td>
<td>Total arrests (low) At 15 y follow-up to age 18y</td>
<td>–</td>
<td>Not reported</td>
</tr>
<tr>
<td>Berlin, 2011 Sweden 1972-1981</td>
<td>Prospective cohort Swedish national registers 0y</td>
<td>OoH: 5224 IH: 6455</td>
<td>High Low</td>
<td>Criminality (high) Follow-up from age 20y to 2005</td>
<td>–</td>
<td>Not reported</td>
</tr>
<tr>
<td>DeGue, 2009 USA 1967-1971</td>
<td>Prospective cohort (Widom cohort) ≤11y</td>
<td>OoH: 581 IH: 109</td>
<td>High High</td>
<td>1. Adult arrests (low) 2. Adult &amp; juvenile (low) 3. Violent arrests (low) Mean age at follow-up 31.8y</td>
<td>1. RE 2. – 3. –</td>
<td>Main effect Not reported Worse by # placements</td>
</tr>
<tr>
<td>McMahon, 2002 USA 1967-1971</td>
<td>Prospective cohort (Widom cohort) ≤11y</td>
<td>749 (OoH: 81%)</td>
<td>High High</td>
<td>1. Juvenile arrests (low) 2. Adult arrests (low) At 23-27y follow-up</td>
<td>4. – 5. +</td>
<td>ND, but sig. interactions</td>
</tr>
</tbody>
</table>

Outcome group: Risky behaviours

CRIMINAL JUSTICE OUTCOMES

Notes: NSCAW = National Survey of Child and Adolescent Wellbeing NA= Not applicable ND = No difference RE = Reported elsewhere (another included study) FPS = Family-preservation services Sign Direction = direction of effect favourable (+) or unfavourable (-) results for OoH
| Widom, 1991 USA 1967-1971 Prospective cohort (Widom cohort) ≤11y OoH: 603 IH: 106 High High 1. Juvenile arrests (low) 2. Adult arrests (low) 3. Adult & juvenile (low) 4. Violent arrests (low) Mean age at follow-up 25.7y | RE Main effect Not reported Worse by # placements |
| Goodkind, 2013 USA 1985-1994 Prospective birth cohort Allegheny county, Pennsylvania Linked official data 0y N=17,471 OoH 21.2% High High Juvenile justice placement/detention (high) Up to age 18y |
| Runyan, 1985b USA 1969-1977 Retrospective cohort 5 to 7y (mean) OoH: 114 IH: 106 High High Crimes committed and charged (high) At 11-18y of age |
| **DRUG AND ALCOHOL USE** |
| Berlin, 2011 Sweden 1972-1981 Prospective cohort Swedish national registers 0y OoH: 5224 IH: 6455 High Low 1. Drug abuse (high) 2. Alcohol abuse (high) Follow-up from age 20y to 2005 |
| Cheng, 2012 USA 1999-2000 Prospective cohort (NSCAW) 11-15y N=1005 OoH: 26% High High Non-medical use of prescription drugs (low) ~3.5y after investigation onset |
| Traube, 2012 USA 1999-2000 Prospective cohort (NSCAW) 11-15y N=827 OoH: 24% High High 1. Use of social drugs last 30 days 2. Use of hard drugs last 30 days ~3.5y after investigation onset |
| Wall, 2007 USA 1999-2000 Prospective cohort (NSCAW) 11-15y N=912 OoH: 9% High High Moderate/high substance use (low) ~3.5y after investigation onset |
### SUICIDE ATTEMPTS

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Years</th>
<th>Cohort Type</th>
<th>OoH: IH</th>
<th>Risk Group</th>
<th>Follow-up Details</th>
<th>RE/Not Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin, 2011</td>
<td>Sweden</td>
<td>1972-1981</td>
<td>Prospective cohort, Swedish national registers</td>
<td>5224: 6455</td>
<td>High: Low</td>
<td>Suicide attempt (low) Follow-up from age 20y to 2005</td>
<td>RE/Not reported</td>
</tr>
<tr>
<td>Vinnerljung, 2006</td>
<td>Sweden</td>
<td>1973-1982</td>
<td>Prospective cohort, Swedish national registers</td>
<td>15855: 6450</td>
<td>High: Low</td>
<td>1. Suicide attempts aged 13-17 (low) 2. Suicide attempts aged 19+ (low) At 13y of age to 18-27y of age</td>
<td>1. – 2. –</td>
</tr>
</tbody>
</table>

### RISKY SEXUAL BEHAVIOUR AND TEENAGE BIRTHS

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Years</th>
<th>Cohort Type</th>
<th>Total N</th>
<th>Risk Group</th>
<th>Omnibus Follow-up Details</th>
<th>RE/Not Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fowler, 2014</td>
<td>USA</td>
<td>2008-2009</td>
<td>Prospective cohort (NSCAW-II) 13-17y</td>
<td>714: OoH 28%</td>
<td>High: Low</td>
<td>High risk sexual behaviour (low) ~2y after investigation onset</td>
<td>+ Better</td>
</tr>
<tr>
<td>Vinnerljung, 2007</td>
<td>Sweden</td>
<td>1972-1983</td>
<td>Prospective cohort, Swedish national registers 0y</td>
<td>21053: 8698</td>
<td>High: Low</td>
<td>Teenage pregnancy (low)</td>
<td>NR</td>
</tr>
</tbody>
</table>

### HEALTH RISK BEHAVIOURS

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Years</th>
<th>Cohort Type</th>
<th>Total N</th>
<th>Risk Group</th>
<th>Omnibus Follow-up Details</th>
<th>RE/Not Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinto, 2013</td>
<td>Portugal</td>
<td>1999-2006</td>
<td>Retrospective cohort &lt;12y</td>
<td>86: 50</td>
<td>High: High</td>
<td>Health risk behaviours (high) At age 14-23</td>
<td>+ Better</td>
</tr>
</tbody>
</table>

### RUNNING AWAY

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Years</th>
<th>Cohort Type</th>
<th>Total N</th>
<th>Risk Group</th>
<th>Omnibus Follow-up Details</th>
<th>RE/Not Reported</th>
</tr>
</thead>
</table>
Outcome Group 2: Risky behaviour

Criminal Justice

Two low selection bias risk studies examined juvenile court appearances (see Table 3). Doyle’s (2011) analysis provides results for marginal cases, where placement decisions are likely to vary between caseworkers. Among marginal cases, foster care was associated with an 18% increase in delinquency. Conversely, Lee (2009) found no significant difference in court appearances for children who received OoHC with (HR=1.24, p=0.14) or without (HR=1.02, p=0.83) family-preservation services, compared to in-home care with family-preservation services.

A further seven papers at high risk of selection bias examined criminal justice outcomes, in five cohort studies (four US and one Swedish). Consistent with Lee (2009), Runyan (1985b) found no significant difference between the rate of crime per person year between OoHC (0.050) and in-home care groups (0.059), and McMahon (2002) found no difference in arrests. Conversely, Goodkind (2013) found OoHC was associated with increased likelihood of spending time in a juvenile justice facility or detention (OR=1.36(1.19-1.56), similar to Doyle’s (2011) findings.

Another study looked at various arrest outcomes and found mixed results for level of risk across groups (Baskin, 2011), but did not directly compare OoHC and in-home care groups. Although significance of differences cannot be ascertained, odds ratios indicate lower risk for the in-home care group than the foster group for total arrests and non-violent arrests, but higher risk for violent crime arrests. Compared to unfounded cases, the risk of total arrests was: in-home OR=0.990, foster care OR=1.77, and group home OR=2.13. Violent-crime arrests: in-home OR= 2.75; foster care OR=1.86; and group home OR=1.83. Non-violent arrests: in-home OR=1.92; foster care OR=4.59; and group home OR=5.14.

The Swedish study by Berlin (2011), compared criminality among children who received in-home or OoHC with children in the general population. Both child welfare groups had
increased risks of serious criminality but risk was lower for in-home (RR=2.16(1.99-2.34)) than OoHC (RR=2.84(2.62-3.08)).

Two studies using Widom’s cohort (DeGue, 2009; & Widom, 1991) and studies by Baskin (2011) and Runyan (1985b) examined the association between number of placements and criminality. All found multiple placements were associated with significantly worse criminality. However, there was no significant increase in criminality outcomes among maltreated children placed only once compared to in-home care. Runyan (1985b) reported the relative risk of delinquency compared to those with no placements increased from .20 (non-significant) for first foster placement to 3.77(1.77-8.02) for children with over four placements. With high risk of selection bias common, and limited measurement of baseline behaviour problems, caution must be applied regarding causality and direction of effects.

McMahon (2002) extended the analysis of Widom’s data and found interactions between child and family characteristics and placement decision on arrest outcomes.

Overall, there was a mix of studies showing worse outcomes for children in OoHC and studies showing no difference. This occurred in studies both at low and high risk for selection bias.

**Substance Abuse**

Five studies assessed substance use, all had high risk of selection bias. Four NSCAW studies examined substance use in youths recruited aged 11-15. Despite different measures of substance use, the degree of overlap means they should be considered in conjunction with each other. Casaneuva (2014) found higher use of marijuana and any drugs among OoHC adolescents at wave one, but slower increases in marijuana use over time compared to children at home. Traube (2012) found increased use of ‘hard’ drugs but not ‘social’ drugs associated with OoHC. Wall (2007) found higher substance use associated with OoHC. Cheng (2012) found no difference between groups on non-medical use of prescription drugs.
A Swedish study (Berlin, 2011) found both child welfare groups had elevated risks of alcohol abuse (in-home RR=1.48(1.32-1.66); higher for OoHC RR=2.17(1.96-2.42)) and drug abuse (in-home RR=1.80(1.63-1.99), higher for OoHC RR=2.60(2.36-2.86)), compared with the general population.

Overall, there were some indications of increased substance use among OoHC children, although results were mixed, only two cohorts provided the data, and risk of bias is noted.

**Suicide Attempts**

Two papers using Swedish registry data examined suicide attempts, both had high risk of selection bias (Berlin, 2011; Vinnerljung, 2006). Both used a general population reference group. The studies differed somewhat in the OoHC groups studied, ages, and control variables, but overlap between the study population means they should be considered as two reports using the same data. Berlin (2011) found compared to the general population, both child welfare groups were more likely to have attempted suicide aged 20+ (in-home RR=1.66(1.42-1.95); OoHC higher at RR=2.28(1.97-2.65)).

Vinnerljung (2006) found in-home care (RR=2.1((1.9-2.7)) and OoHC (RRs=2.2(subgroup CIs=1.6-3.1;1.7-2.9;1.8-2.6)) had similarly elevated risk for suicide attempts aged 13-17, and for adult suicide attempts (19+ years) in-home care (RR=1.9(1.5-2.4)) and OoHC groups (between RR=2.0(1.5-2.7) to RR=2.3(1.8-2.8).

Overall, we found no clear evidence for better or worse suicide risk for children placed in out-of-home versus in-home care.

**Risky Sexual Behaviour and Teenage Births**

Two studies assessed teenage births and one examined risky sexual behaviours. Lee (2009) found the risk of teenage parenthood did not differ significantly when comparing OoHC with family-preservation services (HR=1.77, p=0.06) or OoHC only (HR=1.46, p=0.15) to in-home care with family-preservation services. Lee’s study had low selection bias risk. In a Swedish study with high risk of selection bias, Vinnerljung (2007) did not make direct comparisons between in-home care and OoHC groups in their analysis of teenage births (using a general population reference group). However odds ratios for in-
home and OoHC groups were generally similar: in-home (OR=2.1(1.9-2.3)), OoHC(ORs for different periods in OoHC=1.5(1.3-1.7) to 2.9(2.6-3.4)).

Fowler’s (2015) NSCAW-II study found the out-of-home group were less likely to engage in high risk sexual behaviours. Pinto similarly found early sexual initiation was higher for in-home adolescents, which they attributed to less monitoring. However this was based on the supplementary analysis (details not reported) of one item from a non-validated health risk behaviours questionnaire.

Available evidence indicates no significant differences between in-home and OoHC groups for teenage births. There is limited evidence available regarding risky sexual behaviour, with indications of worse outcomes for in-home children.

**Health Risk Behaviours**

One Portuguese study (Pinto, 2013), at high risk of selection bias, examined health risk behaviours. The study found no difference on the global measure of health risk. No questionnaire validation was reported. The questionnaire incorporated diverse health risk behaviours, and the authors note irregular tooth-brushing and early sexual initiation were higher among children at home, while self-harm and attempted suicide were higher in the OOHC group. Insufficient information was provided about this supplementary analysis.

**Running Away**

One study examined running away, measured via court petitions or shelter records, and found mixed results from two comparisons (Lee, 2009). Compared to children who received in-home care with family-preservation services, an increased risk of running away was found for children placed in OoHC only (HR=2.13, p=0.004) but not children who received OoHC and family-preservation services (HR=1.13, p=0.69). This outcome was considered high risk for detection bias, as monitoring and response to runaway behaviour may vary between groups.
Secondary Outcomes

Service use. Five NSCAW studies and one NSCAW-II study examined service use (see Table 2 Panel B). All found higher mental health service use (Horwitz, 2012; Hurlbert, 2004; Leslie, 2005; Ringeisen, 2009) or psychotropic medication use (Leslie, 2010; Raghavan, 2014) among maltreated children in OoHC compared with in-home care. Ringeisen (2009) found more special educational service use among OoHC children, although results varied by OoHC type. As all the papers are from two related cohorts, evidence is limited but suggests children in OoHC use more services, which may reflect differences in need, referral rates, or caregiver responsiveness.

Summary of Primary Outcome Results

Of 40 significance-tested comparisons at the 5% level, 29 were consistent with no evidence of benefit or harm of OoHC, 7 were consistent with harm and 4 consistent with benefit. Among the three studies with low risk of selection bias, one was consistent with harmful outcomes for the OoHC group (Doyle, 2011), one consistent with no significant differences (Berger, 2009) and one found no difference across three outcomes and inconsistent evidence of harmful outcomes for one outcome (Lee, 2009). Sensitivity analysis excluding studies with no requirement of substantiation did not change the overall findings.

Discussion

This study provides the first comprehensive and systematic review of children’s developmental health and wellbeing outcomes comparing maltreated children placed in OoHC to those remaining at home. Thirty-one studies covered 15 wellbeing outcomes, but only 3 studies had low risk of selection bias. These three studies showed no evidence of significant differences, or found worse outcomes for OoHC. The remaining studies with higher risks of selection bias mostly reported no significant associations. Some found worse outcomes for maltreated children placed in OoHC compared with in-home care, and a smaller number found benefits. These associations are likely to be confounded by selection bias favouring placement of children likely to have worse outcomes into OoHC.
The review had a number of limitations. There was a high risk of bias in the reviewed studies. Further gaps include outcomes found only in excluded studies, e.g. physical growth (King & Taitz, 1985), and many outcome areas had few studies. There were few studies outside the US, and although no language restrictions were imposed on the search, we lacked the resources to translate papers that could not be screened via an English abstract or title. Additional services beyond OoHC were seldom reported. Our review included wide inclusion criteria, and studies were heterogeneous across all aspects of design and analysis. The small number of low bias risk studies and lack of consistent subgroups precluded planned sub-group analyses by age, prior placement, number of placements or type of OoHC, all of which may affect OoHC outcomes.

As only three studies had low selection bias risk, there is a need for more rigorous research. There were no randomised controlled trials (RCTs) examining effects of OoHC versus in-home care on wellbeing outcomes. RCTs are considered the best method for ensuring intervention and comparison groups are equivalent (Higgins & Green, 2011). McDonald (1996) argued that given the weak evidence regarding outcomes, and natural variation in placement decisions depending on regional policies, caseworkers’ propensity to use OoHC, and the many children recommended for OoHC but never placed, current allocation is already somewhat random, and RCTs would be justified. A child’s safety should never be compromised for the sake of research, but a carefully designed randomised study of children already in the ‘area of uncertainty’ could provide much stronger evidence of the effectiveness of out-of-home versus in-home care, allowing better informed decision-making about placement for children in the future. However such a study would be challenging in design and execution.

Carefully designed prospective cohort studies that ascertain the study population prior to placement are also needed to compare outcomes of placement across the range of outcomes. Studies should address bias risk explicitly, especially selection bias risk through increased use of covariates to create more comparable samples, longitudinal designs, propensity matching, instrumental variables, pre-intervention baseline measures, and analysis methods that take into account individual change over time.
Even allowing for significant bias in the studies, there were mixed results for children entering OoHC after maltreatment. A systematic review of kinship care compared to foster care found children in kinship care had better outcomes in some, but not all areas (Winokur et al., 2014). Outcomes for OoHC are thus likely to vary by care-type as well as outcome area.

In our review, worse outcomes for children placed in OoHC were generally more common in studies of risky behaviours than studies measuring general functioning. These variations might support the premise that OoHC has different associations with different outcomes, or simply reflect differences in study design. Future research across domains, using consistent participant characteristics, subgroups, definitions and methods would be valuable. Interactive effects between child characteristics and placement on outcomes (McMahon, 2002) are relatively unexplored, and would allow a more nuanced understanding of placement outcomes. Measuring maltreatment recurrence in conjunction with wellbeing outcomes would also strengthen research.

Ideally, this review would have yielded results allowing definitive statements about the impact of OoHC on maltreated children’s outcomes across a range of domains. Such statements would be premature based on the current literature. Even among the highest quality studies, results were mixed. Nonetheless, the review provides a valuable overview of the state of knowledge on this topic, and highlights how few good comparative studies there are for such an important policy area. Further research addressing the methodological issues outlined above is needed before firm conclusions can be drawn.
Chapter 4 Overview of Methodology

Preamble

The following Chapters (Chapter 5 – Chapter 8) are original studies using the linked data. This Chapter outlines the general methodology used for the four data linkage studies, including the overall cohort and setting, the process of data linkage through the Data Linkage Branch, a description of the datasets, and how the data has been used for this project. Specific methods used in individual studies are outlined in the method section of each study chapter, however methodological issues and approaches that apply across the thesis are discussed in the current Chapter.
The Developmental Pathways Project

This research is part of the Developmental Pathways Project in Western Australia, an innovative collaboration between the Telethon Kids Institute, the University of Western Australia, and thirteen Government agencies. These include the Departments of Health; Education; Child Protection and Family Support; Education; the Attorney General; Communities; Corrective Services, Housing, Aboriginal Affairs, and Treasury, and the Disability Services Commission, Mental Health Commission, the School Curriculum and Standards Authority and the WA Police. The aim of the collaboration is to facilitate the use of population-level linked data across multiple Government jurisdictions to examine temporal, geographic, socioeconomic and racial differences associated with children’s different developmental outcomes and identify important risk and protective factors that can inform policy and practice. The current study is a sub-project within the Developmental Pathways Project that focusses on educational outcomes for children who have had involvement with child protection, as well as comparisons with children who have had no contact with Child Protection and Family Support.

Study Cohort and Setting

The study used a birth cohort that included all children born in Western Australia from 1990 to the end of 2009. The study used linked data from the Western Australian Department of Education, Child Protection and Family Support, Department of Health, and the Disability Services Commission, supplemented by Births and Deaths Registrations from the Department of the Attorney General.

Western Australia is a large State occupying the western third of Australia. Much of its area is sparsely populated, and includes some very remote areas. Most of the 2.5 million population resides in the city of Perth and surrounding areas along the west coast. The geography of the State creates challenges in providing health, education and social services to more distant regions and remote communities. It is also likely to be a contributor to the limited levels of migration out of the State, which at around 2.6% is low compared to typical migration out of other areas (Clark, Preen, Ng, Semmens, & Holman, 2010). A relatively stable population is beneficial for data linkage projects as it means reduced loss to follow-up.
Data Linkage

Data linkage involves joining together records from different sources that relate to the same person or family (Holman et al., 2008). It has been used in Western Australia for health research since the 1970s, and has been used extensively since that time. In 1995, the Data Linkage Branch was established within the Department of Health to provide a dedicated data linkage service. The core data sets for linkage include the Hospital Morbidity Data System, Death Registrations, Mental Health Information System, Cancer Registry, Midwives Notification System, Birth Registrations and the Electoral Roll. Additional datasets from various Government agencies or surveys have been linked for individual projects.

The Data Linkage Branch uses probabilistic matching to link records based on identifying information such as surname, first name, date of birth, gender and address. The probability of records being a match is assessed, taking into account common variations in spelling. Clerical review is then used to check matches that are not clearly a match or non-match. An assessment of the linkage quality after clerical review in one project estimated linkage error rates of approximately 0.1% (Holman, Bass, Rouse, & Hobbs, 1999).

An important feature of the data linkage process is the protocols in places to ensure individual privacy and confidentiality is maintained. Data custodians from each agency provide only the identifying information to the Data Linkage Branch: Linkage officers do not view clinical or other sensitive information from individuals’ records. The data linkage process results in a linkage key assigned to each individual in the datasets. De-identified data such as health records can then be provided to the researcher with the linkage key to allow merging of records from different datasets. This process protects individual privacy, one of the main ethical concerns in data linkage research. Projects are also required to obtain approval from the Department of Health WA Human Research Ethics Committee.

The usual requirement of individual consent is waived by the ethics committee for such data linkage studies where appropriate. The grounds for waiver in this study include that
it would be impracticable to seek consent from approximately half a million children and parents; that the privacy protocols in place sufficiently address likely concerns about using or linking personal information; that using linked data improves the validity of the study by utilising the whole population; that participants are not contacted or exposed to potentially distressing questions; and that the study has potential benefits for current and future children involved in the child protection system. The current data linkage approach has had unexpected ethical benefits such as the reduction in the proportion of research studies in Western Australia that require identifying information, and the protection of privacy for people who would have consented to participate in a study requiring identifying information as well as those who would not have (Holman et al., 2008).

Datasets by Agency

The study included datasets from a range of Government agencies. The datasets from each agency are outlined below.

Department of Health

Midwives Notification System

The Midwives Notification System contains records of all births in Western Australia, including live births and stillbirths of babies weighing over 400 grams and at least 20 weeks gestation. It includes demographic details of the mother, and details of the pregnancy, birth and infant characteristics, medical conditions and complications of pregnancy or birth. This collection has been in place since 1980.

This dataset is the primary source of demographic information on the child and parents in the current study, as well as information on birth weight and gestational age.

Hospital Morbidity Data

The Hospital Morbidity Data collection contains records of all hospital admissions. Records contain demographic information, and diagnostic codes based on the International Classification of Diseases (ICD) developed by the World Health
Organisation. The ICD-8 was used until 1978. From 1979 to June 1999 the ICD-9 was used. ICD-10AM (Australian Modification) has been used since July 1999.

**Mental Health Information System**

The Mental Health Information System collects data on people who are admitted to public or private hospital mental health services or attend public services. This information has been collected since 1966. Like the Hospital Morbidity Data, the Mental Health Information System uses ICD diagnostic codes.

The Hospital Morbidity Data and Mental Health Information System provide information on parent hospital contacts for mental health, substance-related issues and assault-related injuries in the present study.

**Department of the Attorney General**

**Birth Registrations**

All births in Western Australia must be registered within 60 days. Birth registration data includes information on the parents’ age, occupation, country of birth, marital status and number of previous children. Records are available from 1980 onwards.

Birth registrations data is used in the current study to supplement demographic information from the Midwives Notification System.

**Death Registrations**

All deaths are required to be registered within 14 days. This legal requirement is usually undertaken by the funeral director. This dataset contains information on all individuals who have died in Western Australia and their cause of death.

This study used death registrations data to exclude children whose death prior to the outcome measures made them ineligible for inclusion in the research.
Intellectual Disabilities Exploring Answers (IDEA)

The IDEA database is a population database of children diagnosed with intellectual disabilities in Western Australia. Children are included on the database if they have an IQ below 70 or observable developmental disability. Information for this database comes from the Disabilities Services Commission and the Department of Education.

From this database intellectual disabilities were identified for the current study. Intellectual disability was coded as a binary variable indicating the presence or absence of a diagnosed intellectual disability.

Western Australian Register of Developmental Anomalies (WARDA)

The WARDA database is the amalgamation of two data collections that commenced in 1980. The Birth Defects Register contains information on children born with a birth defect, which could be diagnosed any time up to the age of six. The Cerebral Palsy Register contains information on children diagnosed with cerebral palsy by five years of age.

The present study identified children who were recorded on WARDA as having a birth anomaly (including birth defects or cerebral palsy).

Child Protection and Family Support

The Child Protection and Family Support datasets historically include records of child maltreatment allegations, investigations, substantiations of maltreatment, periods of out-of-home care and placement data related to out-of-home care. This data is available from 1990. The initial extraction for this project provided data up to 2010, however some additional data was provided in 2015 covering the period up to the end of 2013 to allow inclusion of children with more recent child protection involvement in the later Chapters.

There have been several changes in the recording of data over this time. The most important regard the classification and terminology surrounding maltreatment allegations. In the early data, child concern reports were differentiated from child maltreatment allegations, reflecting a focus on diverting families to a family support
response via a child concern report rather than always using a more forensic child protection response (Bilson, Cant, Harries, & Thorpe, 2015). Only child maltreatment allegations (reported concerns that a child is being abused, neglected or harmed) are considered to be child protection notifications in national reporting (AIHW, 2015a). After a child concern report was made, further information that led Department staff to have concerns regarding harm to the child could result in the case being reclassified and an investigation of possible maltreatment conducted.

In March 2006, the child maltreatment allegation and child concern report categories were replaced with a single category: concern for child’s wellbeing. Records of concern for child’s wellbeing where the decision has been made to conduct an investigation are comparable to a child maltreatment allegation, and recoded as allegations in the current project. Further changes to the database took place in 2010, and children with a safety and wellbeing assessment are considered equivalent to children with an investigation of maltreatment.

Within the placements data, two variables (placement type and relationship) contribute to the definition of out-of-home care placement type used in the study. In keeping with Departmental use of the data, we included in the category of kinship care children who were placed in foster care with family friends or neighbours as well as those placed with relatives.

Numerous variables from these datasets were used in this project, and specific variables are outlined in individual Chapters.

Department of Education and School Curriculum and Standards Authority Data

State and national achievement test data were held by the Department of Education up to 2010, after which they have been held by the School Curriculum and Standards Authority.

Western Australian Numeracy and Literacy Assessments (WALNA)

The WALNA was used from 1999 to 2007, and was developed to assess students’ literacy and numeracy state-wide. Assessments were undertaken in Years 3, 5, and 7. Demographics of the child, parents and school were also recorded. Assessments were
compulsory within public schools, whereas parents of children from private schools had to provide permission for their children to participate. National benchmarks were set, reflecting agreed standards of performance that professional educators throughout Australia consider represent the minimum levels required for students to make adequate progress in their schooling across nationally established levels.

**National Assessment Program – Literacy and Numeracy (NAPLAN)**

NAPLAN, a national assessment, replaced the WALNA in 2008. Similar to the WALNA, children are assessed across areas of literacy and numeracy in Years 3, 5, 7 and 9. Standardised scores are recorded, and benchmarks known as the National Minimum Standards for each year level have been set by the Ministerial Council for Education, Early Childhood Development and Youth Affairs. Methodological details for the NAPLAN tests are publicly available in a technical report (ACARA, 2015b). In addition to information on test participation and scores, demographic information is collected, including parents’ self-reported highest level of education.

Children’s test scores were the main information obtained from the WALNA and NAPLAN tests. Parents’ education level was also used in some studies, but was only available from 2008-2012.

**Attendance and Suspension Records**

This dataset includes attendance data recorded by the Department of Education for the first semester of each year. The Department collects information regarding total absences, authorised and unauthorised absences, and days enrolled for each school attended by each child. Information on suspensions is also recorded for each child for each school year.

**Data Availability for Each Study**

The timing of data delivery varied across the datasets, and in some cases re-extraction was required, or additional data was made available. Consequently, some data were included in the later Chapters of this thesis that were not available at the time the first analyses were conducted.
Data Analysis

Statistical techniques used in this thesis include logistic regression, linear regression, and multilevel modelling. Propensity score matching was used in Chapter 8 to create more similar comparison groups prior to undertaking linear and logistic regression analyses.

Logistic regression was selected as the preferred model for many of the analyses throughout this thesis, with reading scores dichotomised into low (bottom decile) versus non-low, school attendance dichotomised into high absence (>20% of enrolled days absent) versus non-high, and suspensions grouped as any suspensions versus no suspensions. Dichotomising the data has a number of practical advantages, including a focus on groups of concern to Government such as students with very low achievement, and ease of communication of results to policymakers via the odds ratios. The cut-point for low reading score was similar to the percentages of students not meeting benchmarks in the WA Literacy and Numeracy Assessment or National Minimum Standards in the National Assessment Program Literacy and Numeracy tests (which varies a small amount annually). Students not meeting benchmarks/minimum standards are likely to have difficulty progressing satisfactorily through school without targeted intervention and support (ACARA, 2015a). The cut point for school absence was aligned with the border between ‘indicated’ and ‘moderate’ educational risk described in Hancock et al. (2014). As most students are never suspended, and suspensions are typically indicative of a serious behavioural issue, having any suspension was used to divide the suspensions data.

Despite the practical advantages of this approach, dichotomising a continuous variable has the potential to adversely affect the analysis, most commonly via reduced power to detect statistically significant differences (DeCoster, Iselin, & Gallucci, 2009). To address this risk, linear regressions were conducted that were equivalent to the logistic regressions, using continuous variable versions of reading (z-scores), attendance (percentage of enrolled days absent) and suspensions (number of suspensions). Most of the results were substantively the same or similar, and where differences were found these are noted in Appendix 7.

The results from each study are presented in table or graph form throughout the thesis. Logistic regression results are presented using odds ratios (ORs) and 95% confidence
intervals (CIs) (Tabachnick & Fidell, 2001). Where the confidence interval does not include ‘1’, the result can be considered statistically significantly different from the reference level. A $p$ value of $>.05$ is used to determine statistical significance throughout the thesis.

In identifying risk factors, it is important to consider not only statistical significance but effect size. Analyses with large sample sizes have the potential to detect statistically significant results with very small effect size. Effect sizes such as the odds ratio should therefore also be considered in determining the importance of a risk factor as they are not affected by the large sample sizes, and by showing the magnitude of the effect are more informative about the practical significance of a finding (American Psychological Association, 2009; Cumming, 2013; Ellis, 2014).

Except where otherwise specified, main effects models were used. Most of the comparable research literature in this field has used main effects models. Main effects models therefore offer the advantage of both providing comparable results, and avoiding the inclusion of a large number of interaction terms that do not have an empirical or theoretical basis. As the statistical models include a large number of covariates, main effects models also improve parsimony and reduce the risk of type I errors or overfitting the model. In the multilevel model in Chapter 7, an interaction term of socio-economic disadvantage and time was included because previous research indicates socio-economic status results in increasing achievement gaps over time. Such a general approach of only including interactions with some prior evidence of likely importance has been recommended by Harrell (2001, pp36-38) and Cox and Donnelly (Principles of Applied Statistics. Cambridge, 2011, pp 171-177).

**Ethics**

The study has ethics approval from the Western Australian Department of Health Human Research Ethics Committee (#2012/37), and the Western Australian Aboriginal Health Ethics Committee (#458). The University of Western Australia has granted recognition of ethics approval from another human research ethics committee (RA/4/1/5952).
Chapter 5 Pre-existing Adversity, Level of Child Protection Involvement, and School Attendance Predict Educational Outcomes in a Longitudinal Study

Preamble

This Chapter is the first of the studies using the linked data. The study focusses on early reading achievement, measured at Year 3 of schooling. Few studies with have been conducted that include large samples and co-existing risk factors, and these have raised questions about the relationship between maltreatment and educational achievement, such as whether outcomes vary across subgroups of maltreated children, and whether adverse outcomes are actually due to other adversities rather than maltreatment. The aim of the study is to identify the prevalence of low reading achievement for children with different levels of child protection involvement, and examine the influences on early reading achievement. Potential influences include maltreatment, pre-existing adversity (child, family and neighbourhood risk factors), level of child protection system involvement, and school attendance.
Abstract

Maltreatment largely occurs in a multiple-risk context. The few large studies adjusting for confounding factors have raised doubts about whether low educational achievement results from maltreatment or co-occurring risk factors. This study examined prevalence, risk and protective factors for low educational achievement among children involved with the child protection system compared to other children. We conducted a population-based record-linkage study of children born in Western Australia who sat national Year 3 reading achievement tests between 2008-2010 (N=46,838). The longitudinal study linked data from the Western Australian Department of Education, Department of Child Protection and Family Support, Department of Health, and the Disability Services Commission. Children with histories of child protection involvement (unsubstantiated maltreatment reports, substantiations or out-of-home care placement) were at three-fold increased risk of low reading scores. Adjusting for socio-demographic adversity partially attenuated the increased risk, however risk remained elevated overall and for substantiated (OR=1.68) and unsubstantiated maltreatment (OR=1.55). Risk of low reading scores in the out-of-home care group was fully attenuated after adjusting for socio-demographic adversity (OR=1.16). Attendance was significantly higher in the out-of-home care group and served a protective role. Neglect, sexual abuse, and physical abuse were associated with low reading scores. Pre-existing adversity was also significantly associated with achievement. Results support policies and practices to engage children and families in regular school attendance, and highlight a need for further strategies to prevent maltreatment and disadvantage from restricting children’s opportunities for success.
Introduction

There is a sizeable body of research investigating the link between child maltreatment and adverse educational outcomes. Children who have experienced abuse or neglect are at increased risk of lower levels of cognitive functioning, language development, achievement in reading and maths, grades, and school attendance, suspensions and decreased personal expectations of attending college (Eigsti & Cicchetti, 2004; Lansford et al., 2002; Leiter, 2007; Rowe & Eckenrode, 1999; Stone, 2007). Maltreated children are also less likely to finish high school and gain university qualifications, which in turn leads to unemployment and lower incomes (Mersky & Topitzes, 2010). However, as capacity has increased for larger studies that address a greater number of confounding factors, questions have been raised regarding whether such outcomes are attributable to maltreatment, or are a result of co-occurring risk factors (Boden et al., 2007). Given that millions of children around the world have experienced abuse or neglect (Sethi et al., 2013), it is important to understand the prevalence and risk of low educational achievement among maltreated children and to inform prevention and intervention strategies.

Maltreatment is both an adverse outcome resulting from a constellation of risk factors as well as an independent risk factor for other adverse child outcomes. Risk factors associated with maltreatment include parents being young or single, with low educational achievement and low socio-economic status, lack of social support, maternal smoking during pregnancy, substance use, or mental health problems (Sethi et al., 2013). A Western Australian cohort study found risk factors for substantiated child maltreatment include parental hospital admissions related to mental health, substance abuse and assault, along with social disadvantage and younger parental age. Children who were Aboriginal, and children with disabilities were at increased risk for substantiated maltreatment (O’Donnell et al., 2010).

Many of the same or similar factors are associated with low educational achievement, including low gestational age and birthweight, low maternal education, young parenthood, disadvantaged minority status, low SES, single parent status or changes in family structure, rigid parenting beliefs, negative parent-child interaction style, substance
abuse, stressful life events, mental health problems, and domestic violence (Bradley, 2002; Fergusson et al., 2008; Gutman et al., 2003; Kitzmann, Gaylord, Holt, & Kenny, 2003; Kolar, Brown, Haertzen, & Michaelson, 1994; Malacova et al., 2008; Moore et al., 2014).

Many studies of maltreated children have had to rely on small or highly selected samples, use of cross-sectional data, data from a single source (such as welfare records or survey data), with limited access to comparison groups and data on the broader range of risk factors affecting the child and their family. The use of linked administrative data is increasingly becoming recognised as a valuable tool in understanding the effects of maltreatment in a multiple-risk context (Fantuzzo et al., 2011).

Very few population level linked record studies (Fantuzzo et al., 2011; Rouse & Fantuzzo, 2009) and large surveys (Boden et al., 2007) have been conducted examining the relationship between maltreatment and low educational achievement. These studies have found mixed results regarding the impact of maltreatment on educational achievement after taking into account co-occurring risk factors, raising questions about the widely-held belief that maltreatment causes poor educational outcomes. In particular, Boden et al., 2007 in a longitudinal survey of 1,265 New Zealand children found that after controlling for confounding social, parent and child factors, the associations between child physical and sexual abuse and educational achievement (high school and tertiary qualifications) became non-significant. They concluded that social, family and individual context, rather than the child’s maltreatment experiences were responsible for later educational outcomes. Conversely, Fantuzzo and colleagues found maltreatment was the strongest risk factor (adjusted OR = 1.6) for low educational achievement in second grade students, measured by the California Achievement Tests (Rouse & Fantuzzo, 2009). Subsequent analysis showed results were only significant for some subgroups of maltreated children (Fantuzzo et al., 2011). Both studies used sound measures of educational achievement (standardised tests or attainment of qualifications) and controlled for additional risk factors, although Boden et al., 2007 controlled for many more risk factors than Rouse and Fantuzzo (2009). The conflicting and mixed results point to a need for further research to clarify the relationship between maltreatment and
educational outcomes, taking into account pre-existing adversity and possible subgroup variations.

In addition, the influence of school attendance on educational achievement in child protection populations has not been studied widely. Within the general population, regular school attendance is associated with academic achievement (Hancock et al., 2014). Reduced attendance has been found among child protection groups, especially neglected children (Fantuzzo et al., 2011). School attendance is therefore an important factor to include in relation to educational achievement with clear policy implications.

**Level of Child Protection Involvement**

Although maltreated children are often treated as a homogenous group in research, it is also recognised that outcomes are likely to differ across subgroups. First, results may differ for children with unsubstantiated maltreatment reports and substantiated maltreatment. Fantuzzo et al., (2011) found that the most consistent findings for poor educational outcomes were associated with unsubstantiated maltreatment reports prior to kindergarten, which may be an indicator of chronic adverse conditions.

In addition, after substantiation some children are placed in out-of-home care while others remain at home. Although children placed in out-of-home care are generally considered to be at particularly high risk for poor educational outcomes (Trout et al., 2008), the limited available evidence from studies that control for co-occurring risk factors suggests out-of-home care may have positive effects on academic engagement (Font & Maguire-Jack, 2013), and no significant effect on educational achievement (Fantuzzo et al., 2011; Font & Maguire-Jack, 2013). However, as there are few large-scale studies that address co-occurring risk factors, and the study by Font and Maguire-Jack relies on children’s self-reports of academic achievement, further examination of whether maltreated children’s educational outcomes are similar for children who have and have not experienced out-of-home care is warranted.
**Type of Maltreatment**

Educational outcomes may also vary depending on the type of maltreatment the child experienced. Reviews have suggested that neglect may be more strongly associated with academic difficulties, whereas physical abuse may be more strongly associated with behavioural problems (Stone, 2007; Trocmé & Caunce, 1995). Fantuzzo and colleagues (2011) found poor educational achievement was associated with neglect, but not physical abuse. Sexual and emotional abuse were not included. None of the larger-scale studies examined all four types of maltreatment, and none assessed the relationship between emotional abuse and educational achievement.

In summary, although it is clear that children who have been maltreated are at increased risk for poor educational outcomes, larger studies that control for social and demographic risk factors have cast doubt over the relationship once confounding variables are controlled for. In addition, there are gaps regarding potential differences in outcomes for children with different levels of contact with the child protection system, and different maltreatment types, especially emotional abuse. The role of school attendance in this vulnerable population also requires examination.

The current study has three aims. First, to identify the prevalence of low educational achievement among children with different levels of contact with the child protection system. Second, to examine risk and protective factors for low educational achievement, including maltreatment, level of contact with the child protection system, type of maltreatment, attendance, and child, parent and neighbourhood factors. Third, to assess whether maltreatment remains a significant risk factor for low educational achievement after controlling for multiple risk factors.

**Method**

**Procedure**

We conducted a population based cohort study using linked records from administrative datasets. Data linkage was undertaken by the WA Data Linkage Branch within the Department of Health, following strict procedures to preserve privacy and maximise
quality of the record linkage (Kelman, Bass, & Holman, 2002). De-identified datasets with a unique identification number for each individual were provided to the researchers.

**Participants**

The initial cohort was all children born in Western Australia who were enrolled in Year 3 and potentially eligible to sit the National Assessment Literacy and Numeracy (NAPLAN) reading test between 2008 and 2010 (N=66,098). The study included only the 70.9% of students with attendance data available (N=46,838), which excluded private school students. Half the children were male, and 10.4% were Aboriginal. The average age at the Year 3 test was 8 years and 5 months. In total, reading outcome data were available for 44,539 students (95.1%). Exemptions from the NAPLAN tests are made in certain cases, such as children with severe disabilities or recent migrants from non-English speaking backgrounds. Parents can also withdraw their children from the tests, and some children are absent from school on the day of the test.

**Measures**

*Child Characteristics*

From the Midwives Notification System and Births Registrations we obtained information on gender, Aboriginality, date of birth (used to calculate age in months at the time of Year 3 tests), preterm births (<37 weeks gestation), and birthweight. Birthweight percentile for gestational age was calculated separately for boys and girls using percentile reference levels for singletons born 1990-1994 (Roberts & Lancaster, 1999a), multiples born 1990-1994 (Roberts & Lancaster, 1999b), and children born after 1995 (Dobbins, Sullivan, Roberts, & Simpson, 2013). Children in the lowest 10% were classified low birthweight for gestational age.

*Disability.* Information on children’s disability status was obtained from the Intellectual Disabilities Exploring Answers (IDEA) database and Western Australian Register of Developmental Anomalies (WARDA). IDEA is a population-based database on individuals with disabilities, using information provided by the Disability Services Commission and the Department of Education. WARDA contains information on birth
anomalies for diagnoses made any time from conception to six years of age. Children with a record in the IDEA or WARDA datasets were classified as having one or both of the following disability types: 1) intellectual disabilities, or 2) birth anomalies.

**Child Protection Involvement**

The Department for Child Protection and Family Support provided information on child maltreatment allegations (reports to the Department of suspected abuse or neglect), substantiations of maltreatment and out-of-home care. All coding was based on the child’s records from birth until the time of their Year 3 NAPLAN test. For the main analysis, children were coded as having a maltreatment allegation if they had any recorded allegation. For the secondary analysis children were categorised based on their highest level of child protection contact (none, unsubstantiated allegation, substantiation with no out-of-home care, or had substantiated maltreatment and ever entered out-of-home care). Maltreatment type was based on the presence or absence of an allegation of each of the four types of maltreatment (physical, sexual and emotional abuse, and neglect) within the child’s records. Children therefore may have more than one type of maltreatment recorded, although only one maltreatment type is recorded per allegation.

**School Attendance**

Attendance data was provided by the Department of Education for the first semester of each year. Attendance was calculated as the percentage of days attended from the potential days enrolled during the first semester of Year 3. For students that changed schools, attendance days and enrolment days were summed across two or more schools.

**Parent Characteristics**

From the Midwives and Births data, we obtained maternal and paternal age and marital status at the child’s birth, and maternal smoking during pregnancy.

**Parent education.** Self-reported information on both parents’ highest completed level of education was provided by the WA Department of Education. We coded the highest level of completed education for either parent as 1) Year 11 or less, 2) Year 12 (the final year of secondary schooling in Western Australia), Advanced certificate, or Diploma, 3)
University Degree, or 0) missing data. Missing parent education data was relatively common overall (31%), and higher among the child protection groups (48%-56% of children).

**Maternal and paternal psychosocial risk factors.** Parents’ mental health information includes public and private in-patient admissions and public out-patient admission obtained from two sources: the Mental Health Information System and the Hospital Morbidity Data System. International Classification of Disease codes from ICD8, ICD9 and ICD10 provide diagnostic information in both data sources. Mental health contacts by mothers included a mental health diagnosis across major diagnostic categories (such as depression, anxiety disorder, schizophrenia, bipolar disorder but excluding substance-related diagnoses) prior to the child’s NAPLAN test. Parents’ substance-related admissions were included where ICD codes indicated an alcohol or drug related contact.

Maternal and paternal assault related admissions included any hospital admission for an assault related injury inflicted on the parent (ICD-9: E960-E969, ICD-10: X85-Y09) that occurred any time before the child’s NAPLAN test.

**Community Characteristics**

Community variables from the Australian Bureau of Statistics were included to account for socio-economic differences (ABS, 2008) and disparities by level of remoteness (Department of Health and Aged Care, 2001). The Socio Economic Indices for Area (SEIFA) is a neighbourhood level measure of relative social disadvantage based on place of residence at the time of the child’s birth. SEIFA scores for areas are based on the national population census which is conducted every five years. SEIFA was grouped into five categories, from least disadvantaged (1) to most disadvantaged (5), plus missing. The Accessibility/Remoteness Index of Australia (ARIA) is also grouped into five categories from least remote (1) to most remote (5) and indicates the accessibility of the area in which the family lives at the time of the child’s birth. Community data by collection district (approximately 400 households) was available for 91% of children. Missing SEIFA and ARIA were filled using a less precise version of the variables - more recent
data from larger geographical areas (postcodes), for cases missing collection district level information.

**Outcome Variable - Low Reading Achievement**

The National Assessment Program – Literacy and Numeracy (NAPLAN) was introduced in 2008, and is sat by all Australian Year 3 students in May of each year. Children were categorised as having low reading achievement if they scored in the lowest 10% of students within their test year on the NAPLAN reading test.

**Data Analysis**

In addition to descriptive analysis, the risk of low reading achievement for children with a maltreatment allegation, adjusted for confounding individual, parental and neighbourhood factors was examined using a multivariate logistic regression analyses. Supplementary multivariate logistic regression analyses were conducted using a) level of child protection involvement to assess differences between these subgroups and b) maltreatment type.

Our analysis was undertaken in three steps. First, we conducted univariate logistic regression to estimate the association between each predictor variable and the outcome variable. Second, we conducted each of the multivariate logistic regression analyses described above with child, parent and community risk factors included as covariates. Third we added school attendance to each of the multivariate models. Where adding attendance substantively changed the results, both are presented, otherwise only the univariate and final multivariate model results are presented. Paternal age was excluded from the models because it is closely correlated with maternal age. Results are presented using odds ratios (ORs) and 95% confidence intervals (CIs) (Tabachnick & Fidell, 2001). The data were analysed using SPSS version 22 software.

A ‘missing’ category was created for parent education (Cooper, McNamara, de Klerk, Davis, & Jones, 2014). Sensitivity analysis was conducted in order to assess the impact of missing data on results. For the sensitivity analysis, parent education was imputed using multiple imputation with 25 imputed datasets in SPSS (Graham, Olchowski, &
Gilreath, 2007; Takahashi & Takayuki, 2013). Additional sensitivity analyses included using the full 2008-2012 dataset which had a larger sample but less complete ascertainment of child protection events, and using ‘missing’ data categories for SEIFA and ARIA.

Children’s age in months had a positive linear effect however children who were sufficiently old to fall outside the typical range for Year 3 tests (most likely children who had been retained) scored markedly worse. An indicator variable was added to the model to account for these children.

**Ethics**

Ethics approval for the study was granted by the University of WA Human Research Ethics Committee, the Department of Health Human Research Ethics Committee, and the WA Aboriginal Human Information and Ethics Committee.

**Results**

**Descriptive Statistics**

Of the 46,838 children in the sample 2,716 (5.8%) had been the subject of a maltreatment allegation. Of these 1,343 had unsubstantiated allegations, 622 had substantiated maltreatment and remained at home, and 751 had substantiated maltreatment and entered out-of-home care at least once (Table 4). The prevalence of low reading achievement in the maltreatment allegation group was 30.2% compared to 11.4% of children with no allegations. Children with maltreatment allegations were over-represented in the low reading achievement group (13.2% of low scorers vs. 4.3% of children scoring above the bottom decile). Across different levels of child protection involvement, low reading achievement scores were obtained by 28.9% of children with unsubstantiated allegations only, 32.1% of children with a substantiation, and 31.1% of children who had entered out-of-home care.

The characteristics of the study population, including prevalence of risk factors is shown in Table 4. Almost all of the individual, parental and neighbourhood risk factors were more common among children with maltreatment allegations, and many had increased
frequency among children with higher levels of involvement with the child protection system. In total 22.3% of children without an allegation were from the most socially disadvantaged areas, compared to 42.7% of children with unsubstantiated allegations, 46.7% of those with substantiated allegations, and 50.0% of those who had entered out-of-home care. Maternal mental health contact was especially common among children who had entered out-of-home care: 62.3%, compared to 15.4% of children with no allegations, 38.7% of those with unsubstantiated allegations and 38.3% of those with substantiated allegations. A high proportion of children with child protection involvement had missing education data for both parents (from 48.0% to 56.5%). Almost half (43.5%) of the children who had entered out-of-home care were Aboriginal, although Aboriginal children only comprised 10.4% of the study population.

Intellectual disabilities were most common among children who entered out-of-home care (8.4%). As children with intellectual disabilities can be exempted from the test, we examined participation rates and found a higher percentage of children with an intellectual disability participated in the reading test among the children with a substantiation (55.2%) than among children with other types of child protection contact (ranging from 44.3%-46.0%).

For non-Aboriginal children school absence was highest among children with substantiated maltreatment who never entered out-of-home care, (absent for 10.0% of enrolled days), followed by unsubstantiated cases (9.2% days absent), children who had entered out-of-home care (8.0% days absent) and lowest for children with no allegations (6.6% days absent). For Aboriginal children school absence levels were higher, at 26.9% among children with substantiated maltreatment who never entered out-of-home care, 25.4% among children with unsubstantiated allegations, and 18.9% among children with no allegations. School absences were lowest among children who had entered out-of-home care (15.7%).
Table 4. Characteristics of study population by level of child protection involvement
Characteristic
Age months (Mean)
Gender
Female
Male
Aboriginality
Aboriginal
Non-Aboriginal
Intellectual disability
Birth anomaly
Preterm
Low birthweight
Maternal smoking
Parent education
Up to Yr11
Yr12/certificate/diploma
University degree
Missing
Marital Status
Married/defacto
Not married/Unknown
Maternal age
<20
20-29
30+
Maternal substance use
Maternal assault
Maternal mental health
Paternal substance use
Paternal assault
Paternal mental health
Social disadvantage
Most disadvantaged
2
3
4
Least disadvantaged
Remoteness
Least remote
2
3
4
Most remote
Attendance (% absent)
0-5%
>5-10%
>10-15%
>15-25%
>25%
Low reading score
Any physical CMA
Any sexual CMA
Any emotional CMA
Any neglect CMA

No
Allegations
(n = 44,122)
8yr5 months

Unsubstantiated

Substantiated

OOHC

Total

(n = 1,343)
8yr5 months

(n = 622)
8yr5 months

(n = 751)
8yr5 months

(n = 46,838)
8yr5 months

21,506
22,616

48.7%
51.3%

695
648

51.7%
48.3%

316
306

50.8%
49.2%

349
402

46.5%
53.5%

22,866
23,972

48.8%
51.2%

3,870
40,252
804
2,701
3,197
4,447
10,554

8.8%
91.2%
1.8%
6.1%
7.2%
10.1%
23.9%

432
911
61
72
168
213
722

32.2%
67.8%
4.5%
5.4%
12.5%
15.9%
53.8%

232
390
29
39
72
118
359

37.3%
62.7%
4.7%
6.3%
11.6%
19.0%
57.7%

327
424
63
68
128
175
473

43.5%
56.5%
8.4%
9.1%
17.1%
23.3%
63.1%

4,861
41,977
957
2,880
3,565
4,953
12,108

10.4%
89.6%
2.0%
6.1%
7.6%
10.6%
25.9%

5,398
17,412
8,245
13,067

12.2%
39.5%
18.7%
29.6%

324
314
61
644

24.1%
23.4%
4.5%
48.0%

147
129
23
323

23.6%
20.7%
3.7%
51.9%

163
136
28
424

21.7%
18.1%
3.7%
56.5%

6,032
17,991
8,357
14,458

12.9%
38.4%
17.8%
30.9%

39,328
4,794

89.1%
10.9%

938
405

69.8%
30.2%

434
188

69.8%
30.2%

438
313

58.3%
41.7%

41,138
5,700

87.8%
12.2%

2,945
21,695
19,482
2,872
1,150
6,784
3,489
2,125
3,486

6.7%
49.2%
44.2%
6.5%
2.6%
15.4%
7.9%
4.8%
7.9%

225
772
346
387
246
520
288
205
227

16.8%
57.5%
25.8%
28.8%
18.3%
38.7%
21.4%
15.3%
16.9%

102
387
133
230
160
238
143
95
101

16.4%
62.2%
21.4%
37.0%
25.7%
38.3%
23.0%
15.3%
16.2%

156
419
176
484
290
468
249
152
160

20.8%
55.8%
23.4%
64.4%
38.6%
62.3%
33.2%
20.2%
21.3%

3,428
23,273
20,137
3,973
1,846
8,010
4,169
2,577
3,974

7.3%
49.7%
43.0%
8.5%
3.9%
17.1%
8.9%
5.5%
8.5%

9,804
9,379
8,858
8,167
7,781

22.3%
21.3%
20.1%
18.6%
17.7%

571
323
210
151
83

42.7%
24.1%
15.7%
11.3%
6.2%

289
137
95
62
36

46.7%
22.1%
15.3%
10.0%
5.8%

373
190
117
42
24

50.0%
25.5%
15.7%
5.6%
3.2%

11,037
10,029
9,280
8,422
7,924

23.6%
21.5%
19.9%
18.0%
17.0%

29,273
5,034
5,499
3,050
1,240

66.4%
11.4%
12.5%
6.9%
2.8%

739
214
175
122
92

55.1%
15.9%
13.0%
9.1%
6.9%

355
67
86
62
52

57.1%
10.8%
13.8%
10.0%
8.4%

482
83
77
68
39

64.4%
11.1%
10.3%
9.1%
5.2%

30,849
5,398
5,837
3,302
1,423

65.9%
11.5%
12.5%
7.1%
3.0%

22,598
11,676
4,828
3,045
1,975
4,785
-

51.2%
26.5%
10.9%
6.9%
4.5%
11.4%
-

435
307
184
178
239
347
430
541
206
373

32.4%
22.9%
13.7%
13.3%
17.8%
28.9%
32.0%
40.3%
15.3%
27.8%

186
141
65
108
122
174
242
215
141
261

29.9%
22.7%
10.5%
17.4%
19.6%
32.1%
38.9%
34.6%
22.7%
42.0%

318
160
89
94
90
204
333
155
229
535

42.3%
21.3%
11.9%
12.5%
12.0%
31.1%
44.3%
20.6%
30.5%
71.2%

23,537
12,284
5,166
3,425
2,426
5,510
1,005
911
576
1,169

50.3%
26.2%
11.0%
7.3%
5.2%
12.4%
2.1%
1.9%
1.2%
2.5%

90


Logistic Regression Analysis of Risk

Table 5 shows the odds ratios for the risk of low reading achievement. Children with a maltreatment allegation remained at significantly elevated risk of low reading achievement after adjusting for other risk factors compared to children without an allegation (OR=1.46, 95% CI [1.31,1.63]).

With the exception of paternal substance-related contacts, paternal assaults and birth anomalies, all of the risk factors were significantly associated with reading scores in both the univariate and fully adjusted models. Paternal assaults were significant in a number of the sensitivity analyses but not in the main analysis. The highest odds ratios were for intellectual disability (OR=5.19, 95% CI [4.22,6.39]), low parental education especially where both parents’ education is less than Year 12 (OR=3.71, 95% CI [3.19,4.31]) or missing (OR=3.30, 95% CI [2.86,3.79]), being older than typical (OR=2.67, 95% CI [2.09,3.40]), poor attendance (OR=2.37, 95% CI [2.08,2.69]), living in the most socially disadvantaged areas (OR=2.17, 95% CI [1.91,2.46]) and being Aboriginal (OR=2.00, 95% CI [1.82,2.19]). To ensure that the results are not biased by the inclusion of unsubstantiated maltreatment reports, we also ran the analysis limiting maltreatment to substantiations rather than allegations. As results were similar, indicating a significantly elevated risk for low reading scores (OR=1.36, 95% CI [1.17, 1.57]) associated with substantiated maltreatment, we continued the analysis based on maltreatment allegations.

Multivariate logistic regression analyses were also undertaken using the four types of maltreatment (Table 6). The same risk factors were controlled for (odds ratios for these risk factors remained almost the same so are not presented again). Logistic regression analysis examining all four types of maltreatment allegations found that after adjusting for other risk factors, elevated risk was associated with allegations of sexual abuse (OR=1.53, 95% CI [1.29,1.82]), neglect (OR=1.52, 95% CI [1.30, 1.77]) and physical abuse (1.26, 95% CI [1.07, 1.49]). Emotional abuse was associated with threefold increased risk in the univariate analysis, but this effect was attenuated and non-significant in the adjusted model (OR 1.18, 95% CI [0.95-1.47].
### Table 5. Logistic regression: Odds of low reading scores for children with or without maltreatment allegations

<table>
<thead>
<tr>
<th></th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age in months</strong></td>
<td>0.96* (0.95, 0.97)</td>
<td>0.94* (0.94, 0.95)</td>
</tr>
<tr>
<td>Higher than typical age</td>
<td>2.21* (1.80, 2.70)</td>
<td>2.67* (2.09, 3.40)</td>
</tr>
<tr>
<td>Young or typical age</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td>1.55* (1.47, 1.64)</td>
<td>1.63* (1.53, 1.73)</td>
</tr>
<tr>
<td>Aboriginal</td>
<td>5.14* (4.79, 5.52)</td>
<td>2.00* (1.82, 2.19)</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>6.56* (5.42, 7.93)</td>
<td>5.19* (4.22, 6.39)</td>
</tr>
<tr>
<td>Preterm birth</td>
<td>1.58* (1.44, 1.74)</td>
<td>1.25* (1.12, 1.38)</td>
</tr>
<tr>
<td>Birthweight percentile for gestational age &lt;10%</td>
<td>1.56* (1.43, 1.69)</td>
<td>1.17* (1.07, 1.28)</td>
</tr>
<tr>
<td><strong>Maternal smoking</strong></td>
<td>2.26* (2.13, 2.40)</td>
<td>1.25* (1.17, 1.34)</td>
</tr>
<tr>
<td>Parent education missing</td>
<td>6.87* (6.02, 7.85)</td>
<td>3.30* (2.86, 3.79)</td>
</tr>
<tr>
<td>Up to Yr11</td>
<td>7.67* (6.66, 8.83)</td>
<td>3.71* (3.19, 4.31)</td>
</tr>
<tr>
<td>Yr12/certificate/diploma</td>
<td>3.30* (2.89, 3.78)</td>
<td>2.39* (2.08, 2.75)</td>
</tr>
<tr>
<td><strong>University degree</strong></td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Unmarried / unknown</td>
<td>2.27* (2.12, 2.45)</td>
<td>1.13* (1.03, 1.23)</td>
</tr>
<tr>
<td>Married/defacto at birth</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Maternal age under 20</td>
<td>3.23* (2.93, 3.56)</td>
<td>1.30* (1.16, 1.46)</td>
</tr>
<tr>
<td>20-29</td>
<td>1.74* (1.63, 1.85)</td>
<td>1.19* (1.11, 1.28)</td>
</tr>
<tr>
<td>30+</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Maternal substance use</td>
<td>2.60* (2.39, 2.82)</td>
<td>1.12* (1.00, 1.24)</td>
</tr>
<tr>
<td>Maternal assault</td>
<td>4.56* (4.10, 5.08)</td>
<td>1.16* (1.02, 1.33)</td>
</tr>
<tr>
<td>Maternal mental health</td>
<td>1.67* (1.56, 1.79)</td>
<td>1.08* (1.00, 1.17)</td>
</tr>
<tr>
<td>Paternal assault</td>
<td>2.30* (2.08, 2.54)</td>
<td>1.09 (0.97, 1.22)</td>
</tr>
<tr>
<td>Paternal mental health</td>
<td>1.46* (1.33, 1.60)</td>
<td>1.11 (1.00, 1.23)</td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>5.45* (4.85, 6.12)</td>
<td>2.17* (1.91, 2.46)</td>
</tr>
<tr>
<td>2</td>
<td>3.29* (2.91, 3.71)</td>
<td>1.74* (1.53, 1.98)</td>
</tr>
<tr>
<td>3</td>
<td>2.60* (2.29, 2.95)</td>
<td>1.66* (1.45, 1.89)</td>
</tr>
<tr>
<td>4</td>
<td>1.80* (1.58, 2.06)</td>
<td>1.33* (1.16, 1.53)</td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>ARIA remoteness – least remote</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>2</td>
<td>1.30* (1.19, 1.43)</td>
<td>1.08 (0.98, 1.18)</td>
</tr>
<tr>
<td>3</td>
<td>1.65* (1.52, 1.79)</td>
<td>1.27* (1.17, 1.39)</td>
</tr>
<tr>
<td>4</td>
<td>1.97* (1.78, 2.17)</td>
<td>1.25* (1.11, 1.39)</td>
</tr>
<tr>
<td>Most remote</td>
<td>4.23* (3.73, 4.8)</td>
<td>1.55* (1.33, 1.81)</td>
</tr>
<tr>
<td>Attendance (% absent) 0-5%</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>&gt;5-10%</td>
<td>1.34* (1.25, 1.44)</td>
<td>1.16* (1.07, 1.25)</td>
</tr>
<tr>
<td>&gt;10-15%</td>
<td>1.84* (1.68, 2.02)</td>
<td>1.39* (1.26, 1.53)</td>
</tr>
<tr>
<td>&gt;15-25%</td>
<td>2.98* (2.71, 3.28)</td>
<td>1.70* (1.53, 1.89)</td>
</tr>
<tr>
<td>&gt;25%</td>
<td>6.61* (5.94, 7.37)</td>
<td>2.37* (2.08, 2.69)</td>
</tr>
<tr>
<td>Any maltreatment allegation</td>
<td>3.38* (3.08, 3.71)</td>
<td>1.46* (1.31, 1.63)</td>
</tr>
<tr>
<td>No</td>
<td>reference</td>
<td>reference</td>
</tr>
</tbody>
</table>

Notes: Other disabilities (combined birth anomalies and cerebral palsy) were non-significant, as was paternal substance-related contacts.

* p < .05.
Table 6. Logistic regression: Odds of low reading scores by maltreatment type

<table>
<thead>
<tr>
<th>Allegation Types</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any physical</td>
<td>3.19* (2.76, 1.49)</td>
<td>1.26* (1.07, 1.49)</td>
</tr>
<tr>
<td>Any sexual</td>
<td>2.74* (2.35, 1.82)</td>
<td>1.53* (1.29, 1.82)</td>
</tr>
<tr>
<td>Any emotional</td>
<td>2.99* (2.46, 1.47)</td>
<td>1.18 (0.95, 1.47)</td>
</tr>
<tr>
<td>Any neglect</td>
<td>4.24* (3.71, 1.77)</td>
<td>1.52* (1.30, 1.77)</td>
</tr>
</tbody>
</table>

Notes: Each maltreatment type was examined in a separate analysis with all other risk factors from Table 2 except ‘Any maltreatment allegation’. All estimates remained relatively unchanged in the analysis. When all other maltreatment types were controlled for in a combined model, physical abuse was no longer significant
* p < .05.

Finally, logistic regression analyses were undertaken using the level of child protection contact (instead of any maltreatment allegation or allegation type) (Table 7). Again, the same risk factors were controlled for. Attendance differs across levels of child protection, and there was some variation in the results when attendance was included, so results are presented for Model B (controlling for all background risk factors except attendance) and Model C (adding attendance to Model B). The results from Model B showed that compared to children with no maltreatment allegations, children with unsubstantiated allegations were at increased risk of low reading achievement (OR=1.55, 95% CI[1.34,1.78]), as were children with substantiated allegations who remained at home (OR=1.68, 95% CI[1.37,2.06]). However, children who had ever entered out-of-home care did not have significantly increased risk of low reading achievement compared to children with no allegations (OR=1.16, 95% CI[0.96,1.41]).

After adding attendance to the model (Model C), however, although the changes were small we found the protective effect of out-of-home care was no longer significant, and reading scores for all three child protection groups were significantly worse than for children with no allegations. This suggests that the effect of out-of-home care on Year 3 reading scores is partially mediated by school attendance. Compared to children with no allegations, the odds ratio for low reading scores for children with unsubstantiated maltreatment was 1.49 (95% CI[1.29,1.72]), for children with substantiations was 1.63 (95% CI[1.33,2.00]), and for children who had entered out-of-home care was 1.28 (95% CI[1.05,1.55]). When presented separately by Aboriginal status, the effect of adding attendance to the model primarily affected the odds ratio for Aboriginal children in out-of-home care, but was not significant.
Table 7. Logistic regression: Odds of low reading scores by level of child protection involvement

<table>
<thead>
<tr>
<th>Contact Level</th>
<th>All Children</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Univariate OR (95% CI)</td>
<td>Multivariate OR (95% CI) without attendance</td>
<td>Multivariate OR (95% CI) with attendance</td>
<td></td>
</tr>
<tr>
<td>No allegations</td>
<td>reference</td>
<td>reference</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Unsubstantiated</td>
<td>3.17* (2.79, 3.61)</td>
<td>1.55* (1.34, 1.78)</td>
<td>1.49* (1.29, 1.72)</td>
<td></td>
</tr>
<tr>
<td>Substantiated</td>
<td>3.69* (3.07, 4.43)</td>
<td>1.68* (1.37, 2.06)</td>
<td>1.63* (1.33, 2.00)</td>
<td></td>
</tr>
<tr>
<td>Out-of-home care</td>
<td>3.52* (2.97, 4.16)</td>
<td>1.16 (0.96, 1.41)</td>
<td>1.28* (1.05, 1.55)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aboriginal</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Univariate OR (95% CI)</td>
<td>Multivariate OR (95% CI) without attendance</td>
<td>Multivariate OR (95% CI) with attendance</td>
<td></td>
</tr>
<tr>
<td>No allegations</td>
<td>reference</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Unsubstantiated</td>
<td>1.86* (1.49, 2.31)</td>
<td>1.62* (1.28, 2.05)</td>
<td>1.57* (1.23, 1.99)</td>
</tr>
<tr>
<td>Substantiated</td>
<td>1.80* (1.34, 2.44)</td>
<td>1.44* (1.04, 1.99)</td>
<td>1.38 (1.00, 1.92)</td>
</tr>
<tr>
<td>Out-of-home care</td>
<td>1.20* (0.93, 1.55)</td>
<td>0.99 (0.74, 1.32)</td>
<td>1.16 (0.86, 1.55)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Aboriginal</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Univariate OR (95% CI)</td>
<td>Multivariate OR (95% CI) without attendance</td>
<td>Multivariate OR (95% CI) with attendance</td>
<td></td>
</tr>
<tr>
<td>No allegations</td>
<td>reference</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Unsubstantiated</td>
<td>2.48* (2.09, 2.94)</td>
<td>1.49* (1.24, 1.79)</td>
<td>1.44* (1.20, 1.73)</td>
</tr>
<tr>
<td>Substantiated</td>
<td>3.08* (2.41, 3.93)</td>
<td>1.81* (1.40, 2.35)</td>
<td>1.78* (1.37, 2.30)</td>
</tr>
<tr>
<td>Out-of-home care</td>
<td>3.41* (2.71, 4.30)</td>
<td>1.43* (1.11, 1.86)</td>
<td>1.47* (1.14, 1.91)</td>
</tr>
</tbody>
</table>

Notes: Level of child protection involvement was examined in a separate analysis with all other risk factors from Table 2 except ‘Any maltreatment allegation’. All estimates remained relatively unchanged in the analysis.
* p < .05.

Sensitivity analysis produced results that generally did not differ substantively from those reported. In some models, either a greater or smaller number of the parental psychosocial risk factors were significant.

Discussion

Low reading achievement was common across children with child protection involvement, affecting over a quarter of these children (27.8%), representing a three times increased risk for low achievement compared to children without child protection involvement. After controlling for a wide range of risk factors, our findings showed a small but fairly consistent association between maltreatment and low reading achievement in Year 3, across both substantiated and unsubstantiated maltreatment allegations, and most types of abuse and neglect. This is in line with research showing
links between some types of maltreatment and poor outcomes (Fantuzzo et al., 2011; Mersky & Topitzes, 2010), but extends the findings of these studies to show that almost all sub-groups of children with maltreatment allegations (substantiated or unsubstantiated, and across neglect, physical and sexual abuse) are at elevated risk for academic difficulties.

**Maltreatment Type and Reading Achievement**

Sexual abuse and neglect were both associated with approximately 50% increased odds of low reading achievement. Physical abuse was also significantly associated with poor reading. Our finding that sexual abuse was one of the maltreatment types associated with the highest increase in risk of low reading achievement is consistent with Fergusson and colleagues’ results showing sexual abuse to be associated with a wide range of adverse outcomes (Fergusson, McLeod, & Horwood, 2013), although not with their non-significant findings regarding educational outcomes (Boden et al., 2007). It is unclear why the effects of emotional abuse were fully attenuated by other risk factors whereas all other maltreatment types showed harmful effects. Emotional abuse has been linked to other poor outcomes (Crow, Cross, Powers, & Bradley, 2014; Gross, 1992; Iwaniec, Larkin, & Higgins, 2006), but remains one of the less-studied areas of maltreatment and requires further exploration.

**Level of Child Protection Involvement and Reading Achievement**

Although all three child protection groups had over threefold increased risk of low readings scores prior to adjustment, after controlling for pre-existing adversity the risk for the out-of-home care group was not significantly different from children with no allegations. This finding should not be interpreted to mean that children in out-of-home care are performing satisfactorily in school (almost one in three have poor reading achievement), but rather that given the highly increased risks they face through their family, community and individual characteristics as well as maltreatment experiences, we would expect them to be performing even worse.

Although the difference was small, having entered out-of-home care was associated with lower odds of poor reading achievement compared to children with substantiated or
unsubstantiated allegations which suggests that out-of-home care, or other interventions or monitoring that accompany entry to care, may have a protective effect on education. This finding is new, but not inconsistent with the literature. Using data from the National Survey of Child and Adolescent Wellbeing II, Font and Maguire-Jack (2013) found increased school engagement among some of their out-of-home care groups, and suggested that the null findings for performance may be due to use of self-report measures. Runyan and Gould (1985a) found increased school attendance and no difference in school grades despite higher levels of background risk, and a Swedish study found fewer children with low or no grades among the out-of-home care group (Berlin et al., 2011). Conversely, two studies using the National Survey of Child and Adolescent Wellbeing data found no significant differences in language and cognitive development between children placed in out-of-home care and those receiving in-home welfare interventions (Berger et al., 2009; Stahmer et al., 2009). Our study did not aim to specifically examine the causal ‘effects’ of out-of-home care as an intervention, but the results are suggestive of a protective role of out-of-home care (and at minimum no harmful effect). Future research will be undertaken using longitudinal education data to come closer to estimating possible causal relationships.

**Attendance**

Regular school attendance was an important protective factor. Our research suggests that attendance accounts for some of the protective effect of out-of-home care on Year 3 reading results. While an association has previously found between out-of-home care and attendance (Runyan & Gould, 1985a), and between attendance and achievement in the general population (Hancock et al., 2014; Roby, 2004) the role of attendance in the relationship between out-of-home care and achievement has not previously been examined. Strategies to improve attendance among all child protection groups, particularly those that remain at home may play a valuable role in improving children’s early achievement and position them better for school success in adolescence.

**Adversity**

Like Boden and colleagues (2007), we found some attenuation of risk for low educational achievement after taking into account other risk factors in maltreated children’s lives. A
high proportion of children with child protection involvement had additional risk factors, and these were especially common among children who entered out-of-home care. Over one third of children who entered out-of-home care had mothers who had been to hospital following an assault, and over half had mothers with hospital contacts for mental health and two thirds of mothers’ had hospital contact for substance-related issues. The high level of risk factors supports the need to account for these in research examining outcomes for maltreated children (Fantuzzo et al., 2011; Stone, 2007).

While it is not surprising to see intellectual disability emerge as the strongest predictor of low reading scores, it highlights the importance of taking into account disabilities in research among child protection populations. Disabilities are more common among maltreated children, and children affected by both are likely to have additional support needs.

Many of the strongest risk factors for poor educational achievement reflect issues of social disadvantage: low parental education, living in a socially disadvantaged area, and Aboriginal status. Rouse and colleagues found maltreatment had the highest OR (1.6) followed by low maternal education, poverty, homelessness and birth risks (Rouse & Fantuzzo, 2009). This differs somewhat from our findings as maltreatment was not our strongest risk factor. Public health interventions addressing adversity and disadvantage as well as child maltreatment are needed.

Closing the educational gap between Aboriginal and non-Aboriginal students is a complex task requiring sensitivity to a history of entrenched inequality (Ford, 2012). Previous research has illustrated that many expected resilience factors for Aboriginal youth were not significant (Hopkins, Taylor, D'Antoine, & Zubrick, 2012). Within the educational domain, we found school attendance was equally effective at promoting achievement outcomes for Aboriginal and non-Aboriginal students. Education officers within the Department for Child Protection and Family Support are tasked with supporting achievement and attendance among children in out-of-home care, which may contribute to the higher attendance rates for these children. Effective strategies are needed to improve attendance among other Aboriginal children, especially those with maltreatment allegations who remain at home.
Limitations and Future Research

The study had a number of limitations, although we have attempted to address them where possible. Record linkage provides extensive population data but does have limitations in that records are only created when there is contact with government agencies. Thus maltreatment was only captured for children who had contact with the child protection system and may be under-ascertained. As mental health and substance-related issues were counted only for public and private hospital inpatients and public outpatients, there may be some bias towards undercounting these issues among higher socio-economic groups, and the data is likely to capture more severe cases of mental illness rather than cases that are dealt with in the community by general practitioners and private practice psychologists. We also did not have information on whether educational, psychological or family support services were provided so cannot control for or assess the impact of these.

Despite these limitations the study uses standardised national assessments of reading ability and linked longitudinal data to overcome many of the limitations of previous research including small sample size, cross-sectional and point in time data. Record linkage provides the ability to capture sensitive information such as maltreatment allegations and parental hospital contacts and includes individuals who may not participate in surveys.

We only studied children in Year 3. One possible explanation for our findings regarding the association between maltreatment and achievement being closer to results from Rouse and Fantuzzo (2009) than the non-significant findings from Boden and colleagues (2007) is that the latter looked at older students (high school completions). However Mersky and Topitzes, (2010) also examined high school and university outcomes and did find maltreatment remained significantly associated with negative educational outcomes after controlling for a range of sociodemographic risk factors within a highly disadvantaged population. Further research should examine whether the same the relationships exist between level of child protection involvement, attendance and achievement in older children and adolescents.
Our study combined all children who had entered out-of-home care into a single group. However, there is evidence that children’s outcomes may vary depending on their out-of-home care experiences, such as placement type (Rubin et al., 2008), duration of out-of-home care, and number of placement changes (Baskin & Sommers, 2011). Future research should examine whether out-of-home care has consistent relationships with attendance and achievement, or varies depending on care experiences. Understanding other mechanisms through which entry to out-of-home care influences children’s academic achievement would also be valuable. Furthermore, research should be conducted using longitudinal data and matching techniques to more fully address questions regarding the causal impact of out-of-home care placement decisions for maltreated children. The linked dataset provides the opportunity for more in-depth exploration of the relationships between different aspects of children’s child protection history (including type and timing of events across childhood and more detailed examination of out-of-home care experiences). Such detail was beyond the scope of this study, however further research is planned.

Finally, linked-record population studies provide a means for monitoring changes in educational outcomes for maltreated children, and evaluating the effect of interventions. The Department for Child Protection and Family Support has fairly recently (2009) introduced Individualised Education Plans for all children in care of compulsory school age, in recognition of the need to address poor educational outcomes. There was insufficient data available after 2009 to evaluate their impact, however future research might be able to shed more light on the effectiveness of the Individualised Education Plans.

**Implications for Policy and Practice**

This study highlights the prevalence of low reading achievement among children in contact with the child protection system, who typically come from backgrounds of significant adversity and trauma. There is a need to continue to develop effective approaches to increase attendance, which promotes achievement amongst even these vulnerable groups of children.
There is also research support for educational interventions such as tutoring, provision of extra learning materials, individualised educational and psychological support and educational liaison (Forsman & Vinnerljung, 2012). As maltreatment can affect children’s achievement via socio-emotional delays as well as cognitive delays (Trocme & Caunce, 1995), a one-size fits all approach may not be ideal.

This research does not specifically assess the effectiveness of current policies and practices in Western Australia, however the findings are consistent with the need for roles such as the Department for Child Protection and Family Support Education Officers who specifically support the educational needs of children in care, and initiatives such as Individualised Education Plans to encourage a focus on the educational needs of children in care. Although children in out-of-home care may be doing better than expected given their extensive challenges, there is still a long way to go to achieve results comparable to the general population. Children with substantiated and unsubstantiated maltreatment allegations, and children with significant social disadvantage are also at high risk of poor educational achievement by Year 3 of schooling, and would also benefit from policies and services aimed at improving educational outcomes.

**Conclusions**

This study provides new insight into prevalence, risk and protective factors for low reading achievement with a focus on children involved in child protection. After controlling for an extensive range of background risk factors, we found maltreatment, including unsubstantiated and substantiated cases, and neglect, physical and sexual abuse were all associated with increased risk for low reading scores. Out-of-home care was associated with a small protective effect on Year 3 reading scores and much higher school attendance. These findings highlight the need for increased attention to the educational needs of child protection populations, and should be used to inform strategies to improve educational outcomes. Further research is needed to examine whether the same relationships between child protection history, school attendance and achievement exist among older children, and across subgroups of children with different out-of-home care experiences.
Chapter 6 Relationship Between Out-of-home Care
Placement History Characteristics and Educational Outcomes

Preamble

Chapter 5 explored child protection involvement, adversity and school attendance as predictors of low reading achievement in Year 3 students. The results showed that after adjusting for adversity at the child, family and neighbourhood levels, maltreated children who had entered out-of-home had reading scores that were statistically equivalent to children with no child protection involvement. Children with unsubstantiated or substantiated maltreatment allegations who remained at home, however, had significantly worse reading scores than children with no child protection involvement. These findings suggest that out-of-home care may reduce the impact of maltreatment on educational outcomes. As out-of-home care experiences can differ markedly the current Chapter aims to examine a variety of characteristics of children’s out-of-home care histories to assess their relationship with reading outcomes.
Abstract

Children who have entered out-of-home care have worse educational outcomes than the general population, although recent research suggest maltreatment, and other adversities are major contributors to their academic difficulties. Children’s out-of-home care experiences vary and may affect their outcomes. This study examined the influence of placement stability, reunification, type of care, time in care and age at entry to care on children’s educational outcomes. We conducted a population-based record-linkage study of children born in Western Australia between 1990-2010 who sat State or national Year 3 reading achievement tests (N=235,045 children, including 2,160 children with a history of out-of-home care). Children’s educational outcomes varied with many aspects of their care experience. Children placed in residential care showed an almost seven-fold crude increased risk in low reading scores, which was partially attenuated after adjusting for background risk factors but remained significant (OR=1.50, 95% CIs [1.08, 2.08].

Reading scores were also lower for children who had experienced changes in care arrangements in the year of the test. A dose-response effect for multiple placements was expected but not found. Different characteristics of a child’s care history were interwoven with each other as well as child, family and neighbourhood characteristics, highlighting a need for caution in attributing causality. Findings suggest extra educational support is needed particularly for children who have entered residential care, those who first entered care aged four years or older, children who have been in care for shorter durations, reunified children, and those who have experienced a recent change in living arrangements.
Introduction

Prior research has found that children who have been maltreated have worse educational outcomes than children who have not experienced maltreatment, however recent research showed this was not the case for all groups of maltreated children. Maclean, Taylor & O’Donnell (2015) found that reading scores for children who were maltreated and entered out-of-home care were comparable to the general population after controlling for a range of other risk factors (including socio-economic disadvantage, ethnicity, and parental factors), whereas maltreated children who remained at home had increased risk of poor reading performance. Children’s experiences of out-of-home care, however, can vary greatly according to factors such as placement stability and type of care. Out-of-home care factors that have been linked to children’s outcomes (e.g. educational achievement, mental health, and behaviour problems) include placement stability, reunification, type of care, time in care and age at entry to care (e.g. Lee, 2009; Taussig, 2002; Zima et al., 2000).

Placement Stability

Placement stability is often measured by the number of placements the child has had, with higher numbers showing greater placement instability. Duration of a placement can also indicate stability. High numbers of placements are associated with adverse outcomes including increased behaviour problems, juvenile delinquency and running away (Lee, 2009; Runyan & Gould, 1985b; Widom, 1989). Results for education outcomes have been mixed. Runyan and Gould (1985a) found no difference in school failure rates between foster care children based on number of placements, or whether the current placement was longer than three years. Conversely, Zima et al., (2000) found an 18% increased odds of academic skills delay with each additional placement. Likewise, Vinnerljung, Öman, & Gunnarson (2005) found worse educational outcomes among out-of-home care children with long term but unstable care compared to those with long term stable care, or short-intermediate term care.

An Australian pilot study examining educational outcomes for children on guardianship/custody orders found no significant effect of placement type or length of
guardianship/custody order, but emphasised a need for research to examine other placement factors such as placement stability and to take into account other important influences on education such as socio-economic background (AIHW, 2007).

**Reunification**

Although a great deal of research focusses on children in care, and Australian policy supports reunification, there is relatively little research on outcomes for children who have been reunited with their families. Research suggests this may be a particularly vulnerable group. Compared to children remaining in care, reunified children were found to be more likely to have low grades, have dropped out of school, and have more behaviour problems and self-destructive behaviour in adolescence (Taussig, Clyman & Landsverk, 2001). Increased internalising behaviour problems were also found by Bellamy (2008) and attributed to increased exposure to risks such as parental mental health problems rather than direct effects of reunification. Bellamy suggested more behaviour problems may have been identified if there was a longer follow-up similar to that in Taussig’s study. However, the effects of timing since reunification on outcomes have not been specifically examined. Longer duration since reunification may mean greater exposure to other risks in the home such as parental mental health issues which may have a negative effect, or may result in increased stability with a positive effect on reading.

**Type of Care**

Foster care and kinship care are the most commonly used forms of out-of-home care in Western Australia, with 7.3% in residential care including family group homes (AIHW, 2015). Internationally, there has been particular interest in kinship care, which is being increasingly used in order to maintain a connection between the child and their extended family of origin (Berrick, 1998; Farmer, 2009). However, kinship carers often have lower levels of education and income than foster carers (Gebel, 1996), and may be unprepared for caring for a relative’s child when the need for placement arises suddenly. Kinship carers tend to be given less training and support than foster carers, and it has been suggested that lower quality placements may be accepted in order to maintain a family
link (Peters, 2005; Spence, 2004). Consequently kinship care could be associated with better or worse reading outcomes.

A review conducted in 2009 and recently updated (Winokur et al., 2014) found children in kinship care had more placement stability and better behaviour and mental health, but no difference for educational outcomes. All of the included studies measuring educational outcomes were from the USA. A study conducted in Spain, where kinship care is widely used, also found that children in kinship care have similar outcomes to children in foster care in teacher-rated behaviour and academic outcomes (Palacios & Jiménez, 2009). In Australia, kinship care is increasingly being used, especially for Aboriginal children as part of the Aboriginal Child Placement Principle (Monohan, 2002). Australian research has shown that children in kinship care are slower to be reunified (Delfabbro, Fernandez, McCormick, & Kettler, 2013), however other outcomes of kinship placement compared to foster placement have not been examined.

In contrast to kinship care, the use of residential care has declined markedly over the past four decades in Australia compared to the UK and USA. Although in the last decade this has levelled off and there is renewed interest in residential care with increased psychological and educational supports for a small proportion of children in care (Ainsworth & Hansen, 2005; Smyth & Eardley, 2008). Residential care is often viewed as a placement option for children with emotional or behavioural problems who cannot easily be placed in foster or kinship care (Smyth & Eardley, 2008). Although residential placements have been linked to adverse outcomes including behaviour problems (Lee, 2009) and arrests (Baskin & Sommers, 2011), few studies have examined educational outcomes for children placed in residential care. An Australian study found no difference in NAPLAN achievement test scores for children by placement type, however residential care was aggregated into a broader ‘other living arrangements’ category for comparison with kinship and foster care (AIHW, 2007).

**Time in Care**

Children who spend a longer total amount of time in care are children who are unable to be reunified with the families, or who experience multiple failed reunifications. Both scenarios suggest chronic difficulties in the family situation or more severe or chronic
abuse. Increased time in care also increases the chance the child may experience placement changes. For all of these reasons, children with a higher total amount of time in care may be more likely to have poor educational outcomes.

Age at Entry to Care

Some research suggests worse outcomes for children who enter care at an older age such as more placement breakdowns (Farmer, 2010), juvenile offending and running away (Lee, 2009), and adult arrests (DeGue & Spatz Widom, 2009). It is plausible that behavioural problems and poor adjustment observed in children experiencing placement at an older age are also accompanied by worse academic outcomes. Research is needed to assess whether worse reading outcomes are found for children who enter out-of-home care at an older age.

The Current Study

Although a number of aspects of out-of-home care experiences have been linked to a range of outcomes for children, there have been mixed findings and many gaps in regard to academic outcomes. Further investigation is required to ascertain the relationship between different types of out-of-home care histories and academic achievement. There is also a need for research that takes into account other influences of children’s academic outcomes (AIHW, 2007).

Through the use of linked administrative data, the present study is able to examine a comprehensive set of characteristics of children’s out-of-home care experiences from birth onwards. The study aims to assess the relationship between each of the following out-of-home care history characteristics and Year 3 reading outcomes:

1. Placement stability (number of placements and time in current placement)
2. Reunification status and time since exiting last placement
3. Type of care (primary type of care and most recent type)
4. Time in care
5. Age at first placement
Reporting adjusted and unadjusted odds ratios shows the relationship of each out-of-home care history characteristic and reading scores, both at a crude level and after accounting for important characteristics of the child, family and neighbourhood that may also influence reading outcomes.

Method

Dataset

The dataset was constructed by linking data from Birth Registrations, the Midwives Notification System, Child Protection and Family Support, the Department of Education, the School Curriculum and Standards Authority and the Disability Services Commission for all children born in Western Australia (WA) between 1990 and 2010. This study focussed on children who sat the Year 3 WA Literacy and Numeracy assessment (WALNA) or National Assessment Program – Literacy and Numeracy (NAPLAN) reading tests. The data was linked by the WA Data Linkage Branch within the Department of Health using probabilistic matching, with de-identified data provided to the researchers. The data linkage process and privacy measures are described elsewhere (Kelman et al., 2002).

Study Population

The out-of-home care group consisted of children in the birth cohort with substantiated maltreatment who had entered out-of-home care prior to their Year 3 reading test. The comparison group was all children born in WA during the same period with no child protection contact prior to their Year 3 reading test. The total cohort consisted of 235,045 children, including 2,160 children with a history of out-of-home care. The average age of students at their Year 3 reading test was 8 years and 4 months. Half the students were male, and 6.6% were Aboriginal. Just over half of the children with a history of out-of-home care (55.4%) had been reunified and were no longer in care on the day of the test.

Outcome Variable - Low Reading Achievement Scores

From 1999 until 2007, children sat the WA Literacy and Numeracy Test (WALNA). WALNA was replaced by the National Assessment Program – Literacy and Numeracy
(NAPLAN) in 2008, which is sat by all Australian Year 3 students in May of each year. A small percentage of children are absent on the day of the test, are withdrawn by their parents, or are exempt due to severe disabilities or having recently migrated from a non-English speaking country. Children were classed as having low reading scores if they scored in the lowest 10% of Year 3 students in WA for the year in which they sat their WALNA/NAPLAN reading test. Using decile scores helps to overcome differences in scoring methods across WALNA and NAPLAN. In addition, a ranking in the lowest 10% on reading achievement for the State in either test can be considered concerning.

**Out-of-Home Care Placement History Variables**

Child Protection and Family Support provided placement data for all children in the birth cohort with substantiated maltreatment who had entered out-of-home care in Western Australia between 1990 and 2010. All variables reflect the situation at the time of the child’s Year 3 reading test (subsequent out-of-home care experiences were not included in the analysis). Variables included: Number of placements (1, 2-3, 4+), time in current placement (1-12 months, 13-24 months, >24 months, compared to all children not in care or placed for less than 1 month), currently in care versus reunified at the time of the test, time since reunification for children living at home (<=12 months, >1-2 years, >2-4 years, >4-6 years, >6 years). Primary type of care represented where children had spent >65% of their placements days in one care type (kinship, foster care, residential, or no primary type where no care type comprised >65%). Most recent placement type consisted of the major out-of-home care types: foster care, kinship care, residential care. Kinship care included care by relatives, and also other people already known to the child such as friends or neighbours. Other types of care, including care by unapproved persons, or detention were less common and of less policy interest as they are unlikely to be preferred placement options in policy or individual level placement decision-making. Therefore they were not analysed separately for care type, but contribute to number of placements and time spent in care. Total time in care consisted of the sum of days across all of a child’s placements prior to the Year 3 reading test, grouped as 0-<1 day, 1 day-12 months, >1 to 5 years, > 5 years. The child’s age in years at first placement was also analysed.
Covariates

**Child Characteristics**

From the Midwives Notification System and Births Registrations we obtained gender, Aboriginality, date of birth (used to calculate age in months at the time of Year 3 tests), preterm births (<37 weeks gestation), and birthweight. Children in the lowest 10% were classified low birthweight for gestational age, based on published reference levels (Dobbins, Sullivan, Roberts, & Simpson, 2013; Roberts & Lancaster, 1999a, 1999b). Information on children’s disability status was obtained from the Intellectual Disabilities Exploring Answers (IDEA) database and Western Australian Register of Developmental Anomalies (WARDA). Children were classified as having intellectual disability and/or developmental anomalies based on records in the IDEA and WARDA datasets. School attendance data from the first semester of Year 3 was available for a subgroup of children, and was treated as a categorical variable based on the percentage of days recorded as absent out of days enrolled.

**Parent Characteristics**

Maternal and paternal age were obtained from Midwives and Births data. Mental health information was obtained from the Mental Health Information System and the Hospital Morbidity Data system, which include public and private in-patient admissions and public out-patient admissions. International Classification of Disease codes from ICD8, ICD9 and ICD10 provide diagnostic information in both data sources. Parents were coded as having a mental health contact if their records included a mental health diagnostic code including major diagnostic categories (such as anxiety, depression, schizophrenia and bipolar disorder, but excluding substance-related diagnoses). Parents were coded as having a substance-related contact if ICD codes indicated a drug or alcohol related event. Parents’ assault related admissions included any hospital admission for an assault related injury inflicted on the mother or father (ICD-9: E960-E969, ICD-10: X85-Y09). Only health contacts prior to the child’s Year 3 test were included.
Community Characteristics

Community characteristics information from the Australian Bureau of Statistics were obtained to account for disparities related to social disadvantage (ABS, 2008) and the level of remoteness (Department of Health and Aged Care, 2001). The Socio Economic Indices for Area (SEIFA) is a neighbourhood level measure of relative social disadvantage based on residence at the child’s birth. The Accessibility/Remoteness Index of Australia (ARIA) indicates the accessibility of the area in which the family lives at the time of the child’s birth. Data were available at the collection district level (approximately 400 households) for 90% of children. A less precise version of the variables was used to fill in the missing SEIFA and ARIA data (more recent data from larger geographical areas – postcodes).

Analysis

For each of the out-of-home care placement variables, multivariable logistic regression analysis was conducted to predict low reading scores, controlling for age, being above the typical test age range, gender, Aboriginality, intellectual disability, developmental anomalies, preterm birth, low birthweight percentile for gestational age, maternal age, maternal substance related hospital contacts, maternal assault contacts, maternal mental health contacts, paternal substance related hospital contacts, paternal assault contacts, paternal mental health contacts, social disadvantage, and remoteness. Separate logistic regression models for Aboriginal and non-Aboriginal were also run for care type and total time in care, but not for the sub-group analyses such as time since reunification which was limited to children living at home at the time of the test due to smaller sample sizes. Bivariate logistic regression results are also presented to show the unadjusted odds ratio for each variable. Results are presented using odds ratios (ORs) and 95% confidence intervals (CIs) (Tabachnick & Fidell, 2001). Results can be considered statistically significant (at the .05 level) where the confidence interval does not include 1.

The data were analysed using SPSS version 22 software. Children’s age at the time of the test had a negative linear relationship with low test scores, however children with atypically high ages (most likely children who had been retained) had markedly worse reading scores. An indicator variable was added to the model to account for these
children. Supplementary analysis was conducted for the subgroup of children with attendance data. As school attendance has been shown to be an important predictor of reading scores among maltreated children (Maclean et al., 2015) the above analyses were repeated with attendance as an additional covariate to assess whether the results changed markedly after controlling for attendance.

Results

Descriptive Statistics

Descriptive statistics for the cohort are shown in Table 8, broken down by whether the child was in care at the time of test, had been in care but was reunified at the time of the test, or had never entered care, and also by the main type of care the child had experienced. Compared to children who had no child protection involvement, children with out-of-home care experiences had markedly higher rates of adversities, such as preterm births, parent hospital contacts for assaults, mental health or substance-related issues, and low socio-economic backgrounds. Children who were in out-of-home care at the time of the Year 3 tests had similar but marginally higher levels of adversity compared to children who had been reunified and were living at home. Aboriginal children comprised 37.3% of reunified children, and 42.1% of children in care at Year 3, despite comprising only 7.0% of the study population.

Kinship care was the most common primary type of care for Aboriginal children, and was used for a higher percentage of Aboriginal children with a care history (36.5%) than non-Aboriginal children (17.9%). Foster care was the most common primary type of care for non-Aboriginal children (44.5%), and less common for Aboriginal children (21.2%). Residential care was less frequently used, but was the primary care type for a higher percentage of Aboriginal children (14.1%) than non-Aboriginal children (4.5%). Children in residential care were more likely to have been born in remote/very remote areas (41.3%), compared to children in kinship care (17.4%) or foster care (7.7%). Approximately half of the children whose primary care type was residential or kinship care and a quarter of children in foster care had a mother with a previous hospital contact as an assault victim. Most children with a primary care type of residential care (70.9%)
had spent a total of one year or less in care across all placements, whereas other care placements were associated with a longer time in care. Children primarily in residential care were least likely to have had 4+ placements (22.3%) compared to kinship care (37.1%), foster care (35.4%). Two thirds of children with no primary placement / mixed care had 4+ placements (67.2%).
### Table 8. Characteristics of study population by placement status and by primary type of care

<table>
<thead>
<tr>
<th>Placement Status at Yr3 test</th>
<th>Never Placed</th>
<th>Reunified By Test</th>
<th>In care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low reading score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Low</td>
<td>204,768</td>
<td>741</td>
<td>631</td>
</tr>
<tr>
<td>Lowest 10%</td>
<td>21,327</td>
<td>325</td>
<td>259</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>113,529</td>
<td>574</td>
<td>475</td>
</tr>
<tr>
<td>Male</td>
<td>119,356</td>
<td>623</td>
<td>488</td>
</tr>
<tr>
<td>Higher than typical age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>219,089</td>
<td>1,098</td>
<td>849</td>
</tr>
<tr>
<td>Yes</td>
<td>13,796</td>
<td>99</td>
<td>114</td>
</tr>
<tr>
<td>Birth anomaly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>219,480</td>
<td>1,118</td>
<td>875</td>
</tr>
<tr>
<td>Yes</td>
<td>13,405</td>
<td>79</td>
<td>88</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>230,272</td>
<td>1,114</td>
<td>880</td>
</tr>
<tr>
<td>Yes</td>
<td>2,613</td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td>Aboriginal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td>218,301</td>
<td>751</td>
<td>558</td>
</tr>
<tr>
<td>Aboriginal</td>
<td>14,584</td>
<td>446</td>
<td>405</td>
</tr>
<tr>
<td>Preterm birth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not preterm</td>
<td>217,638</td>
<td>1,010</td>
<td>813</td>
</tr>
<tr>
<td>Preterm</td>
<td>15,016</td>
<td>186</td>
<td>148</td>
</tr>
<tr>
<td>Birthweight percentile for gestational age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Low</td>
<td>209,066</td>
<td>949</td>
<td>741</td>
</tr>
<tr>
<td>Married / defacto</td>
<td>211,077</td>
<td>674</td>
<td>562</td>
</tr>
<tr>
<td>Not married/ unknown</td>
<td>21,808</td>
<td>523</td>
<td>401</td>
</tr>
<tr>
<td>Maternal age category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>12,388</td>
<td>258</td>
<td>190</td>
</tr>
<tr>
<td>20-29</td>
<td>118,530</td>
<td>684</td>
<td>564</td>
</tr>
<tr>
<td>30+</td>
<td>101,967</td>
<td>255</td>
<td>209</td>
</tr>
<tr>
<td>Maternal mental health contact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>202,477</td>
<td>512</td>
<td>359</td>
</tr>
<tr>
<td>Yes</td>
<td>30,408</td>
<td>685</td>
<td>604</td>
</tr>
<tr>
<td>Maternal substance Contact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>220,025</td>
<td>515</td>
<td>341</td>
</tr>
<tr>
<td>Yes</td>
<td>12,860</td>
<td>682</td>
<td>622</td>
</tr>
<tr>
<td>Maternal assault</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>228,500</td>
<td>790</td>
<td>578</td>
</tr>
<tr>
<td>Kinship</td>
<td>340</td>
<td>529</td>
<td>90</td>
</tr>
<tr>
<td>Foster</td>
<td>160</td>
<td>166</td>
<td>64</td>
</tr>
<tr>
<td>Residential</td>
<td>269</td>
<td>363</td>
<td>89</td>
</tr>
<tr>
<td>Mixed</td>
<td>276</td>
<td>399</td>
<td>90</td>
</tr>
</tbody>
</table>

Placement Status at Yr3: Never Placed, Reunified By Test, In care
Primary Type of Out-Of-Home Care: Kinship, Foster, Residential, Mixed

Placement Status at Yr3: Never Placed, Reunified By Test, In care
Primary Type of Out-Of-Home Care: Kinship, Foster, Residential, Mixed
<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>1.9%</th>
<th>407</th>
<th>34.0%</th>
<th>385</th>
<th>40.0%</th>
<th>273</th>
<th>50.1%</th>
<th>210</th>
<th>27.6%</th>
<th>94</th>
<th>52.5%</th>
<th>156</th>
<th>39.7%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paternal mental health contact</td>
<td>No</td>
<td>217,366</td>
<td>93.3%</td>
<td>979</td>
<td>81.8%</td>
<td>754</td>
<td>78.3%</td>
<td>426</td>
<td>78.2%</td>
<td>615</td>
<td>80.7%</td>
<td>156</td>
<td>87.2%</td>
<td>313</td>
</tr>
<tr>
<td>Paternal substance contact</td>
<td>Yes</td>
<td>15,519</td>
<td>6.7%</td>
<td>218</td>
<td>18.2%</td>
<td>209</td>
<td>21.7%</td>
<td>119</td>
<td>21.8%</td>
<td>147</td>
<td>19.3%</td>
<td>23</td>
<td>12.8%</td>
<td>80</td>
</tr>
<tr>
<td>Paternal assault</td>
<td>No</td>
<td>217,868</td>
<td>93.6%</td>
<td>891</td>
<td>74.4%</td>
<td>667</td>
<td>69.3%</td>
<td>372</td>
<td>68.3%</td>
<td>579</td>
<td>76.0%</td>
<td>133</td>
<td>74.3%</td>
<td>265</td>
</tr>
<tr>
<td>Neighbourhood social disadvantage</td>
<td>Yes</td>
<td>15,017</td>
<td>6.4%</td>
<td>306</td>
<td>25.6%</td>
<td>296</td>
<td>30.7%</td>
<td>173</td>
<td>31.7%</td>
<td>183</td>
<td>24.0%</td>
<td>46</td>
<td>25.7%</td>
<td>128</td>
</tr>
<tr>
<td>Paternal physical assault</td>
<td>No</td>
<td>224,480</td>
<td>96.4%</td>
<td>978</td>
<td>81.7%</td>
<td>751</td>
<td>78.0%</td>
<td>415</td>
<td>76.1%</td>
<td>631</td>
<td>82.8%</td>
<td>135</td>
<td>75.4%</td>
<td>305</td>
</tr>
<tr>
<td>Paternal mental health</td>
<td>Yes</td>
<td>8,405</td>
<td>3.6%</td>
<td>219</td>
<td>18.3%</td>
<td>212</td>
<td>22.0%</td>
<td>130</td>
<td>23.9%</td>
<td>131</td>
<td>17.2%</td>
<td>44</td>
<td>24.6%</td>
<td>88</td>
</tr>
<tr>
<td>Time in current placement</td>
<td>0-1 month</td>
<td>232,885</td>
<td>100.0%</td>
<td>0</td>
<td>0.0%</td>
<td>19</td>
<td>2.0%</td>
<td>0</td>
<td>0.0%</td>
<td>7</td>
<td>2.0%</td>
<td>6</td>
<td>11.5%</td>
<td>6</td>
</tr>
<tr>
<td>Total time in care</td>
<td>1-12 months</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>383</td>
<td>39.8%</td>
<td>130</td>
<td>38.8%</td>
<td>110</td>
<td>31.3%</td>
<td>14</td>
<td>26.9%</td>
<td>87</td>
</tr>
<tr>
<td>Number of placements</td>
<td>1 year-5 years</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>156</td>
<td>16.2%</td>
<td>59</td>
<td>17.6%</td>
<td>44</td>
<td>12.5%</td>
<td>6</td>
<td>11.5%</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>&gt;5 years</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>404</td>
<td>42.0%</td>
<td>146</td>
<td>43.6%</td>
<td>191</td>
<td>54.3%</td>
<td>26</td>
<td>50.0%</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>232,885</td>
<td>100.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>0.0%</td>
<td>355</td>
<td>29.7%</td>
<td>149</td>
<td>15.5%</td>
<td>128</td>
<td>23.5%</td>
<td>215</td>
<td>28.2%</td>
<td>76</td>
<td>42.5%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>0</td>
<td>0.0%</td>
<td>455</td>
<td>38.0%</td>
<td>362</td>
<td>37.6%</td>
<td>215</td>
<td>39.4%</td>
<td>277</td>
<td>36.4%</td>
<td>63</td>
<td>35.2%</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>4+</td>
<td>0</td>
<td>0.0%</td>
<td>387</td>
<td>32.3%</td>
<td>451</td>
<td>46.8%</td>
<td>202</td>
<td>37.1%</td>
<td>270</td>
<td>35.4%</td>
<td>40</td>
<td>22.3%</td>
<td>264</td>
</tr>
</tbody>
</table>
Logistic Regression Analysis of Risk

Number of Placement Changes

Table 9. Logistic regressions: Odds of low reading scores for children by number of placements for all children and by Aboriginality

<table>
<thead>
<tr>
<th></th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child age in months</td>
<td>0.99* (0.98, 0.99)</td>
<td>0.97* (0.96, 0.97)</td>
</tr>
<tr>
<td>Higher than typical age</td>
<td>1.12* (1.06, 1.19)</td>
<td>1.26* (1.17, 1.35)</td>
</tr>
<tr>
<td>Gender</td>
<td>1.49* (1.45, 1.53)</td>
<td>1.53* (1.48, 1.57)</td>
</tr>
<tr>
<td>Aboriginal</td>
<td>5.81* (5.59, 6.03)</td>
<td>2.88* (2.75, 3.02)</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>9.61* (8.80, 10.5)</td>
<td>7.98* (7.26, 8.78)</td>
</tr>
<tr>
<td>Birth anomaly</td>
<td>1.11* (1.05, 1.18)</td>
<td>1.08* (1.02, 1.15)</td>
</tr>
<tr>
<td>Preterm birth (&lt;37 weeks)</td>
<td>1.38* (1.32, 1.46)</td>
<td>1.17* (1.11, 1.24)</td>
</tr>
<tr>
<td>Birthweight percentile for gestational age &lt;10th%</td>
<td>1.48* (1.42, 1.55)</td>
<td>1.22* (1.16, 1.27)</td>
</tr>
<tr>
<td>Not married / unknown</td>
<td>2.26* (2.17, 2.34)</td>
<td>1.27* (1.21, 1.32)</td>
</tr>
<tr>
<td>Maternal age 30+</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Maternal age &lt;20</td>
<td>3.49* (3.32, 3.68)</td>
<td>1.57* (1.48, 1.67)</td>
</tr>
<tr>
<td>Maternal age 20-29</td>
<td>1.62* (1.57, 1.67)</td>
<td>1.25* (1.21, 1.29)</td>
</tr>
<tr>
<td>Maternal substance-related contact</td>
<td>2.49* (2.38, 2.61)</td>
<td>1.30* (1.23, 1.38)</td>
</tr>
<tr>
<td>Maternal assault</td>
<td>5.41* (5.08, 5.76)</td>
<td>1.42* (1.31, 1.54)</td>
</tr>
<tr>
<td>Maternal mental health contact</td>
<td>1.56* (1.51, 1.62)</td>
<td>1.16* (1.12, 1.21)</td>
</tr>
<tr>
<td>Paternal substance-related contact</td>
<td>1.90* (1.82, 1.99)</td>
<td>1.17* (1.11, 1.24)</td>
</tr>
<tr>
<td>Paternal Assault</td>
<td>2.32* (2.19, 2.46)</td>
<td>1.17* (1.10, 1.25)</td>
</tr>
<tr>
<td>Paternal mental health contact</td>
<td>1.47* (1.40, 1.54)</td>
<td>1.17* (1.10, 1.23)</td>
</tr>
<tr>
<td>SEIFA 1 – least disadvantaged</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>2</td>
<td>1.64* (1.54, 1.74)</td>
<td>1.39* (1.31, 1.47)</td>
</tr>
<tr>
<td>3</td>
<td>2.16* (2.04, 2.29)</td>
<td>1.73* (1.63, 1.83)</td>
</tr>
<tr>
<td>4</td>
<td>2.64* (2.50, 2.79)</td>
<td>1.89* (1.78, 2.00)</td>
</tr>
<tr>
<td>5 - most disadvantaged</td>
<td>4.39* (4.17, 4.63)</td>
<td>2.42* (2.29, 2.56)</td>
</tr>
<tr>
<td>ARIA remoteness – 1 least remote</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>2</td>
<td>1.37* (1.31, 1.44)</td>
<td>1.18* (1.13, 1.24)</td>
</tr>
<tr>
<td>3</td>
<td>1.54* (1.48, 1.61)</td>
<td>1.24* (1.19, 1.30)</td>
</tr>
<tr>
<td>4</td>
<td>1.97* (1.88, 2.07)</td>
<td>1.40* (1.32, 1.47)</td>
</tr>
<tr>
<td>5- most remote</td>
<td>4.43* (4.18, 4.71)</td>
<td>2.13* (1.99, 2.29)</td>
</tr>
<tr>
<td>No placements</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>1 placement</td>
<td>3.94* (3.22, 4.83)</td>
<td>1.12* (0.89, 1.41)</td>
</tr>
<tr>
<td>2-3 placements</td>
<td>4.18* (3.57, 4.89)</td>
<td>1.41* (1.18, 1.68)</td>
</tr>
<tr>
<td>4+ placements</td>
<td>4.09* (3.50, 4.77)</td>
<td>1.14* (0.95, 1.35)</td>
</tr>
</tbody>
</table>

Number of Placements

<table>
<thead>
<tr>
<th></th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Aboriginal</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>No placements</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>1 placement</td>
<td>2.65* (1.95, 3.61)</td>
<td>1.18* (0.85, 1.63)</td>
</tr>
<tr>
<td>2-3 placements</td>
<td>3.85* (3.14, 4.72)</td>
<td>1.71* (1.38, 2.14)</td>
</tr>
<tr>
<td>4+ placements</td>
<td>3.98* (3.22, 4.92)</td>
<td>1.61* (1.28, 2.02)</td>
</tr>
</tbody>
</table>
The associations between number of placements and low reading scores did not fit a dose-response pattern (see Table 9). Overall, 2-3 placements were associated with significantly worse reading scores than no placements, however 1 placement and 4+ placements were not associated with worse reading scores in the multivariate model. For non-Aboriginal students, 2-3, or 4+ placements were associated with significantly worse reading scores than no placements, whereas one placement did not differ significantly from no placements for reading scores.

**Time in Current Placement**

Table 10. Logistic regression: Odds of low reading scores for children months in current placement for all children

<table>
<thead>
<tr>
<th>Months in current placement</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not in OOHC or &lt;1</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>1-12 months</td>
<td>5.18* (4.16, 6.46)</td>
<td>1.44* (1.12, 1.85)</td>
</tr>
<tr>
<td>13-24 months</td>
<td>3.71* (2.59, 5.32)</td>
<td>1.10 (0.73, 1.65)</td>
</tr>
<tr>
<td>&gt;24 months</td>
<td>2.89* (2.27, 3.67)</td>
<td>0.77 (0.59, 1.00)</td>
</tr>
</tbody>
</table>

Notes. Multivariate analysis adjusted for child age, atypically high age, gender, Aboriginality, intellectual disability, birth anomaly, preterm birth, low birthweight for gestational age, maternal age, mother’s marital status at birth, maternal substance contacts, maternal assault contacts, maternal mental health contacts, paternal substance contacts, paternal assault contacts, paternal mental health contacts, SEIFA, ARIA

* p < .05.

A short duration in the most recent placement (up to 12 months) was associated with worse reading scores compared to no placements (OR 1.44, 95% CI [1.12,1.85]), as shown in Table 10. Reading scores for children with more than 12 months in the current placement did not differ significantly from those of children not in care.
Reunification and Time Since Reunification

Children who had been reunified before the Y3 reading test performed significantly worse than the general population (OR=1.35, 95% CIs [1.16, 1.57], whereas children still in care did not differ from the general population (Table 11).

For children who had been reunified, being reunified within 12 months prior to the Year 3 tests was associated with worse reading scores compared to those who had been reunified for more than 12 months. As the duration of time since reunification increased, however, the ‘protective’ effect of being past the first 12 months decreased. Number of periods of care (where higher numbers indicate a greater number of care entries and reunifications) was not significant in either the univariate or multivariate analysis, including when broken down by Aboriginality.

Table 11. Logistic regressions: Odds of low reading scores by reunification status and time since reunification

<table>
<thead>
<tr>
<th>Reunification status</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never in care</td>
<td>Reference level</td>
<td>Reference level</td>
</tr>
<tr>
<td>Reunified – home at time of test</td>
<td>4.21* (3.69, 4.80)</td>
<td>1.35* (1.16, 1.56)</td>
</tr>
<tr>
<td>In care at time of test</td>
<td>3.94* (3.41, 4.56)</td>
<td>1.09 (0.93, 1.29)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If Reunified: Time Since Exiting Last Placement</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12 months</td>
<td>Reference level</td>
<td>Reference level</td>
</tr>
<tr>
<td>&gt;1-2 years</td>
<td>0.50* (0.31, 0.80)</td>
<td>0.51* (0.31, 0.83)</td>
</tr>
<tr>
<td>&gt;2-4 years</td>
<td>0.56* (0.38, 0.81)</td>
<td>0.60* (0.40, 0.89)</td>
</tr>
<tr>
<td>&gt;4-6 years</td>
<td>0.63* (0.44, 0.92)</td>
<td>0.65* (0.43, 0.97)</td>
</tr>
<tr>
<td>&gt;6 years</td>
<td>0.94 (0.63, 1.40)</td>
<td>0.89 (0.58, 1.36)</td>
</tr>
</tbody>
</table>

Notes. Multivariate analyses adjusted for child age, atypically high age, gender, Aboriginality, intellectual disability, birth anomaly, preterm birth, low birthweight for gestational age, maternal age, mother’s marital status at birth, maternal substance contacts, maternal assault contacts, maternal mental health contacts, paternal substance contacts, paternal assault contacts, paternal mental health contacts, SEIFA, ARIA

* p < .05.

Primary Type of Care

Primary type of care was defined as more than 65% of out-of-home care days spent in kinship, foster or residential care, or ‘mixed care’ when there was no primary type. Overall, before adjusting for other risk factors, all placement types were associated with significantly
lower reading scores, with odds ratios varying from OR 3.00, 95% CI[2.52, 3.58] for foster care to OR 6.81, 95% CI[4.94, 9.39] for residential care. The risk associated with placement type was largely attenuated in the multivariate model. For non-Aboriginal children the multivariate analysis showed only ‘mixed’ placement (no primary type) was associated with worse reading scores than the general population (Table 12). For Aboriginal children residential care had the highest risk of low reading scores but none of the care types were significantly associated with reading scores in the multivariate model.

Table 12. Logistic regressions: Odds of low reading scores by primary type of OOHC, overall and by Aboriginality

<table>
<thead>
<tr>
<th>Primary type of OOHC</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other children</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Kinship</td>
<td>4.51* (3.73, 5.44)</td>
<td>1.01 (0.82, 1.24)</td>
</tr>
<tr>
<td>Foster</td>
<td>3.00* (2.52, 3.58)</td>
<td>1.06 (0.87, 1.29)</td>
</tr>
<tr>
<td>Residential</td>
<td>6.81* (4.94, 9.39)</td>
<td>1.39 (0.98, 1.99)</td>
</tr>
<tr>
<td>Mixed/No Primary Type</td>
<td>4.91* (3.94, 6.13)</td>
<td>1.44* (1.13, 1.84)</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other children</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Kinship</td>
<td>3.78* (2.78, 5.12)</td>
<td>1.47* (1.06, 2.03)</td>
</tr>
<tr>
<td>Foster</td>
<td>3.01* (2.44, 3.71)</td>
<td>1.20 (0.96, 1.51)</td>
</tr>
<tr>
<td>Residential</td>
<td>3.22* (1.70, 6.11)</td>
<td>1.47 (0.75, 2.90)</td>
</tr>
<tr>
<td>Mixed/No Primary Type</td>
<td>5.52* (4.11, 7.40)</td>
<td>2.35* (1.71, 3.22)</td>
</tr>
<tr>
<td>Aboriginal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other children</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Kinship</td>
<td>1.21 (0.95, 1.55)</td>
<td>0.95 (0.73, 1.24)</td>
</tr>
<tr>
<td>Foster</td>
<td>1.06 (0.76, 1.48)</td>
<td>0.90 (0.63, 1.28)</td>
</tr>
<tr>
<td>Residential</td>
<td>2.20* (1.48, 3.27)</td>
<td>1.35 (0.88, 2.07)</td>
</tr>
<tr>
<td>Mixed/No Primary Type</td>
<td>1.12 (0.80, 1.57)</td>
<td>0.95 (0.66, 1.36)</td>
</tr>
</tbody>
</table>

Notes. Multivariate analyses adjusted for child age, atypically high age, gender, Aboriginality, intellectual disability, birth anomaly, preterm birth, low birthweight for gestational age, maternal age, mother’s marital status at birth, maternal substance contacts, maternal assault contacts, maternal mental health contacts, paternal substance contacts, paternal assault contacts, paternal mental health contacts, SEIFA, ARIA

* p < .05.

Most Recent Type of Care

We defined most recent care type as the type of current placement for children in care, or the last placement for children who had been reunified. The three major care types (kinship, foster or residential) were compared to all other children in the population (Table 13). For
most recent care type, residential care was associated with significantly worse reading outcomes for non-Aboriginal children and overall. Residential care was also associated with the highest risk of low reading scores for Aboriginal children but was non-significant. Kinship care was associated with significantly worse reading outcomes for non-Aboriginal children, whereas for Aboriginal children whose most recent placement was kinship care outcomes were similar to the general population of Aboriginal children.

Table 13. Logistic regressions: Odds of low reading scores by recent type of OOHC, overall and by Aboriginality

<table>
<thead>
<tr>
<th>Most recent type of OOHC</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other children</td>
<td>Reference level</td>
<td>Reference level</td>
</tr>
<tr>
<td>Kinship</td>
<td>4.73* (3.95, 5.68)</td>
<td>1.03 (0.84, 1.26)</td>
</tr>
<tr>
<td>Foster</td>
<td>3.18* (2.68, 3.78)</td>
<td>1.13 (0.93, 1.37)</td>
</tr>
<tr>
<td>Residential</td>
<td>6.92* (5.18, 9.25)</td>
<td>1.50* (1.08, 2.08)</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other children</td>
<td>Reference level</td>
<td>Reference level</td>
</tr>
<tr>
<td>Kinship</td>
<td>4.10* (3.06, 5.50)</td>
<td>1.52* (1.11, 2.08)</td>
</tr>
<tr>
<td>Foster</td>
<td>3.04* (2.46, 3.76)</td>
<td>1.25 (0.99, 1.57)</td>
</tr>
<tr>
<td>Residential</td>
<td>4.60* (2.81, 7.55)</td>
<td>1.99* (1.17, 3.38)</td>
</tr>
<tr>
<td>Aboriginal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other children</td>
<td>Reference level</td>
<td>Reference level</td>
</tr>
<tr>
<td>Kinship</td>
<td>1.25 (0.98, 1.58)</td>
<td>0.99 (0.77, 1.28)</td>
</tr>
<tr>
<td>Foster</td>
<td>1.18 (0.86, 1.60)</td>
<td>1.03 (0.74, 1.43)</td>
</tr>
<tr>
<td>Residential</td>
<td>2.10* (1.45, 3.06)</td>
<td>1.31 (0.87, 1.96)</td>
</tr>
</tbody>
</table>

Notes. Multivariate analyses adjusted for child age, atypically high age, gender, Aboriginality, intellectual disability, birth anomaly, preterm birth, low birthweight for gestational age, maternal age, mother’s marital status at birth, maternal substance contacts, maternal assault contacts, maternal mental health contacts, paternal substance contacts, paternal assault contacts, paternal mental health contacts, SEIFA, ARIA

* p < .05.

Time in Care

Despite the fact that total time in care may be spread over more than one placement so does not necessarily indicate stability, the results for longer duration in care overall were similar to the results for amount of time in the most recent placement. Shorter amounts of time (up to 1 year, and 1-5 years) were associated with significantly worse reading outcomes compared to no time in care (OR 1.35, 95% CI [1.12, 1.62] and OR 1.34, 95% CI [1.14, 1.59]
respectively). For children who had been in care for over 5 years in total, reading outcomes did not differ from the general population (OR 0.87, 95% CI [0.69,1.11]).

**Age at First Entry to Care**

In the multivariate model, children who first entered care aged 4 and older had significantly worse reading outcomes compared to children who entered care aged 0-3 years (OR 1.24, 95% CI [1.01,1.54]).

**The Role of Attendance**

Sensitivity analysis was conducted to ensure that the differences observed in reading scores weren’t purely a result of difference in school attendance. Attendance data was only available for a subgroup of the cohort, comprised of the children who attended Government schools and sat Year 3 reading tests between 2008-2010. This group included a total of 44,773 students, including 751 with out-of-home care experiences. The results were broadly consistent with the findings presented above. Although some effects were attenuated, caution must be taken in interpreting the results because of small sample sizes, particularly in the more detailed analyses. Attendance was a significant predictor of reading scores, and relationships between out-of-home care experiences and attendance warrants more nuanced examination with a larger dataset, which is beyond the scope of this paper. The sensitivity analysis conducted showed that the main findings are robust when controlled for attendance, and that other pathways contribute to the effect of placement experiences on reading scores. It did not rule out attendance as an independent contributor or partial mediator of reading scores.

**Discussion**

This is the first Australian study to examine the relationship between a comprehensive set of out-of-home care history characteristics and children’s educational outcomes at a population level. The inclusion of longitudinal data on all placement experiences from birth, along with child, family and neighbourhood covariates is a strength of the study. Our results showed that
the early educational outcomes of children vary across children with different placement histories. The results are not intended to reflect causal effects of specific placement decisions (although this may sometimes be the case), but rather to identify the placement history characteristics associated with worse reading outcomes, to inform targeting of educational support services. The major findings can be grouped into three topics: where the child has been placed, the relationship between placement changes or stability and time, and the possibility of cumulative effects of instability via multiple placement changes.

**Where the Child Has Been Placed**

Placement type was significantly associated with differences in reading scores. Based on the unadjusted analysis, children in all primary placement types were at significantly increased risk of poor reading compared to children without child protection contact, however the increased risk varied from seven-fold for residential care, down to four to five fold increased risk for mixed care and kinship care, and a threefold increased risk for foster care. Examination of the results by Aboriginality showed that for Aboriginal children, residential care was associated with significantly worse reading in the univariate analysis, but was not significant after controlling for other risk factors. For non-Aboriginal children, mixed care type was associated with a doubled risk of poor reading even after adjusting for other risk factors, while kinship care was associated with a smaller but significant increased risk of low reading scores. Results for most recent placement type were similar, but also indicated significantly worse risk for non-Aboriginal children who had been in residential care.

Although previous studies have not always found a significant difference in academic outcomes by placement type (AIHW, 2007; Conger & Rebeck, 2001), our finding of worse educational outcomes among children who had been placed in residential care are consistent with those of Flynn and colleagues (Flynn, Tessier, & Coulombe, 2013) as well as research showing a variety of other adverse outcomes among children in residential care, including subsequent placement breakdowns, worse school attendance (Conger & Rebeck, 2001), behaviour problems (Lee, 2009) and arrests (Baskin & Sommers, 2011). It has been suggested that the poor outcomes common among children in residential care may not reflect
the impact of residential care, but rather the frequency of severe emotional and behavioural problems among children for whom residential care is more likely to be seen as a viable placement option (Bath, 2008). In keeping with that explanation, after controlling for risk factors including behavioural and emotional problems Flynn et al. (2013) found the effect of placement type was attenuated. Nevertheless, with children placed in residential care showing an almost seven-fold crude increased risk in poor educational outcomes, this is a group for whom educational supports must be a priority (along with addressing psychological needs).

Kinship care was associated with increased risk of low reading scores among non-Aboriginal children, but not among Aboriginal children. It can be harder to detect predictors of poor outcomes among Aboriginal children, given the lower sample size and the prevalence of low reading scores, however the odds ratios suggest kinship care is associated with reasonably favourable outcomes among Aboriginal children. We do not advocate a reduction in kinship care based on our results, as kinship care may have important emotional benefits, however the results suggest a need for increased support. Kinship carers have been found to receive less support than foster carers, and given the higher levels of low-education, poverty and stress (Ehrle & Geen, 2002; Gebel, 1996; Spence, 2004), may actually have greater needs for support. One study found kinship carers who had lower education levels themselves felt intimidated by the education system and therefore reluctant to engage with it. The same study found an improvement in kinship carers’ self-efficacy in supporting the educational needs of children in their care following a school-based intervention (Strozier, McGrew, Krisman, & Smith, 2005).

Results for children who had been reunified are at least as concerning as those of children who are in care. Although there was not a large difference between the two groups, children who had returned home prior to the reading test had significantly worse reading outcomes than children with no child protection involvement, whereas children still in care did not. This is consistent with studies showing reunified children to be a group with increased risk for a range of adverse outcomes (Bellamy, 2008; Taussig et al., 2001; Wade, Biehal, Farrelly,
& Sinclair, 2010). In Western Australia, education officers within Child Protection and Family Support are available to assist with children’s education needs while they are in out-of-home care. This support ceases upon reunification.

**Placement and Time**

The second set of findings relate to the impact of placement in relation to time. One aspect of time is the point in the child’s life at which they first enter care. We found worse outcomes for children who first entered care aged four and over, compared to younger entrants. This is consistent with research showing a range of other adverse outcomes are more common for children entering care at an older age (Farmer, 2010; Lee, 2009; DeGue & Widom, 2009). As all children were around eight years old when they sat the Year 3 tests, we cannot ascertain whether the better outcomes for younger entrants reflect greater adaptability to out-of-home care among very young children, an increase in the time between first entry and the time of the test, or earlier child protection intervention.

Time in a particular living arrangement can also shape outcomes. For both placement changes and reunifications we saw worse reading outcomes if the test was within one year after the change in living arrangements, which may reflect the disruptive effect of such changes. Our results differed from a previous study which found more positive educational outcomes at Wave 2 for children who entered care after Wave 1 of the survey (Font & Maguire-Jack, 2013), but are consistent with research showing that times of transition can be disruptive for children (Newman & Blackburn, 2002). In both cases (placement changes and reunifications), the initial ‘disrupted’ year was followed by a linear pattern, although in opposite directions. Reunified children had least risk of low reading scores one to two years after reunification, with risk then increasing over time. Conversely, children who were in-out-of-home care had a trend towards better outcomes as the time in the current placement increased. A similar pattern was found for total time in care. The results suggest that periods of instability negatively affect reading outcomes, whereas stability may help or hinder outcomes, most likely depending on the quality of the home environment. Reunified children may be exposed to a much greater array of adversities, in addition to the risk of maltreatment
recurrence. A better understanding of the factors influencing reunified children’s educational outcomes over time would be valuable.

Potential Cumulative Risk from Multiple Placements

Given the apparently disruptive effect of placement changes, one might expect that multiple placements would result in higher cumulative risk of low reading scores. High numbers of placements have been linked to a range of adverse outcomes for children in care including poor educational outcomes (Zima et al., 2000; Vinnerljung, Öman & Gunnarson, 2005) and also problem behaviours (Runyan & Gould 1985b; Widom, 1991; Lee, 2009). Contrary to our expectations, we did not find a consistent linear effect of number of placements, although for non-Aboriginal children, a single placement was associated with better outcomes than more than one placement. Ours is not the first study not to find a clear association between placement stability and educational outcomes: Runyan & Gould found no significant effect of number of placements (1985a). It should also be noted that care history variables are often interlinked, for instance for almost half of Aboriginal children with a single placement the most recent placement was in residential care, and placement length was likely to be shorter. Over half (58%) of Aboriginal children with four or more placements were most recently in kinship care. Any impact of placement moves in our study population may have been outweighed by other factors related with positive educational outcomes. Although further research is needed, our results suggest that a placement move can be associated with positive outcomes where the placement is of overall benefit to the child. An Australian study found that although stability and number of placements were significantly associated with educational attainment, feeling loved and secure was even more important (Cashmore, Paxman, & Townsend, 2007).

The study had a number of limitations. Overall, there are marked differences in both the backgrounds of the children entering different types of out-of-home care, and in the patterns of use (such as number of placements, time in care and likelihood of reunification across different care types). Given the limited sample size and distributions of variables, it was not feasible to include all variable combinations in one analysis and disentangle the many
potential complex interactions between the variables. Furthermore, this study could not capture some important characteristics of the children (such as behavioural and mental health problems) and of the foster care environment (such as the education and poverty status of the caregiver), which have also been found to differ across care types. Therefore in interpreting the results, each variable can be used as a marker of educational risk, but should not be considered as causal, nor independent from other characteristics of the child and their placement histories as in reality these are deeply interwoven.

Despite these limitations, the study highlights out-of-home care history characteristics that are associated with better and worse educational outcomes for children. It is the first study to examine such a broad range of out-of-home characteristics in relation to educational outcomes, and includes information such as the relationship between time since reunification and educational outcomes which has not been previously examined.

This information can be used in targeting support services for children who have been in care. Children in residential care have a much higher risk of low reading scores, although the risk is attenuated by background adversities in a number of the analyses. Regardless of the causes, these children have greater need for services that improve their educational outcomes, whether by directly targeting educational difficulties, or where appropriate ensuring mental health and behavioural issues that can impact on schooling are addressed. Kinship carers may benefit from additional support in helping the children in their care with schooling. School based interventions to increase caregivers confidence liaising with the school have shown some promise, however direct interventions with the children may also be needed. Reunified children had increasing risk of low reading scores as the time since reunification increased from one to five years. Many supports are restricted to children currently in care, so reunified children are likely to be an under-serviced group. Children aged four and above at placement had increased educational risk. Transitions appear to also be disruptive for children, although the effects reduced over time and did not accumulate. Although it is concerning that such educational disparities are present at such a young age even within a group of children with maltreatment and out-of-home care backgrounds, knowledge of factors associated with
worse outcomes can assist in targeting support to the children with greatest need, and at the appropriate times.

Several areas for further research are highlighted by this study. First, it would be valuable to understand the causal mechanisms behind the associations between various out-of-home care experiences and adverse educational outcomes. Qualitative studies in the less studied areas (such as time since reunification) would be valuable, followed by research that quantifies the findings. Second, our study focussed on relatively young children (up to approximately age eight). It is possible that some out-of-home care experiences may have a greater or different effect on older children’s educational outcomes, as children accumulate a longer placement history, face more challenging school work, and reach adolescence. Research examining the relationship between children’s care experiences and their educational trajectories into high school is required. Finally, further research assessing the effectiveness of educational interventions for children in out-of-home care is required. Although there is research evidence for a number of types of interventions, to-date they have not been compared, and there is scope for more targeting of the different potential causes of educational difficulties overall and by child or care history characteristics. This study highlights the variations in educational outcomes across children with different care history characteristics, and groups most in need of intervention to prevent long-term educational difficulties.
Chapter 7 Year 9 Reading Outcomes and Trajectories from Year 3-9 for Children with Different Levels of Child Protection Contact

Preamble

The previous two Chapters have examined the relationships between various risk factors, including child protection factors, background adversity and attendance on early reading outcomes (Year 3). This chapter builds on previous Chapters by exploring reading outcomes for high school students (Year 9) with different levels of child protection involvement and the patterns and trajectories of reading achievement as students move from Year 3 to Year 9. The influence of risk factors such as child, family and neighbourhood level characteristics, and school attendance are also examined. The Chapter contains a series of sub-studies examining different aspects of the educational development of children involved with the child protection system as they become older.
Introduction

Most studies examining educational outcomes for maltreated children and children in care have assessed outcomes at a single point in time, leaving many unanswered questions regarding whether outcomes vary with age or over time. This Chapter aims to explore a series of distinct but related questions about reading outcomes for Year 3 to 9 students with different levels of child protection contact.

Are maltreatment, level of child protection involvement, adversity and attendance predictive of Year 9 reading scores in the same way they are among Year 3 reading scores?

Studies have often examined educational outcomes for maltreated children at a single point in time, which leaves questions regarding whether differences in outcomes result from different age groups of the study participants, or reflect other aspects of the study design (Maclean et al., 2015). More consistent educational outcomes for maltreated children have tended to be found in studies with younger children (e.g. Maclean et al., 2015; Rouse & Fantuzzo, 2009), with mixed results among high school students (Boden et al., 2007; Mersky & Topitzes, 2010). Studies that use a consistent design and examine educational outcomes at different ages for maltreated children would show whether results are consistent across age groups.

With regards to children who have entered out-of-home care, Brownell et al., (2015) found only 38% of children who had ever been in care met or approached expected mathematics standards in Year 7, whereas 49% had met or approached expected standards in Year 3. In comparison, among children without involvement with Child and Family Services 76% met or approached the Grade 7 standard and 80% met or approached the Grade 3. Although these results are descriptive, they are indicative that the gap between children who have and have not entered care may be greater among older students. Risk factors for low achievement among children who had ever been in care were similar for the two different year levels. Although the study included a number of risk factors, some important risk factors such as
parental mental health, substance abuse and exposure to violence, and children’s level of school attendance were not included in predicting achievement outcomes.

In Chapter 5, results showed that children with a maltreatment allegation had a 3.38 times increased odds of poor Year 3 reading scores. Although attenuated in the multivariate analysis, maltreatment allegations remained a significant predictor of low reading scores. In examining level of child protection contact, the inclusion of child, family and neighbourhood risk factors attenuated risk of low reading scores for children who had ever entered care to the extent that results were not significantly different than for children with no child protection involvement. Children with unsubstantiated or substantiated maltreatment that remained at home still had significantly worse reading scores than children with no child protection involvement after adjusting for these risk factors. Intellectual disability, low parent education levels, neighbourhood level social disadvantage, being atypically old for year level, high levels of school absence, and being Aboriginal, were each associated with at least a twofold increase in the odds of low Year 3 reading scores in the multivariate analysis. The first sub-study in this chapter aims to build on Chapter 5, examining whether maltreatment, level of child protection contact, adversity and attendance are predictive of Year 9 reading scores in the same way as observed previously among Year 3 reading scores. The analysis is then extended to take into account Year 3 level of child protection contact and age at entry to care, to assess whether positive Year 9 reading outcomes are only affected by children’s highest level of contact by Year 9, or whether outcomes differ depending on the timing of child protection involvement.

**Is reading achievement from Year 3 to Year 9 characterised by stability or change for children with different levels of child protection involvement?**

**Part A) To what extent does early (Year 3) reading predict later (Year 9) reading among children with different levels of child protection involvement?**

For decades, researchers have been interested in understanding children’s patterns of achievement over time, whether these are characterised by stability or change (Belmont &
Belmont, 1978), and the factors that influence development in key areas such as language and reading skills. Understanding the extent to which early achievement predicts later achievement, and the factors associated with educational risk and resiliency, are fundamental issues in educational research.

Research indicates that previous achievement is a strong predictor of subsequent achievement in areas such as reading and mathematics. For example, skills in mathematics and reading around the time of school entry were found to be the strongest predictors of later performance (from age 8 to 13) in a meta-analysis (Duncan et al., 2007). Similar patterns were found in high school, with Year 7 literacy and numeracy scores explaining a large proportion of the variation in Year 10 English and mathematics achievement (Hemmings & Kay, 2010). Marks (2014) found that early school achievement was the best predictor of later achievement, and controlling for socioeconomic status and school made little difference to this finding. Based on this, the author recommended that policies and interventions focus on prenatal, infant and preschool factors that may increase early ability and achievement, rather than focusing on resources of families or schools during the school years.

Despite this evidence of consistency in achievement over time, there is also research indicating individuals’ achievement can change markedly across time. For example, Belmont and Belmont (1978) found that the majority of children experienced functionally significant changes in their reading achievement rankings over the six years of elementary school. More recently, using latent class analysis to examine patterns of preschool language development, Ukoumunne, et al., (2012) found that a significant minority of children experience patterns of surges, slow progression and catch-up growth rather than a steady progression. These findings suggest that fluctuating levels of achievement may be relatively common. Zubrick, Taylor, and Christensen (2015) closely examined issues of stability and change in language and literacy development from age 4 to 10 and found that although early language development was an important predictor of later language outcomes, it’s predictive power was limited, and many children developed language problems later. Consequently,
identification and intervention for language problems needs to continue throughout schooling rather than focussing efforts entirely on intervention in early childhood.

The developmental patterns of children involved in the child protection system warrant particular attention. These children often experience a range of risk factors, as well as exposure to maltreatment which may occur once or chronically. Furthermore, the children may experience significant interventions such as out-of-home care, and placement in a new home environment which may positively or negatively affect their development. Consequently, they may experience even more instability in their patterns of development than other children. This sub-study provides a first step in exploring the extent to which early reading scores predict later reading scores for children with each level of child protection involvement (none, unsubstantiated allegations, substantiated maltreatment, or out-of-home care following maltreatment).

**Part B) What are the common patterns of reading achievement from Year 3 to Year 9 for children with different levels of child protection contact?**

This sub-study builds on the last to describe common patterns of achievement across Year 3 to Year 9, using descriptive methods (cross-tabulation). Although simple, it answers important questions regarding the proportion of children with different levels of child protection contact who show improvements or declines over time, or show stable high or low levels of reading achievement.

An Australian pilot study examined the educational outcomes over time of children on guardianship/custody orders (AIHW, 2007). Most children on orders reside in out-of-home care (AIHW, 2015a). The study examined educational achievement using achievement tests conducted in Year 3, 5, and 7 of school. The study included 695 children from five Australian States who were continuously on guardianship/custody orders and sat two test levels between 2003 and 2006. Children were twice as likely to show a declining pattern of achievement (meeting the official ‘benchmark’ level of achievement at the first test only) than to show an improving pattern of achievement (meeting the benchmark at the second test, but not the
first). This important study raises many further questions about the ongoing achievement of child protection populations over time.

This sub-study extends the duration of trajectories examined in the Australian Institute of Health and Welfare study by including a cohort of children over 4 year levels of testing (Year 3, 5, 7 and 9). It includes a broader group of children with out-of-home care experience - those ‘ever in care’ – as well as children with unsubstantiated and substantiated maltreatment that did not enter care, and a comparison group of children with no child protection involvement.

**What are the reading trajectories for Aboriginal and non-Aboriginal children with different levels of contact with the child protection system at Year 3 and at Year 9 (with and without adjusting for other adversities)?**

Trajectory analysis uses statistical modelling to examine the relationships between a series of outcomes (in this case test scores from Year 3, 5, 7 and 9) in order to understand how children progress over time. Trajectory approaches are often used to identify whether children from disadvantaged groups maintain a level of achievement that is consistently behind those of other students, whether they catch up or fall further behind over time. Some research has found that early gaps in language development associated with a range of risk factors reduced over time (Taylor et al., 2013), however there is also evidence suggesting that achievement gaps increase for children from lower socio-economic backgrounds (Taylor et al., 2013) or with multiple risk factors (Gutman et al., 2003).

There have been a number of recent papers, including those from the Longitudinal Study of Child Abuse and Neglect (LONGSCAN) that have used a trajectory approach for other aspects of maltreated children’s development including behaviour problems (Lewis et al., 2011; Proctor et al., 2010; Tabone et al., 2011) or risky behaviours (Jones et al., 2010). Trajectory approaches are also very common in the mainstream educational research field (e.g. Caro et al., 2009; Gutman et al., 2003; Jordan et al., 2007). Although looking at a series of outcomes over time has become increasingly common in maltreatment research and
education research, this approach has seldom been used to look at educational outcomes among maltreated children. Interesting longitudinal work has been conducted to examine timing of declines in school performance following maltreatment reports, with early onset and recent maltreatment associated with worse outcomes (Leiter & Johnsen, 1997). Another study found maltreated children had increased risk of grade repetition in kindergarten and Grade 1, but not during Grades 2-6 (Rowe & Eckenrode, 1999). Using a trajectory approach, Leiter (2007) showed maltreated children had declining educational trajectories after a first maltreatment report. Declines were sharper for children with unsubstantiated maltreatment, which was attributed to the public response to substantiated maltreatment lessening the impact on educational outcomes. Further research into the educational trajectories of maltreated children is needed that differentiates between substantiated maltreatment with and without out-of-home care and that takes into account other factors associated with positive or negative trajectories.

Like maltreatment research, out-of-home care research has not often examined educational trajectories. Language development trajectories from infancy to age 6 were found to not differ significantly by placement type (parents, kinship care or foster care) among maltreated children after adjusting for demographic characteristics of the child and caregiver (Stacks et al., 2011). As noted above, one study examined the achievement outcomes of Australian children on guardianship/custody orders over two time points and found declines were more common than improvements. The authors suggested a need for research on academic trajectories of children in care that includes a broader range of social and demographic background variables such as socio-economic status.

This sub-study aims to describe the educational trajectories of children with different levels of child protection involvement, and the influence of characteristics of the child, family and neighbourhood on these trajectories. It extends previous Australian research by covering four tests spanning seven years of schooling which is more suitable for statistical modelling of trajectories (Singer & Willett, 2003), and builds on previous maltreatment trajectory research by differentiating between cases where the children do or do not experience out-of-home care.
after substantiated maltreatment. As the extent of involvement with child protection can vary over time, this sub-study takes the novel approach of examining combinations of children’s highest level of child protection at Year 3 and Year 9.

It also builds on the previous sections of this chapter that began to examine changes in children’s reading achievement over time, and examines the risk factors that influence reading development from Year 3 to 9. As Aboriginal children are over-represented in the child protection system but constitute a relatively small portion of the total population, results are modelled separately for Aboriginal and non-Aboriginal children, in order to assess the influence of risk factors for both groups.

**The Present Study**

As outlined above, this chapter contains a number of sub-studies addressing a series of research questions regarding the educational outcomes and trajectories for students with different levels of child protection contact as they move from Year 3 to Year 9. The research aims underpinning the three sub-studies were as follows:

1. To examine whether maltreatment, level of child protection involvement, adversity and attendance are predictive of Year 9 reading scores (as they were for Year 3 reading scores).

2. To examine whether reading achievement from Year 3 to Year 9 is characterised by stability or change for children with different levels of child protection involvement:

   Part a) Assess whether early reading scores (Year 3) predict later reading scores (Year 9) among children with different levels of child protection involvement.

   Part b) Describe common patterns of reading achievement from Year 3 to Year 9 for children with different levels of child protection contact.
3. To describe the reading trajectories for Aboriginal and non-Aboriginal children with different levels of contact with the child protection system at Year 3 and at Year 9 (with and without adjusting for other adversities).

Method

Data Sources and Cohorts

The study used linked administrative data from the Departments of Health, Child Protection and Family Support, Education, and the Intellectual Disability Exploring Answers Database. Data linkage was undertaken by the WA Data Linkage Branch within the Department of Health using probabilistic matching. The de-identified data was then provided to the researchers with linkage keys to allow merging of the datasets.

The base cohort for the study consisted of all children born in Western Australia between 1990 and 2010. The cohort was limited to children who completed relevant reading achievement tests for each sub-study (outlined below).

Different subsets of the birth cohort were used in order to best answer each research question: some analyses required variables that were only collected since 2008 (such as parents’ education, or attendance), while in other cases it was more important to include a larger number of children with child protection contact, so sample size was enhanced by including earlier test years – the trade-off for this was having to exclude some useful variables.

Sub-study 1: To maximise comparability with Study 2 of this thesis, the Year 9 data was utilised for the same tests years in which the Year 3 data had been available at the time of publishing Study 2, i.e. 2008-2010 (additional child protection data later enabled the use of data to 2013).

Sub-study 2 Part A: The overall analysis was conducted using the data from sub-study 1, for consistency. To increase the sample sizes of the child protection groups, while still
including attendance data, the stratified analysis by level of child protection involvement used data from children who sat the Year 9 tests from 2008-2012.

**Sub-study 2 Part B and Sub-study 3:** These sub-studies used all children who sat the Year 3 test between 1999-2007, which allowed them to potentially sit all four test levels (Year 3, 5, 7, and 9). They mainly sat Year 9 between 2005 and 2013 with a small number sitting the Year 9 test in 2004. This sample was selected to maximise the sample size of children in care while also reducing the number of children who only had the opportunity to sit some of the tests thus creating a more balanced dataset (Singer & Willett, 2003). Sub-study 2 Part B included only students who sat all four reading tests.

**Measures**

*Child Characteristics*

Child characteristics included gender, Aboriginality, age at the time of the test, preterm births (<37 weeks gestation), low birthweight for gestational age, birth anomalies and intellectual disability. In sub-study 1 and 2, child age at the time of test included age in months, as well as a binary indicator of being older than the typical range for the test level (likely to indicate the child had been held back at school). In sub-study 4, a categorical variable was used. This variable used children in the typical age range for the test as the reference level, compared with children who were atypically young and children who were atypically old for test level.

*Parent Characteristics*

Parent characteristics included maternal age and marital status at the child’s birth. The Hospital Morbidity Data System and Mental Health Information System include public and private in-patient admissions and public out-patient admissions. These contain ICD codes from which we ascertained maternal and paternal hospital contacts for mental health, substance-related or assault victimisation events. Parent-reported data on highest level of completed education was coded for both parents combined as: Year 11 or less; Year 12 (the final year of secondary schooling in Western Australia); Advanced certificate, or Diploma;
University Degree; or missing data. Parent education data was only collected from 2008 onwards, so is only used in the sub-studies limited to recent data.

Missing parent education data was relatively common overall (31.2%), and higher among the children with child protection involvement (49% of children). Examination of missing parent education data showed that missing data was a relevant category in itself, associated with low reading scores and higher levels of adversity. The use of a missing category was selected in order to make use of this important variable and maintain the sample size and composition (excluding children with missing parent education data would systematically bias the sample). Alternative treatments of missing parent education data including multiple imputation were assessed in Chapter 5 and results were found to be fairly robust.

Community Characteristics

Community variables included the Socio Economic Indices for Area (SEIFA), which measures neighbourhood level social disadvantage at the time of the child’s birth. The Accessibility/Remoteness Index of Australia (ARIA) provides a measure of the accessibility of the area where the family resides at the child’s birth.

Child Protection Involvement

For the first analysis in sub-study 1, children were coded as having a maltreatment allegation if they had any recorded allegation prior to the Year 9 test (regardless of whether it was substantiated or not and whether the child entered out-of-home care). Age at first entry to out-of-home care was a categorical variable (ages 0-3, 4-7, 8-11 and 12-15 years). A binary variable was created to indicate if children’s period of care covered the test dates. Highest level of child protection contact by Year 9 included the following categories: none (no maltreatment allegations), unsubstantiated allegation, substantiation with no out-of-home care, or had ever entered out-of-home care following substantiated maltreatment.

Children not only have a trajectory through the education system, but also a trajectory through the child protection system – their level of involvement may change from Year 3 to
Year 9. An additional variable was added to capture this effect – children’s ‘pattern’ of child protection contact was classified based on their highest level of child protection contact by Year 3 in combination with their highest level of child protection contact by Year 9. This results in 10 patterns of contact:

- No allegations by Year 3 and still no allegations by Year 9
- No allegations by Year 3 and one or more unsubstantiated allegations by Year 9
- No allegations by Year 3 and one or more substantiated allegations by Year 9
- No allegations by Year 3 and one or more periods of out-of-home care following substantiated allegations by Year 9
- Unsubstantiated allegation by Year 3 and no substantiations by Year 9
- Unsubstantiated allegation by Year 3 and one or more substantiated allegations by Year 9
- Unsubstantiated allegation by Year 3 and one or more periods of out-of-home care following substantiated allegations by Year 9
- Substantiated allegation by Year 3 and no entry to out-of-home care by Year 9
- Substantiated allegation by Year 3 and one or more periods of out-of-home care following substantiated allegations by Year 9
- Highest level of child protection contact is ‘ever in out-of-home care’ by Year 3 and Year 9

The potential pathways through the child protection system are extremely complex, with numerous events such as maltreatment allegations, substantiations, care entries and exits and placement changes. Each of these can occur once or multiple times for a child, at different time points, and each can be characterised in numerous ways (e.g. a maltreatment allegation will be for a certain type of maltreatment, by a parent or other person, occur at a certain age and proximity to the time of the test, may be a first or subsequent allegation, may be substantiated or not, and so on). Out-of-home care experiences are even more complex. It is acknowledged that any classification of children’s pathways through the child protection system will capture only a portion of the possible events that may influence development.
Nonetheless, examining children’s pattern of highest contact provides important information regarding potential effects of the type and timing of child protection involvement for students as they move through their school years.

**School Attendance**

Attendance data was provided by the Department of Education for the first semester of each year. Attendance was calculated as the percentage of days attended from the potential days enrolled during the first semester of Year 9. For students that changed schools, attendance days and enrolment days were summed across two or more schools. Attendance data was only available from 2008-2012, so therefore can only be used in sub-study 1 and 2.

**Reading Achievement**

The National Assessment Program – Literacy and Numeracy (NAPLAN) was introduced in 2008, and is sat by almost all Australian Year 3, 5, 7 and 9 students in May of each year. From 1999-2007, children sat the Western Australian Literacy and Numeracy Assessment (WALNA). A small percentage of students are absent or withdrawn by their parents, or are exempted from sitting the test if they have severe disabilities or are recent migrants from non-English speaking backgrounds. To facilitate comparisons across WALNA and NAPLAN test years, raw scores were separately standardised for each test level (Year 3, 5, 7 and 9) for each calendar year.

Reading scores were used in different ways in order to provide different perspectives on educational outcomes and trajectories as appropriate for the different research questions.

1. Low versus non-low. Children were categorised as having low reading achievement if they scored in the lowest 10% of students within their test year on the reading test. This grouping is particularly useful when focussing on children with very low reading achievement, and therefore most useful for informing interventions for academically vulnerable students. This dichotomous variable is used in the logistic regression analyses in sub-study 1 and 2, and descriptive analysis in parts of sub-study 2.
2. Low, Medium, High. Defining children’s scores simply as (very) low versus all others does not provide much information about children who are performing well, or in the average range. It also does not tell us anything about whether students who move from (very) low to non-low are doing well, or have simply moved marginally above the cut-off for a very low score. The low, medium, high grouping provides more information in these areas. Children’s reading scores within their test year were grouped into tertiles: bottom 33.3% (low), middle 33.3% (medium) and top 33.3% (high). This classification was used in descriptive analysis in parts of sub-study 2.

3. Z-scores allow standardisation across test years, while still retaining maximum information about the full range of student achievement. These were used in the multi-level models in sub-study 3.

Data Analysis

Sub-Study 1

The risk of low reading achievement in Year 9 for children with a maltreatment allegation, adjusted for child, parent and neighbourhood characteristics, and attendance was examined using multivariate logistic regression analyses. Additional multivariate logistic regression analyses were conducted using level of child protection involvement to assess differences between these subgroups. The analysis was then extended to take into account Year 3 level of child protection contact and age at entry to care, to assess whether positive Year 9 reading outcomes for children with different levels of child protection contact by Year 9 are affected by the timing of first reaching higher levels of child protection contact or entering care.

The analysis was conducted in five steps. First, univariate logistic regression was undertaken to estimate the association between each predictor variable and the outcome variable. Second, each of the multivariate logistic regression analyses described above was conducted with child, parent and community risk factors included as covariates. Third, school attendance was added to each of the multivariate models. Fourth, pattern of highest child protection contact
(at Year 3 and 9) was added. Fifth, we conducted a subgroup analysis for children who had entered care to assess whether age at first entry predicted reading scores. Paternal age was excluded from the models because it is closely correlated with maternal age. All results are presented using odds ratios (ORs) and 95% confidence intervals (CIs) (Tabachnick & Fidell, 2001). Analysis was conducted using SPSS version 22 software.

**Sub-Study 2: Part A**

In order to assess whether early reading scores (Year 3) predict later reading scores (Year 9) among children with different levels of child protection involvement, we conducted stratified logistic regression analysis including Year 3 reading scores in a model containing child, family and neighbourhood level characteristics. Data were analysed using SPSS version 22 software. Odds ratios (ORs) and 95% confidence intervals (CIs) are presented.

**Sub-Study 2: Part B**

To describe common patterns of reading achievement from Year 3 to Year 9 for children with different levels of child protection contact, we examined the frequency of different patterns of reading achievement in two ways. First, we undertook frequency analysis (using cross-tabulation) to identify each of the potential combinations of low (bottom decile) or non-low (all other deciles) reading scores for students that completed Year 3, 5, 7 and 9 reading tests. Second, we used similar methods but grouped reading ability into tertiles (thirds), and examined the percentage of students in each tertile for Year 3 that achieved within each Year 9 tertile. Both analyses were stratified by level of child protection contact. The analysis was conducted using SPSS version 22 software.

**Sub-Study 3**

Mixed effects models were built to describe the trajectory of reading achievement for Aboriginal and non-Aboriginal students. These used a multi-level modelling approach with tests (Year 3, 5, 7 and 9) nested within students. The level 1 part of the model describes individual growth parameters, while the level 2 component models fixed effects – the
estimated population averages of the effect on intercepts and slopes associated with each of the risk factors (Singer and Willett, 2003).

The models were built using a series of steps. First, basic models were run looking simply at the change in reading scores over time. Second, pattern of child protection contact and the interaction between pattern of contact and time was added. Next, each of the candidate risk factors were added to the model separately to assess significance. Interactions between risk factors and time were assessed for selected variables (pattern of child protection contact and SEIFA) based on previous research that suggests socio-economic status and child protection events may result in increasing gaps in outcomes over time. As the model already contains a large number of risk factors we did not include all possible interactions. Interactions that were not statistically significant or had very small effects that did not contribute to the prediction of reading outcomes were not included. The full model was then run. Predictors that were non-significant in the full model were tested using likelihood ratio tests to see if their removal had a significant effect on model fit (Rabe-Hesketh & Skrondal, 2012). The results show the effect of the predictors on the starting point of the trajectory (the intercept), and where a risk factor interacted with time (year level) we see the effect of the risk factor on the slope of the trajectory over time. Time was included as a linear variable, centred at Year 3. Alternative methods of representing time were explored, but the linear approach offered parsimony and improved interpretability. The Wald test showed that the models presented were statistically significant overall.

The model output in presented in table form. To illustrate trajectories for example groups of children, several risk factors have been selected, and the results for children with this combination of risk factors are displayed in a graph format. All of the multi-level modelling was conducted using Stata version 13 software.
Ethics

Ethics approval for the study was granted by the University of WA Human Research Ethics Committee, the Department of Health Human Research Ethics Committee, and the WA Aboriginal Human Information and Ethics Committee.

Results

Sub-study 1

Table 14 presents the results of logistic regression analyses conducted to assess risk factors for low reading scores in Year 9 of school. All of the child, family and neighbourhood risk factors were significant in the univariate analysis, as was attendance and having a maltreatment allegation. Effects of most risk factors were attenuated in the multivariate model, with several predictors rendered non-significant (child age in months, marital status at the child’s birth, maternal mental health contacts, and paternal mental health and substance-related contacts). Maltreatment allegations remained a significant predictor of low reading scores after adjusting for the other risk factors (OR=1.51, 95% CI[1.35, 1.69]). Several risk factors had an odds ratio greater than two in the multivariate analysis. These include intellectual disability, parents without tertiary education, especially those without high school completion, being absent for 15% or more of enrolled days, being Aboriginal, and being older than the typical age range for the test.
Table 14. Logistic regression: Odds of low Year 9 reading scores for children with or without maltreatment allegations by Year 9

<table>
<thead>
<tr>
<th></th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in months</td>
<td>1.02* (1.01, 1.03)</td>
<td>1.00 (0.99, 1.00)</td>
</tr>
<tr>
<td>Higher than typical age</td>
<td>3.26* (2.54, 4.19)</td>
<td>2.19* (1.60, 2.99)</td>
</tr>
<tr>
<td>Young or typical age</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Boys</td>
<td>1.75* (1.64, 1.87)</td>
<td>1.85* (1.72, 1.99)</td>
</tr>
<tr>
<td>Aboriginal</td>
<td>6.01* (5.52, 6.55)</td>
<td>2.71* (2.42, 3.02)</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>14.43* (11.92, 17.47)</td>
<td>12.10* (9.83, 14.90)</td>
</tr>
<tr>
<td>Birth anomaly</td>
<td>1.26* (1.10, 1.43)</td>
<td>1.85* (1.72, 1.99)</td>
</tr>
<tr>
<td>Preterm birth</td>
<td>1.55* (1.39, 1.74)</td>
<td>1.17* (1.03, 1.33)</td>
</tr>
<tr>
<td>Birthweight percentile for</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>gestational age &lt;10th%</td>
<td>1.46* (1.39, 1.74)</td>
<td>1.18* (1.06, 1.30)</td>
</tr>
<tr>
<td>Parent education missing</td>
<td>4.25* (3.32, 5.45)</td>
<td>2.58* (1.99, 3.33)</td>
</tr>
<tr>
<td>Up to Yr11</td>
<td>5.52* (4.27, 7.14)</td>
<td>3.32* (2.54, 4.33)</td>
</tr>
<tr>
<td>Yr12/certificate/diploma</td>
<td>2.76* (2.14, 3.55)</td>
<td>2.23* (1.72, 2.91)</td>
</tr>
<tr>
<td>University degree</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Unmarried / unknown</td>
<td>1.95* (1.80, 2.11)</td>
<td>1.04 (0.94, 1.14)</td>
</tr>
<tr>
<td>Married / defacto at birth</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Maternal age under 20</td>
<td>3.07* (2.76, 3.42)</td>
<td>1.48* (1.30, 1.68)</td>
</tr>
<tr>
<td>20-29</td>
<td>1.57* (1.46, 1.69)</td>
<td>1.24* (1.15, 1.35)</td>
</tr>
<tr>
<td>30+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal substance-related contact</td>
<td>2.44* (2.24, 2.66)</td>
<td>1.24* (1.11, 1.39)</td>
</tr>
<tr>
<td>Maternal assault</td>
<td>5.37* (4.75, 6.06)</td>
<td>1.40* (1.19, 1.64)</td>
</tr>
<tr>
<td>Maternal mental health</td>
<td>1.44* (1.34, 1.56)</td>
<td>0.94 (0.86, 1.03)</td>
</tr>
<tr>
<td>Paternal substance-related contact</td>
<td>1.85* (1.69, 2.02)</td>
<td>1.09 (0.98, 1.23)</td>
</tr>
<tr>
<td>Paternal assault</td>
<td>2.29* (2.05, 2.56)</td>
<td>1.15* (1.01, 1.32)</td>
</tr>
<tr>
<td>Paternal mental health</td>
<td>1.34* (1.21, 1.47)</td>
<td>1.06 (0.94, 1.18)</td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>3.61* (3.14, 4.14)</td>
<td>1.89* (1.62, 2.19)</td>
</tr>
<tr>
<td>2</td>
<td>2.23* (1.93, 2.57)</td>
<td>1.64* (1.40, 1.90)</td>
</tr>
<tr>
<td>3</td>
<td>1.71* (1.47, 1.99)</td>
<td>1.32* (1.13, 1.55)</td>
</tr>
<tr>
<td>4</td>
<td>1.43* (1.22, 1.67)</td>
<td>1.20* (1.02, 1.42)</td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>ARIA remoteness – least remote</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>2</td>
<td>1.15* (1.05, 1.27)</td>
<td>1.05 (0.95, 1.17)</td>
</tr>
<tr>
<td>3</td>
<td>1.12* (1.02, 1.23)</td>
<td>0.96 (0.86, 1.06)</td>
</tr>
<tr>
<td>4</td>
<td>1.44* (1.29, 1.61)</td>
<td>1.06 (0.93, 1.21)</td>
</tr>
<tr>
<td>Most remote</td>
<td>3.83* (3.34, 4.38)</td>
<td>1.92* (1.62, 2.27)</td>
</tr>
<tr>
<td>Attendance (% absent) 0-5%</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>&gt;5-10%</td>
<td>1.35* (1.22, 1.48)</td>
<td>1.29* (1.17, 1.43)</td>
</tr>
<tr>
<td>&gt;10-15%</td>
<td>1.84* (1.66, 2.05)</td>
<td>1.65* (1.48, 1.85)</td>
</tr>
<tr>
<td>&gt;15-25%</td>
<td>2.64* (2.39, 2.92)</td>
<td>2.06* (1.85, 2.30)</td>
</tr>
<tr>
<td>&gt;25%</td>
<td>5.77* (5.21, 6.39)</td>
<td>3.07* (2.73, 3.45)</td>
</tr>
<tr>
<td>Any maltreatment allegation</td>
<td>2.88* (2.63, 3.17)</td>
<td>1.51* (1.35, 1.69)</td>
</tr>
</tbody>
</table>

*p < .05.
Logistic regression analyses were also conducted to assess the Year 9 reading scores of children with different levels of child protection contact (Table 15).

**Table 15. Logistic regression: Odds of low Year 9 reading scores by Year 9 level of child protection involvement**

<table>
<thead>
<tr>
<th>Contact Level</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Univariate OR (95% CI)</td>
<td>Multivariate OR (95% CI)</td>
<td>Multivariate OR (95% CI)</td>
</tr>
<tr>
<td>All Children</td>
<td></td>
<td>without attendance</td>
<td>with attendance</td>
</tr>
<tr>
<td>No allegations</td>
<td>reference</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Unsubstantiated</td>
<td>2.38* (2.09, 2.71)</td>
<td>1.46* (1.26, 1.70)</td>
<td>1.34* (1.16, 1.56)</td>
</tr>
<tr>
<td>Substantiated</td>
<td>2.99* (2.54, 3.51)</td>
<td>1.83* (1.52, 2.21)</td>
<td>1.66* (1.37, 2.00)</td>
</tr>
<tr>
<td>Out-of-home care</td>
<td>4.68* (3.82, 5.73)</td>
<td>1.84* (1.45, 2.35)</td>
<td>1.85* (1.45, 2.36)</td>
</tr>
</tbody>
</table>

Notes. Multivariate analyses adjusted for child age, atypically high age, gender, Aboriginality, intellectual disability, birth anomaly, preterm birth, low birthweight for gestational age, parent education level, maternal age, mother’s marital status at birth, maternal substance contacts, maternal assault contacts, maternal mental health contacts, paternal substance contacts, paternal assault contacts, paternal mental health contacts, SEIFA, ARIA.

* p < .05.

Additional analyses below used 2008-2012 data to maximise sample size of children with child protection contact, to assess whether being in care at the time of the test, age at first entry to out-of-home care, or pattern of highest child protection contact by Year 3 and Year 9 were related to Year 9 reading scores and might contribute to any differences between reading outcomes for Year 3 and Year 9 children who had entered care. Neither age at first entry to out-of-home care nor being in care at the time of the test (for children who entered out-of-home care), were significant in the univariate or multivariate results.

Pattern of highest level of child protection contact by Year 3 and Year 9 was significantly related to Year 9 reading scores. The univariate results showed all children with child protection contact had significantly greater odds of low Year 9 reading scores than children with no contact by either time point (Table 16, Model A). The elevated risk of low reading scores was highest for children with unsubstantiated maltreatment allegations by Year 3, who went on to enter out-of-home care before Year 9 (OR=6.64, 95% CI [4.00,11.02]) followed by children whose highest level of contact at both time points was having entered out-of-
home care (OR=4.43, 95% CI [3.62, 5.44]), and children who had no contact prior to Year 3 but entered out-of-home care by Year 9 (OR=4.12, 95% CI [2.88, 5.89]). Other than children with no child protection involvement (the reference group), the smallest odds of low reading scores was found for children whose highest level of child protection contact by either time point was unsubstantiated maltreatment allegations (OR=2.12, 95% CI [1.84, 2.44]).

Table 16. Logistic regression: Odds of low Year 9 reading scores by combined pattern of Year 3-Year 9 level of child protection involvement

<table>
<thead>
<tr>
<th>Pattern of Contact Y3 / Y9</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Univariate OR (95% CI)</td>
<td>Multivariate OR (95% CI) without attendance</td>
<td>Multivariate OR (95% CI) with attendance</td>
</tr>
<tr>
<td>Y3 No CMA, Y9 No CMA</td>
<td>reference</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>Y3 No CMA, Y9 Unsubs.</td>
<td>2.94*(2.54, 3.40)</td>
<td>1.77*(1.50, 2.08)</td>
<td>1.55*(1.31, 1.84)</td>
</tr>
<tr>
<td>Y3 No CMA, Y9 Subs.</td>
<td>2.64*(2.14, 3.27)</td>
<td>1.77*(1.39, 2.25)</td>
<td>1.58*(1.24, 2.01)</td>
</tr>
<tr>
<td>Y3 No CMA, Y9 OOHC</td>
<td>4.12*(2.88, 5.89)</td>
<td>2.02*(1.35, 3.04)</td>
<td>2.06*(1.36, 3.12)</td>
</tr>
<tr>
<td>Y3 Unsubs., Y9 Unsubs.</td>
<td>2.12*(1.84, 2.44)</td>
<td>1.36*(1.16, 1.59)</td>
<td>1.26*(1.08, 1.48)</td>
</tr>
<tr>
<td>Y3 Unsubs., Y9 Subs.</td>
<td>3.82*(2.28, 6.38)</td>
<td>2.08*(1.17, 3.70)</td>
<td>1.82*(1.02, 3.26)</td>
</tr>
<tr>
<td>Y3 Unsubs., Y9 OoHC</td>
<td>6.64*(4.00, 11.02)</td>
<td>2.34*(1.30, 4.18)</td>
<td>2.34*(1.30, 4.22)</td>
</tr>
<tr>
<td>Y3 Subs., Y9 Subs.</td>
<td>3.23*(2.70, 3.86)</td>
<td>1.80*(1.47, 2.22)</td>
<td>1.72*(1.40, 2.12)</td>
</tr>
<tr>
<td>Y3 Subs., Y9 OoHC</td>
<td>3.08*(1.78, 5.30)</td>
<td>1.28 (0.69, 2.36)</td>
<td>1.35*(0.72, 2.52)</td>
</tr>
<tr>
<td>Y3 OOHC, Y9 OOHC</td>
<td>4.43*(3.62, 5.44)</td>
<td>1.52*(1.19, 1.94)</td>
<td>1.57*(1.23, 2.00)</td>
</tr>
</tbody>
</table>

Notes. Multivariate analyses adjusted for child age, atypically high age, gender, Aboriginality, intellectual disability, birth anomaly, preterm birth, low birthweight for gestational age, parent education level, maternal age, mother’s marital status at birth, maternal substance contacts, maternal assault contacts, maternal mental health contacts, paternal substance contacts, paternal assault contacts, paternal mental health contacts, SEIFA, ARIA. CMA = Child maltreatment allegation Unsub. = Unsubstantiated allegation Sub. = Substantiated allegation OoHC = Out-of-home Care

*p < .05.

After adjusting for child, family and neighbourhood risk factors (Table 16, Model B), the risk of low reading scores was attenuated for all child protection involved groups. This attenuation was notable in the children whose highest level of child protection involvement by either time point was out-of-home care: the adjusted odds was attenuated to OR=1.52 (95% CI [1.19, 1.94]), representing one of the lower odds ratios across the different groups. Three patterns of contact were associated with at least a two-fold increase in odds of low
reading scores: unsubstantiated allegations by Year 3 with out-of-home care by Year 9, unsubstantiated allegations by Year 3 with substantiated maltreatment by Year 9, and no contact by Year 3 with out-of-home care by Year 9.

Adding attendance to the multivariate model made little difference to the odds of low reading scores for children who had entered out-of-home care (Table 16, Model C). It added a small further attenuation of risk for children with an increased highest level of contact by Year 9 to unsubstantiated or substantiated maltreatment, such as children with no contact by Year 3, and unsubstantiated allegations by Year 9, for whom the odds of low reading decreased from OR=1.77 (95% CI [1.50, 2.08]) to OR=1.55 (95% CI [1.31, 1.84]).

**Sub-Study 2**

**Part A**

Sub-study two also used the 2008-2012 data, to allow stratification by level of involvement with the child protection system. Stratified logistic regression analysis was undertaken to assess the relationship between early reading achievement (Year 3) and later reading achievement (Year 9). For children with all levels of child protection involvement, reading scores in the lowest decile in Year 3 were a significant predictor of reading scores in the lowest decile in Year 9, even after adjusting for child, family and neighbourhood level adversity (Table 17). Low Year 3 readings scores had the highest odd ratios of any predictor in the model other than intellectual disability, supporting the premise that ability and early achievement are the best predictors of later achievement. Although the odds ratios associated with Year 3 reading scores were lower among children with increased levels of child protection contact, caution should be applied in interpreting this result, which may be affected by a range of factors including smaller sample sizes, high levels of other risk factors, as well as more changes in circumstances over time.
Table 17. Logistic regression: Odds of low Year 9 reading scores by Year 3 reading scores, stratified by level of child protection involvement

<table>
<thead>
<tr>
<th>Level of Child Protection Contact By Year 9</th>
<th>Multivariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No CMA</td>
<td>5.17*(4.79,5.57)</td>
<td>3.75*(2.88,4.89)</td>
<td>3.47*(2.38,5.06)</td>
<td>2.95*(1.90,4.58)</td>
</tr>
<tr>
<td>Unsubstantiated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substantiated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OoHC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes. Multivariate analyses adjusted for child age, atypically high age, gender, Aboriginality, intellectual disability, birth anomaly, preterm birth, low birthweight for gestational age, parent education level, maternal age, mother’s marital status at birth, maternal substance contacts, maternal assault contacts, maternal mental health contacts, paternal substance contacts, paternal assault contacts, paternal mental health contacts, SEIFA, ARIA. CMA = Child maltreatment allegation Unsubstantiated = Unsubstantiated allegation Substantiated = Substantiated allegation OoHC = Out-of-home Care

* p < .05

Part B

This section uses data from the trajectory cohort who sat the Year 3 test from 1999 to 2007, and Year 9 from 2004 to 2013. Table 18 shows the frequency of different patterns of reading scores (lowest decile or not) across Years 3, 5, 7 and 9 of school, for children with different levels of child protection contact by Year 3. Similar results (not shown) were found using highest level of child protection contact by Year 9.

For all levels of child protection contact, the most common pattern of reading achievement was to remain above the lowest decile for all four time points. However this pattern was far more common among children with no child protection system involvement (80.8%), decreasing to 60.8% for children with unsubstantiated allegations and 56.0% of children with no allegations. Less than half (47.8%) of children who had entered out-of-home care by Year 3 remained above the lowest reading decile at all four time points. Conversely, less than 1% of children with no child protection contact remained in the lowest reading decile for all four tests, compared to 5.1% of children who had entered out-of-home care. The second most common pattern of achievement for children who had entered out-of-home care (7.3%), children with unsubstantiated allegations (6.1%), and children with no child protection involvement (3.4%) is a low score only in Year 3, with the child remaining above the lowest decile from Year 5-9.
Table 18. Patterns of reading achievement across Year 3, 5, 7, and 9 by highest level of child protection involvement by Year 3 (lowest reading deciles).

<table>
<thead>
<tr>
<th>Reading Decile Lowest 10%</th>
<th>Y3</th>
<th>Y5</th>
<th>Y7</th>
<th>Y9</th>
<th>No CMA Count</th>
<th>%</th>
<th>Unsubstantiated Count</th>
<th>%</th>
<th>Substantiated Count</th>
<th>%</th>
<th>OOH C after Substantiation Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not-Low Not-Low Not-Low Not-Low</td>
<td>110535</td>
<td>80.8%</td>
<td>1535</td>
<td>60.8%</td>
<td>636</td>
<td>56.0%</td>
<td>320</td>
<td>47.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-Low Not-Low Not-Low Low</td>
<td>3448</td>
<td>2.5%</td>
<td>123</td>
<td>4.9%</td>
<td>53</td>
<td>4.7%</td>
<td>45</td>
<td>6.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-Low Not-Low Low Not-Low</td>
<td>3485</td>
<td>2.5%</td>
<td>81</td>
<td>3.2%</td>
<td>58</td>
<td>5.1%</td>
<td>27</td>
<td>4.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-Low Not-Low Low Low</td>
<td>1507</td>
<td>1.1%</td>
<td>68</td>
<td>2.7%</td>
<td>41</td>
<td>3.6%</td>
<td>27</td>
<td>4.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-Low Low Not-Low Not-Low</td>
<td>3823</td>
<td>2.8%</td>
<td>105</td>
<td>4.2%</td>
<td>52</td>
<td>4.6%</td>
<td>27</td>
<td>4.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-Low Low Not-Low Low</td>
<td>1151</td>
<td>0.8%</td>
<td>67</td>
<td>2.7%</td>
<td>31</td>
<td>2.7%</td>
<td>24</td>
<td>3.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-Low Low Low Not-Low</td>
<td>886</td>
<td>0.6%</td>
<td>41</td>
<td>1.6%</td>
<td>19</td>
<td>1.7%</td>
<td>13</td>
<td>1.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not-Low Low Low Low</td>
<td>1258</td>
<td>0.9%</td>
<td>48</td>
<td>1.9%</td>
<td>47</td>
<td>4.1%</td>
<td>29</td>
<td>4.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Not-Low Not-Low Not-Low</td>
<td>4703</td>
<td>3.4%</td>
<td>154</td>
<td>6.1%</td>
<td>46</td>
<td>4.0%</td>
<td>49</td>
<td>7.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Not-Low Not-Low Low</td>
<td>905</td>
<td>0.7%</td>
<td>46</td>
<td>1.8%</td>
<td>12</td>
<td>1.1%</td>
<td>10</td>
<td>1.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Not-Low Low Not-Low</td>
<td>834</td>
<td>0.6%</td>
<td>26</td>
<td>1.0%</td>
<td>16</td>
<td>1.4%</td>
<td>11</td>
<td>1.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Not-Low Low Low</td>
<td>855</td>
<td>0.6%</td>
<td>58</td>
<td>2.3%</td>
<td>29</td>
<td>2.6%</td>
<td>19</td>
<td>2.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Low Not-Low Not-Low</td>
<td>981</td>
<td>0.7%</td>
<td>41</td>
<td>1.6%</td>
<td>12</td>
<td>1.1%</td>
<td>7</td>
<td>1.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Low Not-Low Low</td>
<td>626</td>
<td>0.5%</td>
<td>32</td>
<td>1.3%</td>
<td>22</td>
<td>1.9%</td>
<td>12</td>
<td>1.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Low Low Not-Low</td>
<td>601</td>
<td>0.4%</td>
<td>29</td>
<td>1.1%</td>
<td>13</td>
<td>1.1%</td>
<td>16</td>
<td>2.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Low Low Low</td>
<td>1193</td>
<td>0.9%</td>
<td>70</td>
<td>2.8%</td>
<td>49</td>
<td>4.3%</td>
<td>34</td>
<td>5.1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>136,791</td>
<td>100%</td>
<td>2,524</td>
<td>100%</td>
<td>1,136</td>
<td>100%</td>
<td>670</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The same data was examined from a different perspective in Table 19. While Table 18 shows detailed combinations of patterns of low or non-low reading achievement across the four tests, Table 19 focusses on the start and end positions, and divides reading scores into broader categories of low, medium and high achievement (tertiles). Overall, children with child protection system involvement, particularly children in out-of-home care, were more likely to show stable low patterns of achievements (remaining low at Year 3 and Year 9 tests), or declining patterns. Of children with child protection involvement who started in the middle third of reading achievement at Year 3, almost half (44.6%-49.8%) showed a decline to being in the lower third of reading scores at Year 9. In comparison, children with no child protection contact who had medium year 3 reading achievement tended to remain at a middle level of achievement in Year 9, with almost even amounts showing improvements to high Y9 reading achievement (25.8%) as declines to low Y9 achievement (29.0%).

Table 19. Frequency of Year 9 reading achievement outcomes by Year 3 reading and highest level of child protection involvement by Year 3 (reading: low, medium, high tertiles)

<table>
<thead>
<tr>
<th>Highest level CPFS contact by Y3</th>
<th>Yr3 Tertile</th>
<th>Yr9 Tertile</th>
<th>No CMA</th>
<th>Unsubstantiated</th>
<th>Substantiated</th>
<th>OOHC after Substantiation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Column %</td>
<td>N</td>
<td>Column %</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>29146</td>
<td>64.7%</td>
<td>1154</td>
<td>76.0%</td>
<td>525</td>
<td>78.7%</td>
</tr>
<tr>
<td>Medium</td>
<td>12663</td>
<td>28.1%</td>
<td>322</td>
<td>21.2%</td>
<td>123</td>
<td>18.4%</td>
</tr>
<tr>
<td>High</td>
<td>3225</td>
<td>7.2%</td>
<td>43</td>
<td>2.8%</td>
<td>19</td>
<td>2.8%</td>
</tr>
<tr>
<td>Total Y3 Lowest</td>
<td>45034</td>
<td>100.0%</td>
<td>1519</td>
<td>100.0%</td>
<td>667</td>
<td>100.0%</td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>14655</td>
<td>29.0%</td>
<td>391</td>
<td>44.6%</td>
<td>187</td>
<td>48.1%</td>
</tr>
<tr>
<td>Medium</td>
<td>22893</td>
<td>45.2%</td>
<td>321</td>
<td>36.6%</td>
<td>148</td>
<td>38.0%</td>
</tr>
<tr>
<td>High</td>
<td>13065</td>
<td>25.8%</td>
<td>164</td>
<td>18.7%</td>
<td>54</td>
<td>13.9%</td>
</tr>
<tr>
<td>Total Y3 Medium</td>
<td>50613</td>
<td>100.0%</td>
<td>876</td>
<td>100.0%</td>
<td>389</td>
<td>100.0%</td>
</tr>
<tr>
<td>Top</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>3297</td>
<td>6.4%</td>
<td>68</td>
<td>13.3%</td>
<td>38</td>
<td>15.8%</td>
</tr>
<tr>
<td>Medium</td>
<td>13919</td>
<td>27.1%</td>
<td>164</td>
<td>32.2%</td>
<td>69</td>
<td>28.6%</td>
</tr>
<tr>
<td>High</td>
<td>34115</td>
<td>66.5%</td>
<td>278</td>
<td>54.5%</td>
<td>134</td>
<td>55.6%</td>
</tr>
<tr>
<td>Total Y3 High</td>
<td>51331</td>
<td>100.0%</td>
<td>510</td>
<td>100.0%</td>
<td>241</td>
<td>100.0%</td>
</tr>
<tr>
<td>Table Total</td>
<td>146978</td>
<td>-</td>
<td>2905</td>
<td>-</td>
<td>1297</td>
<td>-</td>
</tr>
</tbody>
</table>
Although positive achievement patterns were less common among children involved with the child protection system, some did show positive outcomes. Of children with high reading achievement in Year 3, more than half of the children with unsubstantiated maltreatment (54.5%) or substantiated maltreatment (55.6%) and 39.3% of children who had entered care by Year 3 were still achieving in the top third at Year 9. Of child protection involved children who scored in the middle range in the Year 3 test, 13.9% to 18.7% scored in the higher range at Year 9. Among child protection involved children who scored in the lower range in the Year 3 test, 12.5%-21.2% improved to a middle level of reading achievement in the Year 9 test, and around 3% in each group achieved in the top third of Year 9 reading scores.

**Sub-Study 3**

Multilevel modelling was conducted to assess individual reading trajectories over time, and the influence of risk factors including child, family and neighbourhood risk factors as well as pattern of highest level of child protection involvement (by Year 3 and Year 9). The study used standardised reading scores (Z-scores), so a child that maintained a consistent level of achievement relative to their peers would have a Z-score of 0 throughout. Coefficients are much smaller using this scale than other analyses in this thesis. Although raw means and standard deviations vary by test level and year, as an example for readers more used to reports using NAPLAN / WALNA raw scores, the mean Year 9 reading score for 2013 was 582.2 with a standard deviation of 66.7. An effect of -0.5 standard deviations would therefore represent a reduction in the raw score of about 33 points, and an effect of -0.01 standard deviations represents a reduction in the raw score of about 7 points for students sitting Year 9 in 2013.

**Non-Aboriginal Children**

As shown in the final model for non-Aboriginal students (Table 20), pattern of highest level of child protection contact, year level, gender, neighbourhood level social disadvantage, remoteness, birth anomalies, intellectual disability, being small for gestational age or preterm, marital status, maternal age, child age at the time of the test, and hospital contacts
by either parent for mental health, substance-related issues or assault victimisation were all significant. Most of these were associated with lower reading scores, with the exception of being atypically young at the time of the test, which was associated with a 0.28 standard deviation increase in the intercept of the trajectory (i.e. higher Year 3 reading scores). Neighbourhood level social disadvantage (SEIFA) had a significant interaction with time. Higher levels of social disadvantage were associated with both a lower intercept (0.37 standard deviations lower for the most disadvantaged group compared to the least disadvantaged group) and a trajectory that declined more sharply (-0.18 standard deviations per year level for the most disadvantaged group compared to the least disadvantaged group).

<table>
<thead>
<tr>
<th>Table 20. Multivariate multilevel model of reading trajectories for Non-Aboriginal children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year level</td>
</tr>
<tr>
<td>Y3 No CMA Y9 Unsubstantiated</td>
</tr>
<tr>
<td>Y3 No CMA Y9 Substantiated</td>
</tr>
<tr>
<td>Y3 No CMA Y9 OoHC</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 Unsubstantiated</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 Substantiated</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 OoHC</td>
</tr>
<tr>
<td>Y3 Substantiated Y9 Substantiated</td>
</tr>
<tr>
<td>Y3 Substantiated Y9 OoHC</td>
</tr>
<tr>
<td>Y3 OoHC Y9 OoHC</td>
</tr>
<tr>
<td>Pattern * year level</td>
</tr>
<tr>
<td>Y3 No CMA Y9 Unsubstantiated</td>
</tr>
<tr>
<td>Y3 No CMA Y9 Substantiated</td>
</tr>
<tr>
<td>Y3 No CMA Y9 OoHC</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 Unsubstantiated</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 Substantiated</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 OoHC</td>
</tr>
<tr>
<td>Y3 Substantiated Y9 Substantiated</td>
</tr>
<tr>
<td>Y3 Substantiated Y9 OoHC</td>
</tr>
<tr>
<td>Y3 OoHC Y9 OoHC</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Most disadvantaged</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>Least disadvantaged</td>
</tr>
</tbody>
</table>
### Table

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>Coefficient</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEIFA</strong></td>
<td>Most disadvantaged</td>
<td>-0.02</td>
<td>(-0.02, -0.01)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-0.02</td>
<td>(-0.02, -0.01)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-0.01</td>
<td>(-0.02, -0.01)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-0.01</td>
<td>(-0.02, -0.01)</td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>reference</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ARIA</strong></td>
<td>Most remote</td>
<td>-0.06</td>
<td>(-0.07, -0.04)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-0.03</td>
<td>(-0.04, -0.02)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-0.01</td>
<td>(-0.03, 0.01)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-0.04</td>
<td>(-0.07, -0.01)</td>
</tr>
<tr>
<td>Least remote</td>
<td>reference</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Birth anomaly</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.05</td>
<td>(-0.07, -0.03)</td>
</tr>
<tr>
<td><strong>Intellectual disability</strong></td>
<td></td>
<td>-1.18</td>
<td>(-1.22, -1.14)</td>
</tr>
<tr>
<td><strong>Low birthweight</strong></td>
<td></td>
<td>-0.09</td>
<td>(-0.10, -0.07)</td>
</tr>
<tr>
<td><strong>Preterm</strong></td>
<td></td>
<td>-0.04</td>
<td>(-0.05, -0.02)</td>
</tr>
<tr>
<td><strong>Not married or defacto</strong></td>
<td></td>
<td>-0.11</td>
<td>(-0.07, -0.03)</td>
</tr>
<tr>
<td><strong>Maternal age</strong></td>
<td>30+</td>
<td>-0.29</td>
<td>(-0.31, -0.27)</td>
</tr>
<tr>
<td></td>
<td>&lt;20</td>
<td>-0.15</td>
<td>(-0.16, -0.14)</td>
</tr>
<tr>
<td><strong>Child age</strong></td>
<td>Typical range</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.29</td>
<td>(-0.31, -0.27)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.15</td>
<td>(-0.16, -0.14)</td>
</tr>
<tr>
<td><strong>Atypical, younger</strong></td>
<td></td>
<td>-0.10</td>
<td>(-0.11, -0.08)</td>
</tr>
<tr>
<td><strong>Atypical, older</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maternal substance contact</strong></td>
<td></td>
<td>-0.07</td>
<td>(0.00, -0.08)</td>
</tr>
<tr>
<td><strong>Maternal mental health contact</strong></td>
<td></td>
<td>-0.09</td>
<td>(0.00, -0.13)</td>
</tr>
<tr>
<td><strong>Maternal assault contact</strong></td>
<td></td>
<td>-0.03</td>
<td>(0.00, -0.05)</td>
</tr>
<tr>
<td><strong>Paternal substance contact</strong></td>
<td></td>
<td>-0.06</td>
<td>(0.00, -0.08)</td>
</tr>
<tr>
<td><strong>Paternal mental health contact</strong></td>
<td></td>
<td>-0.04</td>
<td>(0.00, -0.06)</td>
</tr>
<tr>
<td><strong>Paternal assault contact</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td></td>
<td>0.54</td>
<td>(0.53, 0.55)</td>
</tr>
<tr>
<td><strong>Random-effects</strong></td>
<td>Coefficient</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>Variance (year level)</td>
<td></td>
<td>0.01</td>
<td>(0.01, 0.01)</td>
</tr>
<tr>
<td>Variance (constant)</td>
<td></td>
<td>0.51</td>
<td>(0.50, 0.51)</td>
</tr>
<tr>
<td>Covariance</td>
<td></td>
<td>0.00</td>
<td>(0.00, 0.00)</td>
</tr>
<tr>
<td>Variance (residual)</td>
<td></td>
<td>0.33</td>
<td>(0.33, 0.33)</td>
</tr>
</tbody>
</table>

* p < .05.

Pattern of child protection involvement also significantly interacted with time. All of the child protection groups had significantly lower intercepts than children with no child protection involvement (after controlling for other risk factors), starting between 0.23 and 0.63 standard deviations below children with no involvement. The effects on the slope were
smaller and in many cases non-significant, however two groups had significantly greater declines than the reference group (children with no child protection involvement). Compared to the reference group, children whose highest level of child protection involvement at both time points was substantiated maltreatment had a significantly greater decline in trajectory of -0.03 standard deviations per year level. Children with no contact by Year 3 and an unsubstantiated allegation by Year 9 had a significantly greater decline in trajectory than the reference group by -0.02 standard deviations per year level.

Using the multi-level models, children’s predicted reading trajectories are presented in Figure 2 and Figure 3. Figure 2 shows the trajectories from the base model, which included only pattern of highest child protection contact, year level (3, 5, 7 and 9) and the interaction between pattern and year level. The figure shows that there is a large gap between children with no child protection involvement and all other groups. There is also variation in the trajectories across the different levels of child protection involvement. As noted above, most of the variation is in the intercepts, with all groups showing a relatively flat or slowly declining trajectory.
Figure 2. Plot of predicted reading trajectories from the simple model without child, family and neighbourhood risk factors, for non-Aboriginal children
Notes. The model figure 1 was based on includes only pattern of highest child protection contact, year level (3, 5, 7 and 9) and the interaction between pattern and year level, using data from non-Aboriginal children

Figure 3. Plot of predicted reading trajectories from the multivariate model for non-Aboriginal children for example group: Boy, most disadvantaged neighbourhoods, maternal age <20 and not married at child’s birth
Notes. Highest Level of Contact CMA = Child maltreatment allegation Unsub. = Unsubstantiated allegation Sub. = Substantiated allegation OoHC = Out-of-home Care
Figure 3 shows the predicted reading trajectories from the multivariate model for children with selected levels of the risk factors, specifically for boys from the most disadvantaged neighbourhoods, with mothers who were aged <20 and not married or in a defacto marriage at child’s birth, and no other risk factors. The trajectories for all groups were broadly similar to those shown in Figure 2, however all groups started with lower reading scores (reflecting the effects of included risk factors), and the position of some of the groups changed. For children whose highest level of child protection involvement at both time points was out-of-home care, the inclusion of child, family and neighbourhood risk factors somewhat attenuated the risk of low reading achievement, lifting their trajectory closer to that of children whose highest level of child protection involvement at both time points was unsubstantiated allegations.

**Aboriginal Children**

For Aboriginal children, the final multi-level model showed significant predictors of reading trajectories were pattern of highest level of child protection contact, year level, gender, neighbourhood level social disadvantage, remoteness, intellectual disability, being small for gestational age or preterm, marital status, maternal age, child age at the time of the test, and hospital contacts by either maternal mental health, substance-related issues or assault victimisation, and paternal assault victimisation. Interactions between predictor variables and time were non-significant.

Community level factors such as living in the most socially disadvantaged neighbourhoods (-0.63), or in the most remote areas (-0.65) both had a marked impact on reducing the starting position of Aboriginal children’s reading trajectories. Being atypically old for the test was not associated with significantly worse reading scores, whereas being atypically young for the test was.
Table 21. Multivariate multilevel model of reading trajectories for Aboriginal children

<table>
<thead>
<tr>
<th>Year Level</th>
<th>Coefficient</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y3 No CMA Y9 Unsubstantiated</td>
<td>-0.22</td>
<td>(-0.29, -0.16)</td>
</tr>
<tr>
<td>Y3 No CMA Y9 Substantiated</td>
<td>-0.19</td>
<td>(-0.27, -0.10)</td>
</tr>
<tr>
<td>Y3 No CMA Y9 OoHC</td>
<td>-0.21</td>
<td>(-0.36, -0.07)</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 Unsubstantiated</td>
<td>-0.12</td>
<td>(-0.18, -0.05)</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 Substantiated</td>
<td>-0.11</td>
<td>(-0.30, 0.08)</td>
</tr>
<tr>
<td>Y3 Unsubstantiated Y9 OoHC</td>
<td>-0.33</td>
<td>(-0.53, -0.12)</td>
</tr>
<tr>
<td>Y3 Substantiated Y9 Substantiated</td>
<td>-0.14</td>
<td>(-0.22, -0.06)</td>
</tr>
<tr>
<td>Y3 Substantiated Y9 OoHC</td>
<td>-0.30</td>
<td>(-0.48, -0.12)</td>
</tr>
<tr>
<td>Y3 OoHC Y9 OoHC</td>
<td>-0.13</td>
<td>(-0.21, -0.06)</td>
</tr>
<tr>
<td>Male</td>
<td>-0.20</td>
<td>(-0.23, -0.18)</td>
</tr>
<tr>
<td>SEIFA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>-0.63</td>
<td>(-0.72, -0.54)</td>
</tr>
<tr>
<td>2</td>
<td>-0.49</td>
<td>(-0.58, -0.40)</td>
</tr>
<tr>
<td>3</td>
<td>-0.39</td>
<td>(-0.49, -0.29)</td>
</tr>
<tr>
<td>4</td>
<td>-0.32</td>
<td>(-0.43, -0.22)</td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>-0.06</td>
<td>(-0.11, -0.00)</td>
</tr>
<tr>
<td>ARIA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most remote</td>
<td>-0.65</td>
<td>(-0.74, -0.57)</td>
</tr>
<tr>
<td>2</td>
<td>-0.15</td>
<td>(-0.19, -0.11)</td>
</tr>
<tr>
<td>3</td>
<td>-0.34</td>
<td>(-0.38, -0.30)</td>
</tr>
<tr>
<td>4</td>
<td>-0.65</td>
<td>(-0.69, -0.61)</td>
</tr>
<tr>
<td>Least remote</td>
<td>-0.10</td>
<td>(-0.14, -0.07)</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>-0.65</td>
<td>(-0.74, -0.57)</td>
</tr>
<tr>
<td>Low birthweight</td>
<td>-0.06</td>
<td>(-0.09, -0.02)</td>
</tr>
<tr>
<td>Preterm</td>
<td>-0.07</td>
<td>(-0.11, -0.02)</td>
</tr>
<tr>
<td>Not married or defacto</td>
<td>-0.10</td>
<td>(-0.14, -0.07)</td>
</tr>
<tr>
<td>Maternal age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30+</td>
<td>-0.18</td>
<td>(-0.23, -0.14)</td>
</tr>
<tr>
<td>&lt;20</td>
<td>-0.11</td>
<td>(-0.15, -0.07)</td>
</tr>
<tr>
<td>20-29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atypical, younger</td>
<td>-0.40</td>
<td>(-0.55, -0.25)</td>
</tr>
<tr>
<td>Atypical, older</td>
<td>-0.03</td>
<td>(-0.08, 0.02)</td>
</tr>
<tr>
<td>Maternal substance contact</td>
<td>-0.09</td>
<td>(-0.13, -0.05)</td>
</tr>
<tr>
<td>Maternal mental health contact</td>
<td>-0.07</td>
<td>(-0.10, -0.04)</td>
</tr>
<tr>
<td>Maternal assault contact</td>
<td>-0.22</td>
<td>(-0.26, -0.18)</td>
</tr>
<tr>
<td>Paternal assault contact</td>
<td>-0.08</td>
<td>(-0.11, -0.05)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.28</td>
<td>(0.19, 0.38)</td>
</tr>
<tr>
<td>Random-effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficient</td>
<td>0.00</td>
<td>(0.00, 0.01)</td>
</tr>
<tr>
<td>95% CI</td>
<td>0.43</td>
<td>(0.40, 0.45)</td>
</tr>
<tr>
<td>Covariance</td>
<td>-0.01</td>
<td>(-0.02, -0.00)</td>
</tr>
<tr>
<td>Variance (year level)</td>
<td>0.54</td>
<td>(0.53, 0.55)</td>
</tr>
<tr>
<td>Variance (constant)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance (residual)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05.
All patterns of child protection involvement reduced the intercept of the reading trajectory between 0.10 and 0.33 of a standard deviation. This was significantly different from the reference group (children with no child protection involvement) in all groups except for children with unsubstantiated maltreatment by Year 3 and a substantiation by Year 9. Consistent with non-Aboriginal results, the lowest reading scores were found for children with unsubstantiated maltreatment by Year 3 who entered out-of-home care by Year 9 (-0.33). Among Aboriginal children, this result was closely followed by results for children with substantiated maltreatment by Year 3 who entered out-of-home care by Year 9 (-0.30).

The declining trajectories in reading achievement over time for Aboriginal children are apparent in the graphs based on the unadjusted and full models (Figure 4 and Figure 5).

![Graph](image)

*Figure 4. Plot of predicted reading trajectories from the simple model without child, family and neighbourhood risk factors, for Aboriginal children*

Notes. The model figure 1 was based on includes only pattern of highest child protection contact, year level (3, 5, 7 and 9), using data from Aboriginal children. The interaction between pattern and year level was non-significant.
Figure 5. Plot of predicted reading trajectories from the multivariate model for Aboriginal children for example group: Boy, most disadvantaged neighbourhoods, maternal age <20 and not married at child’s birth

Notes. Highest Level of Contact CMA = Child maltreatment allegation Unsub. = Unsubstantiated allegation Sub. = Substantiated allegation OoHC = Out-of-home Care

Pairwise comparisons of reading scores by patterns of child protection involvement for non-Aboriginal and Aboriginal children are provided as an appendix and show significant differences between groups based on pattern of highest level of child protection involvement from the multivariate models (Appendix 6).

**Discussion**

The aim of this chapter was to investigate the Year 9 reading outcomes and trajectories from Year 3-9 of children with different levels of child protection contact. A series of sub-studies aimed to explore several important issues, including 1) identifying the risk factors for low Year 9 reading scores including child, family and neighbourhood level risk factors, school attendance and level of child protection involvement, and whether these were consistent with findings reported earlier for Year 3 students; 2) examine common patterns of reading
achievement over time and whether the achievement pathways of children with different levels of child protection involvement are characterised by stability or change; and 3) to model the trajectories of reading achievement for Aboriginal and non-Aboriginal children with different levels of child protection contact taking into account risk factors of the child, family and neighbourhood.

**Reading Achievement Among Children Involved with the Child Protection System**

The most important finding is that children with child protection involvement are at high risk of poor reading achievement in their early secondary school years. Consistently achieving in the lower third of achievement scores from Year 3 to Year 9, or declining achievement trajectories are far too common among these children. In keeping with our previous findings for younger students, this study showed that children with a maltreatment allegation by Year 9 were at almost threefold risk of low reading scores, although this decreased to a 51% increased odds of low reading scores after adjusting for an extensive list of child, family and neighbourhood level risk factors and school attendance.

**Risk Factors for Low Reading Scores in Year 9**

In the first sub-study, logistic regression results showed intellectual disability was by far the strongest predictor of reading achievement in the model (associated with 12 times increased risk of low reading scores). The importance of this risk factor is consistent with our findings from Chapter five, however intellectual disability appears to have a much stronger effect on reading outcomes for Year 9 students than Year 3s. This may reflect the cognitive complexity of secondary school work, or variation in the capacity of different school levels to meet the needs of children with disabilities. Also consistent with the findings in Chapter five are findings showing the importance of school attendance, parents’ level of education, Aboriginality, and being higher than the typical age range (most likely having been retained at school), all of which were associated with at least a doubling of the odds of low reading scores. Sub-study 2 added Year 3 reading achievement to the model, which was found to be second only to intellectual disability in predicting low Year 9 reading achievement.
These findings highlight two areas that are especially important in predicting poor reading outcomes by Year 9: factors related to social disadvantage, and factors relating to early achievement and ability. Previous studies have noted that factors related to social disadvantage impact markedly on academic achievement. The gap between children from different socio-economic backgrounds is less likely to close over time than some other early achievement gaps such as language background (Taylor et al., 2013), and indeed may grow over the children’s school career (Caro et al., 2009). It is therefore not surprising to find that factors relating to social disadvantage continue to be prominent influences for reading achievement at Year 9. The findings related to early achievement are also consistent with previous research (e.g. Marks, 2014) and will be discussed further in the next section.

The inclusion of child, family, neighbourhood and school risk factors somewhat reduced the risk of low reading scores associated with child protection involvement. Before adjusting for other risk factors, children with unsubstantiated allegations or substantiated maltreatment were both at more than twofold increased risk of low reading, and children who had ever entered out-of-home care following substantiated maltreatment had almost 5 times increased risk of low reading scores compared to children with no child protection involvement. After adjustment, results for all three groups were attenuated but still significant, ranging from an odds ratio of 1.34 for children with unsubstantiated allegations to 1.85 for children who had ever entered care. It is notable that the risk of low reading achievement was not fully attenuated for the out-of-home care group in Year 9 as it had been for the Year 3 children.

As results differed for Year 3 and Year 9 students regarding the relationship between out-of-home care and reading outcomes, it was important to assess whether the differences were related to the timing of out-of-home care, as the protective effect of out-of-home care observed for Year 3 students might be related to first entering out-of-home care at a younger age, or Year 9 students having been returned home from care for a much longer time and therefore no longer gaining any earlier benefits. Neither age at first entry or being in care at the time of the Year 9 reading test were significant. Pattern of highest level of child protection contact was significant, in particular the highest odds for low reading scores in the adjusted
model were for children with an unsubstantiated allegation or no allegations by Year 3, who went on to enter out-of-home care between Year 3 and Year 9. These children may have experienced chronic adversity, and possibly maltreatment that was unreported, unsubstantiated or didn’t reach a threshold for intervention until comparatively late in the child’s development. An alternative explanation would be that their maltreatment occurred later (between Year 3 and Year 9), however as reading scores for this group were already very low by Year 3, it seems likely that earlier events are the cause. The multivariate analysis showed children who had already entered out-of-home care by Year 3 had the smallest odds of low Year 9 reading scores among the children who entered care, however they still achieved significantly worse than children with no child protection involvement.

**Patterns of Stability or Change**

The patterns of reading achievement over time for children with different levels of child protection contact show aspects of both stability and change. Results consistent with stability include the high odds ratio for Year 3 reading scores in predicting Year 9 reading scores, the tendency for risk factors in the multi-level models to exert greater influence on the intercept than the slope of the trajectories and the large number of child protection involved students in the lower third of reading scores at both Year 3 and Year 9.

Some authors, including Marks (2014) suggest that early achievement is largely equivalent to ability. There is a case that can be made for this, given the large correlations between measures of ability or IQ and achievement. And indeed, other significant predictors in the model included intellectual disability and being atypically old for the test (most likely due to retention), which could both reflect ability. However there is also evidence that for students with multiple risk factors, a high IQ is insufficient to protect against poor academic outcomes (Gutman et al., 2003). The child protection population may experience not only high levels of general adversity but also the trauma of abuse or neglect, and in some cases the massive changes and disruptions of entering out-of-home care and potentially experiencing multiple placements. It is likely that many of these children are not achieving at their potential and that their low achievement does not purely reflect a lack of innate ability.
If early achievement is considered to represent ability, it is noteworthy that of children who had entered out-of-home care by Year 3 and scored in the middle or top third, 49.8% and 60.3% had dropped to at least the next tertile down by Year 9. This pattern of declines shows that change is also an important aspect of the academic trajectories of children in the child protection system. Consequently, there are two important negative trajectories to be addressed among children in the child protection system – stable low achievement and declining achievement.

This sub-study found that stable low levels of achievement were rare in the general population, with less than 1% of the comparison group consistently scoring in the lowest range for reading. This result echoed the findings of Zubrick et al., (2015), who found less than 1% of students in their general population survey consistently scoring in the lowest range for literacy outcomes. A stable low pattern, however, was much more common among child protection involved children, and especially children who had ever been in care, of whom 1 in 20 consistently scored in the lowest decile on all four reading tests. For this vulnerable group of children, low reading achievement is less likely to be something that can be outgrown with the supports routinely provided at home or school, and there is greater risk of entrenched difficulties. Early identification and intervention of educational problems is required.

However, identifying and addressing educational problems in young students is not sufficient for child protection populations; children have a much higher risk than the general population of showing achievement declines even if their early achievement was satisfactory or even above average. Many of these children experience numerous events related to maltreatment, out-of-home care experiences, or other adversities in their family life that could affect their ability to attend school consistently, concentrate, behave and engage well in school and learn to the best of their ability. Identifying and addressing problems as they arise (or acting to prevent them arising) is therefore also important for children involved with the child protection system.
Reading Trajectories for Children with Different Patterns of Child Protection Involvement

Reading achievement trajectories varied significantly by child protection involvement pattern over time. For both Aboriginal and non-Aboriginal children the lowest level of reading achievement was found for children with unsubstantiated allegations by Year 3 and out-of-home care by Year 9 (although pairwise comparisons showed this group differed significantly from other child protection groups only for non-Aboriginal children). This group of children had low predicted readings scores at both Year 3 and Year 9 – so although at Year 3 they shared the same level of child protection involvement as children with unsubstantiated maltreatment as the highest level of contact at both Year 3 and Year 9, the two groups already showed very different reading outcomes. Previous studies by Fantuzzo et al., (2011) have found worse early education outcomes for children with unsubstantiated maltreatment than substantiated maltreatment, and Maclean et al., (2015) found similar odds ratios for Year 3 reading outcomes for children with substantiated and unsubstantiated maltreatment. The current study further develops the understanding of educational outcomes for children with unsubstantiated maltreatment at an early age. It appears the average early reading scores for unsubstantiated cases are pulled down by a sub-group of children with unsubstantiated maltreatment who subsequently go on to have deeper involvement with child protection. This group was found to have particularly poor outcomes in this study, presumably reflecting chronic exposure to adversity and possibly chronic maltreatment or worsening of parenting issues over time. Children who still had no substantiation by Year 9 had comparatively positive reading outcomes at Year 3 and Year 9 (compared to other child protection-involved children).

Most of the effect associated with level of child protection involvement and other risk factors was seen in the intercepts rather than the slopes. For non-Aboriginal children, all groups showed a relatively flat or slowly declining trajectory. Aboriginal children started lower at the intercept, and showed a steeper decline in achievement over time. Trajectories of different groups tended to retain their position in comparison to others – none of the groups for
instance showed on average a marked improvement over time that raised them above other groups by Year 9. Children with an increased level of child protection involvement by Year 9 tended to have worse reading achievement. A limitation of the classification of children involving their highest level of child protection by Year 9 is it does not assess whether children with no change in highest level of involvement have ongoing child protection events (such as maltreatment allegations) between Year 3 and Year 9 or not. For instance, if their highest level of contact at both Year 3 and Year 9 was substantiated maltreatment, the classification does not distinguish between children who had a substantiation prior to Year 3 and then no further allegations, and children who had ongoing maltreatment allegations and substantiations before and after Year 3. Conversely, all children who had an increased level of child protection contact between Year 3 and Year 9 by definition must have experienced additional maltreatment and or out-of-home care events during this time. Nevertheless, the study found significant group differences and the effects associated with patterns of child protection involvement occurred largely at the intercept before these recorded child protection events have occurred, suggesting that despite its limitations it is still an informative measure.

Overall, there was significant variation in reading trajectories of children with different patterns of child protection involvement, and these persisted after controlling for child, family and neighbourhood level risk factors.

**Limitations of this Study, Implications and Conclusions**

A number of potentially significant variables influencing children’s educational trajectories could not be included. Some are not part of routinely collected administrative data, such as children’s emotional or behavioural adjustment. Some of these are in the dataset, but not available for most children such as parental education and school attendance.

In addition, some aspects of children’s child protection history were not included. Children not only have an educational trajectory, but also a trajectory through the child protection system, which we have attempted to capture through the ‘pattern of highest level of contact’
variable. Classification of children is a useful guide but cannot account for the numerous events that occur for this population and may influence outcomes. Further research is needed to drill down into different aspects of the children’s maltreatment history and out-of-home care history, but was beyond the scope of this thesis. As noted in Chapter 6, any variable selected (such as type of out-of-home care) is likely to be complexly interwoven with numerous other parts of a child’s out-of-home care experiences, as well as their individual and family characteristics. Accounting for all of these potential influences in combination with all of a child’s maltreatment history characteristics is generally not feasible (whether due to constraints in the sample size, availability of variables, or complexity of the analysis). All studies in the child protection area must therefore select which variables and classifications to use, and in doing so they shed light on some aspects and omit others. Providing clear descriptions on approaches used, and their limitations or gaps allows other studies to address issues beyond the scope of one study.

Within the data included, there were also some limitations. For instance, it is widely recognised that not all maltreatment is reported, and the data only captures maltreatment where is comes to the attention of the Department of Child Protection and Family Support. Likewise, hospital data does not capture all parents with mental health or substance issues, or all parent assault victimisations, only those that result in a hospital contact. These variables are likely to capture the more severe end of the spectrum for all of these variables, and since data is more extensively captured for public services, may capture a greater proportion of events that occur to people relying on the public health system, thereby excluding more people with the financial resources to use private outpatient services. Mental health and related issues managed in the community by general practitioners (family doctors) or by psychologists who may be funded by Medicare are also not captured.

Despite these limitations, the study has many strengths. The use of routinely collected administrative data allows investigation of the educational trajectories of an entire population of children, taking into account a large number of risk factors at the child, family and neighbourhood level. Detailed child protection records from birth onwards allow
consideration of a child’s history, not just their maltreatment events or out-of-home care status during a study period. Standardised achievement test data provides high quality, consistent education data. In combination these datasets allow important research questions to be addressed. This study provides new insight into the academic development of children with differing levels of child protection contact as they move from middle childhood to high school.

Main findings from this study included the frequency of poor reading achievement for older children with a history of child protection involvement. Negative pathways included a pattern of consistently low reading scores from Year 3 to Year 9, and also a pattern of declining achievement in time. Adversity and attendance affected reading achievement and attenuated the relationships between child protection involvement and reading scores, however all three groups of child protection involved children had an elevated risk of low Year 9 reading achievement. Trajectories over time also differed significantly depending on children’s pattern of highest level of child protection involvement by both Year 3 and Year 9 – children with the same level of child protection involvement at Year 3 could have significantly different reading trajectories (including intercepts) related to their level of child protection involvement by Year 9.

From a policy and practice perspective this research highlights a need for increased educational support for children with different levels of child protection involvement. Even after accounting for a wide range of other risk factors, these children were at significant risk of poor educational outcomes. Many of the risk factors had already exerted an influence by Year 3, suggesting a need for early interventions to support vulnerable children’s educational needs, but also to aim to reduce and ameliorate the effects of maltreatment and social disadvantage. However, there is less stability in the onward achievement patterns of child protection involved children with early reading scores in the middle or high range than in the general population. It is therefore especially important to develop strategies to continue to identify and address educational issues that arise later for these children. There is some research evidence supporting particular educational interventions for children in out-of-home
care, but further research and evaluation is necessary in order to be able to recommend the most effective interventions, the type of interventions that best suit particular educational issues, and the cost-effectiveness of different intervention options (Forsman & Vinnerljung, 2012).

This study answers a number of important questions regarding the educational achievement outcomes and trajectories for students from Year 3 to Year 9. It also raises further questions regarding whether trajectories are influenced by type and chronicity of maltreatment, type and duration of care, school factors such as attendance and suspensions, and the child’s emotional and behavioural wellbeing. It is hoped that the results from this study, and from future research, will inform strategies that enable children in the child protection system to achieve their potential.
Chapter 8 Estimating the ‘Effects’ of Out-of-Home Care on Year 9 Reading, Attendance and Suspension Outcomes

Preamble

Chapter 8 returns to the second theme in this thesis: the potential causal effects of out-of-home care. Whereas Chapters 5-7 explored a range of risk factors related to children’s educational outcomes, Chapter 8 more specifically focusses on addressing the issues raised in the systematic review in Chapter 3 such as selection bias. The study in Chapter 8 uses a study design and analysis methods to maximise comparability of maltreated children who entered out-of-home care and those that stayed at home in order to estimate the impact of out-of-home care on their educational outcomes.
Abstract

Although there is large body of research showing poor educational outcomes for children who have entered out-of-home care, few studies have examined whether these outcomes are due to placement in out-of-home care or other risk factors. We used propensity score matching and the inclusion of pre-intervention reading scores to estimate the impact of out-of-home care on Year 9 reading achievement, attendance and suspensions. The study used data from 3,270 children with substantiated maltreatment. Administrative data from the Western Australian Department of Education, Department of Child Protection and Family Support, Department of Health, and the Disability Services Commission was linked for the study. Results showed that after accounting for pre-existing group differences in child, family and neighbourhood characteristics, maltreatment history and Year 3 reading achievement, there were no significant differences in achievement and suspension outcomes between maltreated children who entered care and those that remained at home. Fewer school absences were found for children who had entered out-of-home care after adjusting for other risk factors.
Introduction

Out-of-home care is a necessary intervention to protect children at risk from abuse and neglect. Yet there is wide variation in the degree to which out-of-home care is used (Gilbert et al., 2012), with tension between the goals of child protection and family preservation. Countries differ in the level of use of child protection services, and over time rates of out-of-home care use change, often independent of the rates of substantiated child maltreatment (Gilbert et al., 2012). Research has shown that the likelihood of a maltreated child being placed in care depends on the caseworker or judge making the decision (Britner & Mossler, 2002; Doyle, 2011; Lindsey, 1992). This is especially the situation for ‘marginal’ cases, where the decision is less clear-cut (Doyle, 2011). Tragic high profile cases such as the death of a child can also temporarily influence the degree to which child protection services are risk averse in making decisions about the tens of thousands of children they work with (Connolly & Doolan, 2007). As stated by Doyle (2011), a key question for policy is “how aggressive should child protection be?” A related question is: if a child is placed in out-of-home care, what are the benefits and harms?

An understanding of the causal effects of out-of-home care placement would contribute to shaping evidence based policies for the extent to which out-of-home care should be used, particularly for marginal cases. This presents many challenges, however, as children placed in out-of-home care would be expected to have experienced more severe or chronic maltreatment, and research has shown they also come from families with greater disadvantage and psychosocial risks than maltreated children who remain at home (Stone, 2007). In addition, research using child protection populations often does not have access to measures of the child’s functioning prior to placement in out-of-home care to use as a baseline measure. Consequently, other unmeasured characteristics of the children who may affect their outcomes both before and after placement are not accounted for. A systematic review of outcomes for maltreated children placed in care versus those not removed found few studies comparing outcomes for the two groups that addressed the many pre-existing differences between the groups (Chapter 3 of this thesis).
Research has progressed over recent decades in the use of suitable research designs and the availability of data, statistical techniques and computer software to address these challenging research problems. Given that randomisation is not feasible, two main study designs have been used to approach the issue of causation. Doyle (2011) used an instrumental variables approach, where the propensity of individual caseworkers to place children in care was used to compare outcomes for children with caseworkers who were more or less likely to use out-of-home care. This approach is the closest to approximating random allocation, however finding a suitable instrumental variable is seldom possible. In most cases, propensity score matching offers the best available approach to creating a suitable comparison group of maltreated children who are not removed (Font & Maguire-Jack, 2013). Although the benefits of this approach are increasingly recognised, there are still few published studies that use propensity matching or other rigorous methods to control for selection bias in estimating the impact of out-of-home care on children. This is largely because of the data requirements: there is generally a need for a large sample with many variables related to children’s background characteristics and experiences prior to entering out-of-home care.

Maltreated children placed in care differ from maltreated children who are not removed from their homes on a wide range of variables that may also affect their educational outcomes. First, they would be expected to have more severe or chronic maltreatment or be considered at increased risk (Font & Maguire-Jack, 2013; Stone, 2007). Second, maltreated children often come from very disadvantaged families with high prevalence of a range of risk factors. These include characteristics of the child, their family and neighbourhood that may increase their risk of educational difficulties (O’Donnell et al., 2010). Compared to other maltreated children, children placed in out-of-home care have been found to have higher levels of disabilities, are more likely to belong to socially disadvantaged ethnic groups, live in poverty, and have parents with lower levels of education (Berger et al., 2009; Maclean et al., 2015; Runyan & Gould, 1985a). Children in out-of-home care have been found to be less likely to have a sexual abuse allegation (Berger et al., 2009; Maclean et al., 2015) and in our research very likely to have had a neglect allegation (Maclean et al., 2015). The few studies that examined pre-placement measures showed children placed in out-of-home care had lower
levels of passing grades (Runyan & Gould, 1985a) and more internalising and externalising behaviours (Berger et al., 2009), suggesting the effects of maltreatment or other risk factors had already created a more vulnerable group with worse outcomes prior to care entry.

Propensity matching is used to reduce the effects of selection bias by creating samples that are more comparable to each other on background risk factors such as those outlined above. The use of propensity scores has increasingly been used over the last decade to answer important questions in out-of-home care research, for instance in examining the direction of the relationship between behaviour problems and multiple placements among children in out-of-home care (Rubin, O'Reilly, Luan, & Localio, 2007) and to compare outcomes during the transition to adulthood for children placed in out-of-home care compared to the general population (Berzin, 2008).

Although there is a large body of research showing poor educational outcomes for children who have been in care (Brownell et al., 2015; Pecora et al., 2006; Scherr, 2007; Sebba et al., 2015; Stone, 2007; Trout et al., 2008) there is little research addressing whether out-of-home care is responsible for these outcomes. Few studies have used methods such as propensity matching to compare cognitive or education outcomes for maltreated children placed in care and those that remain at home. Berger et al. (2009) used a variety of methods including propensity scores to address the issue of selection bias in comparing cognitive outcomes for children placed in out-of-home care or remaining at home after a maltreatment substantiation, and found that the groups did not differ significantly after matching.

Font and Maguire-Jack (2013) assessed several groups of out-of-home care children, and found those who were placed in care after the first wave of the survey and in care at the 18 month follow-up survey wave had better self-reported engagement with school, compared with maltreated children not placed in care. There were no significant differences for children who were in care at both survey waves, or in survey wave one only. The authors also found no difference for academic performance, but noted that self-reported data was a limitation. Previous qualitative research found children in foster care were often very inaccurate in reporting academic achievement (Finkelstein et al., 2002). An important step is to examine
academic performance and engagement using objective standardised measures. Lee (2009) found no significant differences between out-of-home care and in-home care groups on truancy court petitions (after matching), but noted that this was a very rare outcome which affected the statistical power of the study to detect differences. Berger (2015), although not using propensity matching, used a number of regression models including fixed effects models that take into account an individual child’s previous achievement. The models also controlled for many covariates to address selection bias in comparing academic outcomes for children currently in care versus a range of comparison groups, and found children currently in care did not perform significantly worse than comparison children after controlling for multiple other risk factors.

Our research builds on the work of Berger et al., (2015) and Font and Maguire-Jack (2013) by looking at a broader group of children who have experienced out-of-home care. Although children currently or recently in care are an important group to understand, we chose to include all children who experienced their first placement during the study period - Year 3 to Year 9 of school. Out-of-home care is a major intervention in the life of the child and the family, and which life-course theories (Zubrick, 2015) would suggest could have ongoing beneficial or harmful effects whether the child remains in care or is reunified with their family. The primary aim of the study was to estimate the impact of out-of-home care on Year 9 reading outcomes by comparing a matched sample of maltreated children who entered out-of-home care and maltreated children who remained at home. Secondary aims were to compare attendance and suspension outcomes between the groups.

Method

Data Sources and Sample

The dataset was part of a larger cohort study of all children born in Western Australia (WA) between 1990 and 2010. The current study uses linked administrative data from the Western Australian Department of Education, School Curriculum and Standards Authority Department of Child Protection and Family Support, Department of Health, and the Disability Services Commission. The education datasets included standardised reading
achievement tests (National Assessment Program Literacy and Numeracy from 2008-2013 and Western Australian Literacy and Numeracy Assessment from 1999-2007) from all schools and records of suspensions and attendance from all Government schools in Western Australia from 2008-2012. The data also provided a rich information source regarding characteristics of the child, family, neighbourhood and child protection history that could be used for propensity matching. Multiple measures of achievement over time allowed a study design in which the Year 3 reading test was used as a baseline measure.

The data was linked by the WA Data Linkage Branch within the Department of Health using probabilistic matching. De-identified data were provided to the researchers and merged using linkage keys provided by the WA Data Linkage Branch. More detail on the data linkage process and privacy measures is provided by Kelman, Bass & Holman, (2002). This study focussed on children who sat the Year 3 and Year 9 WA Literacy and Numeracy Assessment (WALNA) or National Assessment Program – Literacy and Numeracy (NAPLAN) reading tests. The children sat Year 9 tests between 2005 and 2013. There were 152,002 children in this cohort from which the propensity matched sample was derived, and 3297 of these had a maltreatment substantiation before the Year 9 tests.

Additional restrictions were placed on the sample in order to reduce selection bias. Children had to have had their first maltreatment substantiation and any first entries to out-of-home care after the Year 3 reading test, and before the Year 9 reading test. This criteria was to ensure the Year 3 reading test provided a baseline measure of achievement prior to the effects of entering out-of-home care, and to increase comparability in the timing of first substantiated maltreatment allegations. Approximately 39% of children who had a maltreatment substantiation by Year 9 had their first substantiation after Year 3 and were included in the study. Although this strengthens the internal validity of the study to attribute outcomes to out-of-home care placement, we acknowledge it reduces the generalisability and may not reflect outcomes for children with early substantiations or out-of-home care placements. Data on first substantiated maltreatment type was missing for 27 children, who were excluded from the analysis. The restricted sample of children with late substantiations, no prior out-
of-home care, and test scores available for Year 3 and Year 9 consisted of 1128 children (260 out-of-home care entrants and 868 maltreated children who remained at home).

Measures

Covariates

Child characteristics. Gender, Aboriginality, month and year of birth (used to calculate age in months at the time of Year 9 tests and first substantiated maltreatment), preterm births (<37 weeks gestation), and birthweight were obtained from the Midwives Notification System and Births Registrations. Published reference levels were used to code children in the lowest 10% of birthweight for gestational age (Dobbins et al., 2013; Roberts & Lancaster, 1999a, 1999b), as outlined in (Maclean et al., 2015). Children were classified as having intellectual disability and/or developmental anomalies based on records in the Intellectual Disabilities Exploring Answers (IDEA) database and Western Australian Register of Developmental Anomalies (WARDA). Children’s Year 3 reading achievement consisted of WALNA or NAPLAN reading tests scores, converted to z-scores to facilitate comparability across tests. A binary indicator was included of whether the child was older than the typical range for Year 3 test (most likely children who had been retained).

Child protection history characteristics. Records of all of the cohort children’s maltreatment allegations, substantiations and periods of out-of-home care from birth to 2013 were obtained from Child Protection and Family Support. These were used to ascertain age at first substantiation, maltreatment type in first substantiation (neglect, physical, sexual and emotional abuse), presence or absence of any maltreatment allegation prior to Year 3, types of maltreatment allegation prior to Year 3 (binary indicator yes/no for neglect, physical, sexual and emotional abuse).

Parent characteristics. From the Midwives and Births data, we obtained maternal and paternal age and marital status at the child’s birth. The Mental Health Information System and the Hospital Morbidity Data system include public and private in-patient admissions and public out-patient admissions. International Classification of Disease codes from ICD8,
ICD9 and ICD10 provide diagnostic information in both data sources. Maternal and paternal mental health contact was coded as yes if records included a mental health diagnostic code including major diagnostic categories (such as anxiety, depression, schizophrenia and bipolar disorder, but excluding substance-related diagnoses). Parents’ substance-related contact was coded as yes if ICD codes indicated a drug or alcohol related event. Parents’ assault related admissions were ascertained via ICD codes for any hospital admission for an assault related injury inflicted on the mother or father (ICD-9: E960-E969, ICD-10: X85-Y09). Only health contacts prior to the child’s Year 3 test were included in the propensity matching, to increase comparability at ‘baseline’, however health contacts to Year 9 were included in sensitivity analyses.

**Community characteristics.** The Socio Economic Indices for Area (SEIFA) is a neighbourhood level measure of relative social disadvantage based on residence at the child’s birth (ABS, 2008). As Western Australia covers a very large land area and includes very remote areas with limited access to services we also obtained information on the Australian Bureau of Statistics’ Accessibility / Remoteness Index of Australia (ARIA), which indicates the accessibility of the area in which the family lives at the time of the child’s birth (Department of Health and Aged Care, 2001).

**Outcome Variables**

**Primary Outcome: Year 9 Reading Achievement.** Year 9 reading scores were obtained from the reading test component of the WA Literacy and Numeracy Assessment (WALNA) or National Assessment Program – Literacy and Numeracy (NAPLAN). The WALNA was a State-based assessment program introduced in 1999, and was replaced in 2008 by NAPLAN which is a national assessment. Tests are conducted in Years 3, 5, 7 and 9. For comparability between the WALNA and NAPLAN tests, raw scores were separately standardised for each test level (Year 3 as a predictor variable and Year 9 as an outcome in this study) for each calendar year.
Secondary Outcomes

Additional education data was available for a subgroup of children who sat the Year 3 tests between 2008 and 2012, and attended Government schools. Attendance data was available for 213 children. As suspensions data was only recorded for students who received a suspension, we limited the suspensions analysis to children who had an attendance record, in order to prevent coding children as having no suspensions when in fact they would not have been included in the data.

Year 9 school attendance. School attendance data from the first semester of Year 9 was used as a binary variable indicating whether the student had a high level of absence (absent for 20% percent or more of days enrolled). Research has found there is no threshold for ‘safe’ levels of absence, however the 20% cut-point used in this study falls on the borderline between ‘indicated’ and ‘moderate’ educational risk outlined by Hancock et al., (2014). Where students attended multiple schools in Year 9, absent days and enrolled days were summed over multiple records.

Suspensions in Year 9. The WA Department of Education also provided data on whether students had been suspended from school. We included a binary indicator of whether the student had any recorded suspension(s) during Year 9 of school.

Analytic Approach

Propensity matching approaches have been developed to address the problem that when evaluating an intervention in situations where randomisation is not possible, there are often systematic differences between the people who receive the intervention and the people who do not (Caliendo & Kopeinig, 2008). In this instance, children who have been exposed to the most adversity within their family life and been the subject of specific types of maltreatment are the most likely to be placed in out-of-home care. Often, the characteristics that make someone more likely to receive an intervention also predispose them to a good or bad outcome, regardless of the intervention. Propensity matching statistically assesses someone’s likelihood of receiving the intervention (here out-of-home care) based on a range of
covariates, and then uses their likelihood of receiving the intervention to create a comparison group that is balanced on the characteristics that made them likely to receive the intervention. The success of the propensity score matching can be assessed by comparing the intervention and comparison group on important covariates, and assessing whether these are similar across the two groups.

Although there is always a risk that the groups may still systematically differ if an important covariate that biases the groups’ outcomes has not been included, propensity score matching is a useful technique for reducing selection bias and creating much more comparable groups across a large number of covariates. Propensity matching is preferred to traditional matching as it balances the groups on a larger number of characteristics. It does not always provide results that are different to traditional analyses (e.g. where covariates are included in the regression model, or traditional matching methods) (Stürmer et al., 2006), however it produces superior results often enough that it can provide increased confidence in the findings (Berzin, 2010; Kurth et al., 2006).

**Statistical Analysis**

The propensity scores were created using a logistic regression model as part of the propensity matching procedure in SPSS. This model (the propensity model) calculated the likelihood of a child entering out-of-home care. This likelihood is known as the child’s propensity score. The variables used to predict a child’s propensity score were: child’s age at first substantiation, child atypically old at Year 3 reading test, gender, Aboriginality, intellectual disability, birth anomaly, preterm birth, low birthweight for gestational age, mother’s marital status at the child’s birth, maternal age, maternal substance contacts, maternal assault contacts, maternal mental health contacts, paternal substance contacts, paternal assault contacts, paternal mental health contacts, social disadvantage (SEIFA), remoteness (ARIA), any maltreatment allegation prior to Year 3, neglect allegation prior to Year 3, sexual abuse allegation prior to Year 3, physical abuse allegation prior to Year 3, emotional abuse allegation prior to Year 3, first substantiated maltreatment type, Year 3 reading score.
One to one matching without replacement was used, so each child that entered out-of-home care was matched with one child that did not enter care. A calliper of 0.25 standard deviations of the propensity scores was set, as is frequently recommended (Berzin, 2008). This means matches will only be made if the propensity scores of the two children fit within the calliper range. The balance of the covariates was assessed before and after matching using chi-squared tests and t-tests for continuous variables.

For the main analysis, the propensity matched sample was used to compare reading scores of children who had entered out-of-home care and those that remained at home following substantiated maltreatment. Regression models included simple univariate models, then added increasing covariates including all of the variables used in the propensity score analysis. The final models also included number of maltreatment allegations in each time bracket to Year 9 (prior to Year 3, between Year 3 and Year 5 tests, Year 5-7, Year 7-9) and number of maltreatment substantiations (Year 3-5, Year 5-7 and Year 7-9). As many of these events occurred after the decision regarding entry to out-of-home care (and may be affected by that decision), they were not included in the propensity score matching. It is important to account for these differences in children’s maltreatment experiences, however if results differ markedly following their addition, the interpretation of results may need to focus on the impact of placement decisions on children’s subsequent maltreatment experiences rather than primarily pre-existing differences. Results were compared to the same analyses conducted with A) the restricted sample of late substantiations (N = 1128) and B) the full cohort of Year 9 students that had a substantiation at any time point and entered care or did not enter care (N =3297). Similar analysis was undertaken comparing the groups on secondary outcome variables (attendance and suspensions).

A number of sensitivity analyses were conducted to assess the robustness of the findings. These included: using propensity scores as quintiles, and assessing whether results were the same across all quintile of propensity score; including as covariates in the main analysis parental health contacts that occurred between Year 3 and Year 9, and using conditional logistic regression to utilise the pairing within the sample.
Ethics

The study has ethics approval from the University of WA Human Research Ethics Committee, the Department of Health Human Research Ethics Committee, and the WA Aboriginal Human Information and Ethics Committee.

Results

From the 260 children who had entered out-of-home care in the restricted sample (late substantiated cases, but not matched), 215 were able to be matched using propensity scores with a child that remained at home following substantiated maltreatment. This group (hereforth referred to as the ‘matched sample’) included 430 children. Figure 6 shows the distributions of propensity scores for the out-of-home and in-home care groups, in the restricted sample prior to matching, and in the matched sample.

![Distributions of Propensity Scores Before Matching](image1)

![Distributions of Propensity Scores After Matching](image2)

Figure 6. Distribution of propensity scores in the unmatched and matched samples

Table 22 shows the balance of covariates in the restricted sample prior to matching, and the matched sample after matching. The out-of-home care children had higher levels of most risk factors. The groups differed significantly on many of the covariates, including age at first maltreatment substantiation, gender, aboriginality, birth anomalies, maternal health contacts for substance-related issues, mental health, and assaults, SEIFA, having any maltreatment allegation before Year 3, having an allegation of neglect, sexual abuse, or physical abuse.
before Year 3, first substantiated maltreatment type, and Year 3 reading scores. After matching, the groups only differed significantly on first substantiated maltreatment type. Similar balancing of covariates was obtained for the attendance and suspensions sample which is smaller as not all of the students had data available (results not shown).

Table 22. Sample descriptives and significant group differences before and after matching

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before Matching</th>
<th>After Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IHC N=868</td>
<td>OoHC N=260</td>
</tr>
<tr>
<td></td>
<td>Coefficient</td>
<td></td>
</tr>
<tr>
<td>Age at first substantiation</td>
<td>136</td>
<td>130</td>
</tr>
<tr>
<td>Higher than typical age</td>
<td>2.0%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Gender, male</td>
<td>37.9%</td>
<td>49.6%</td>
</tr>
<tr>
<td>Aboriginal</td>
<td>14.6%</td>
<td>26.5%</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>2.3%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Birth anomaly</td>
<td>3.9%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Preterm birth</td>
<td>6.8%</td>
<td>8.5%</td>
</tr>
<tr>
<td>Low birthweight</td>
<td>14.0%</td>
<td>16.2%</td>
</tr>
<tr>
<td>Marital status</td>
<td>25.5%</td>
<td>26.2%</td>
</tr>
<tr>
<td>Maternal age &lt;20</td>
<td>19.9%</td>
<td>23.1%</td>
</tr>
<tr>
<td>Maternal substance use</td>
<td>18.8%</td>
<td>33.1%</td>
</tr>
<tr>
<td>Maternal mental health</td>
<td>42.9%</td>
<td>63.5%</td>
</tr>
<tr>
<td>Maternal assault</td>
<td>6.2%</td>
<td>14.6%</td>
</tr>
<tr>
<td>Paternal substance use</td>
<td>31.1%</td>
<td>36.9%</td>
</tr>
<tr>
<td>Paternal mental health</td>
<td>32.7%</td>
<td>39.2%</td>
</tr>
<tr>
<td>Paternal assault</td>
<td>27.6%</td>
<td>32.3%</td>
</tr>
<tr>
<td>1 Most disadvantaged</td>
<td>34.9%</td>
<td>46.9%</td>
</tr>
<tr>
<td>2 Least disadvantaged</td>
<td>27.3%</td>
<td>20.4%</td>
</tr>
<tr>
<td>3 Least disadvantaged</td>
<td>16.2%</td>
<td>15.8%</td>
</tr>
<tr>
<td>4 Least disadvantaged</td>
<td>12.5%</td>
<td>11.9%</td>
</tr>
<tr>
<td>5 Least remote</td>
<td>9.1%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Any allegations</td>
<td>60.1%</td>
<td>64.6%</td>
</tr>
<tr>
<td>Neglect allegation</td>
<td>10.1%</td>
<td>15.6%</td>
</tr>
<tr>
<td>Sexual abuse allegation</td>
<td>10.7%</td>
<td>11.9%</td>
</tr>
<tr>
<td>Physical abuse allegation</td>
<td>10.7%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Emotional abuse allegation</td>
<td>10.7%</td>
<td>12.5%</td>
</tr>
<tr>
<td>First substantiation: Neglect</td>
<td>9.6%</td>
<td>38.5%</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td>16.3%</td>
<td>28.7%</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>16.3%</td>
<td>28.7%</td>
</tr>
<tr>
<td>Emotional abuse</td>
<td>16.3%</td>
<td>31.6%</td>
</tr>
<tr>
<td>Y3 Reading Z-Score (Mean)</td>
<td>-0.51</td>
<td>-0.8</td>
</tr>
</tbody>
</table>

Notes. All parent health contacts and all maltreatment allegation types are measured up to Year 3. Univariate test = Chi Squared or t-test. IHC = In-home Care OoHC = Out-of-home Care * p < .05.
Table 23 presents the results of the linear regressions when the full cohort, the restricted sample (late substantiations) and the matched sample were used. For each of these groups, the results identify differences in reading scores for the out-of-home care group compared to the in-home care group, initially from the univariate analysis, and then with a range of control variables included. The results for Model 1 showed a significant effect of out-of-home care on reading scores in the full sample or the restricted sample, but not the propensity matched sample. This finding showed that after accounting for differences such as child, family and neighbourhood adversity, prior achievement, and maltreatment history, there was no statistically significant difference between the reading scores of maltreated children placed in care and those that remained at home. As increasing controls were added to the models in both of the unmatched samples, the results became more similar to the propensity matched results.

Table 23. Regression models of the effects of out-of-home placement on Year 9 reading

<table>
<thead>
<tr>
<th>Model</th>
<th>Full Year 9 Cohort (N = 3270)</th>
<th>Restricted Sample (N=1128)</th>
<th>Propensity Matched Sample (N=430)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>p</td>
<td>B (SE)</td>
</tr>
<tr>
<td>Model 1: Univariate model</td>
<td>-0.22* (0.04)</td>
<td>0.00</td>
<td>-0.25* (0.07)</td>
</tr>
<tr>
<td>Model 2: Model 1 plus Y3 reading</td>
<td>-0.09* (0.03)</td>
<td>0.01</td>
<td>-0.09 (0.06)</td>
</tr>
<tr>
<td>Model 3: Model 1 plus age at 1st substantiation, race, gender</td>
<td>-0.12* (0.04)</td>
<td>0.00</td>
<td>-0.16* (0.07)</td>
</tr>
<tr>
<td>Model 4: Model 3 plus first substantiation type</td>
<td>-0.05 (0.04)</td>
<td>0.21</td>
<td>-0.10 (0.07)</td>
</tr>
<tr>
<td>Model 5: All covariates from the propensity model</td>
<td>0.02 (0.03)</td>
<td>0.51</td>
<td>0.03 (0.06)</td>
</tr>
<tr>
<td>Model 6: Model 5 plus propensity score (except in full sample) and number of allegations and suspensions</td>
<td>0.04 (0.04)</td>
<td>0.29</td>
<td>0.05 (0.06)</td>
</tr>
</tbody>
</table>

* p < .05
Sensitivity analyses produced findings consistent with the results presented. There was some variation between different analysis methods regarding the amount of control variables required to obtain similar results to the propensity matched group, but overall the pattern of results was similar.

Table 24 shows the results from the logistic regression analyses examining school absences and suspensions. For attendance, the results from the unmatched samples were not significant. In the matched sample, out-of-home care was associated with a decreased odds of high absence rates, reaching significance in the multivariate model (OR=0.36, 95% CI[0.15, 0.91]).

**Table 24. Logistic regression models of the effects of out-of-home placement on Year 9 attendance and suspensions**

<table>
<thead>
<tr>
<th>Year 9 Outcomes</th>
<th>Full Year 9 Cohort N = 1416</th>
<th>Restricted Sample N=531</th>
<th>Propensity Matched Sample N=213</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attendance</strong></td>
<td>OR (95% CI)</td>
<td>p</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Model 1: Univariate model</td>
<td>1.10 (0.88, 1.39)</td>
<td>0.39</td>
<td>1.05 (0.70, 1.57)</td>
</tr>
<tr>
<td>Model 2: All covariates from the propensity model</td>
<td>0.91 (0.68,1.21)</td>
<td>0.50</td>
<td>0.60 (0.35, 1.02)</td>
</tr>
<tr>
<td>Model 3: Model 2 plus propensity score (except in full sample) and number of allegations and suspensions</td>
<td>0.92 (0.69, 1.24)</td>
<td>0.60</td>
<td>0.61 (0.35, 1.08)</td>
</tr>
<tr>
<td><strong>Suspensions</strong></td>
<td>OR (95% CI)</td>
<td>p</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Model 1: Univariate model</td>
<td>1.58*(1.26, 1.99)</td>
<td>0.00</td>
<td>1.46 (0.98, 2.19)</td>
</tr>
<tr>
<td>Model 2: All covariates from the propensity model</td>
<td>1.23 (0.93, 1.61)</td>
<td>0.14</td>
<td>0.99 (0.60, 1.62)</td>
</tr>
<tr>
<td>Model 3: Model 2 plus propensity score (except in full sample) and number of allegations and suspensions</td>
<td>1.16 (0.87, 1.54)</td>
<td>0.31</td>
<td>0.95 (0.56, 1.60)</td>
</tr>
</tbody>
</table>

* p < .05
For suspensions, there was a significantly increased odds of suspensions in the full sample univariate model (OR=1.58, 95% CI[1.26,1.99]), however this was attenuated to non-significance in the full sample multivariate model, and attenuated fully in the matched sample analyses. The results show that after adjusting for other risk factors, children placed in out-of-home care did not significantly differ from children who remained at home with regards to having had a suspension, whereas out-of-home care was associated with better attendance after adjustment.

Additional analysis was conducted to assess whether the relationship between out-of-home care placement and reading was the same across all levels of propensity to be placed in care. Separate comparisons of the out-of-home care group and in-home care group for each quintile of propensity scores found the groups did not differ significantly on Year 9 reading scores in any of the quintiles (at the 5% level). The quintile with the lowest propensity for placement in out-of-home care approached significance ($p = .051$), with the out-of-home care group tending towards better reading scores ($M = -0.21$ compared to $M = -0.64$ for the in-home group). For all other quintiles, the out-of-home care group had equal or worse reading scores than the in-home group but differences were not significant.

**Conclusions**

Although out-of-home care and in-home care groups differed significantly on their reading scores, these differences were attenuated in the propensity matched model and other models that adequately controlled for other risk factors. No differences were found for suspensions. However attendance outcomes were significantly better for children in out-of-home care in the fully adjusted model using the propensity matched sample. These findings suggest that out-of-home care, on average, does not have a harmful impact on children’s educational outcomes and is associated with positive attendance outcomes.

Our results regarding achievement are consistent with recent findings by Berger et al., (2015) that poor reading results for children in care can be attributed to their high levels of background risk factors (including maltreatment and social disadvantage) rather than a direct
result of being in care. Our work builds on Berger’s findings, showing that the lack of harmful (or beneficial) impact of out-of-home care on academic achievement in early secondary school applies to the broader group of children who have entered care after approximately age 8, not only children who are in care at the time or around the time of the achievement test. In making the decision to place a child in care, it is important to know the likely outcomes not only for the time they are in care, or for the subgroup of children who remain in care, but also the ongoing outcomes for the broader group.

Also consistent with our findings regarding attendance outcomes is research by Font and Maguire-Jack (2013), which showed better self-reported school engagement among some children who had entered out-of-home care (those who had entered in the 18 months prior to the second survey wave). Our finding of improved attendance outcomes among children who had entered care suggests previously reported higher levels of engagement shown in self-report measures are also reflected in objective data from attendance records.

Extending this approach to examine suspensions for maltreated children who have or have not received out-of-home care provides new insights regarding the impact of out-of-home care on school behaviour. The finding that after taking into account background risk factors, children in out-of-home care had no more suspensions than maltreated children who remain at home suggest that the high levels of behaviour problems in school reported for this group can be attributed to the children’s prior risk factors rather than the experiences of out-of-home care.

The study had several limitations. First, in order to use Year 3 reading scores as a pre-placement baseline measure, it was necessary to limit the sample to children whose first maltreatment substantiation occurred after the Year 3 reading test. Less than half of all substantiations occurred after this point. The results may not be generalisable to children who experience maltreatment substantiations at an earlier age. Previously, worse outcomes were found for children who entered out-of-home care after year 3, especially if they had already been the subject of an unsubstantiated maltreatment allegation (Chapter 7). Further subgroup analyses would be valuable, but a sufficiently large sample would be required. A limitation
of the propensity matching approach is that a large sample is required to begin with, as a number of participants are excluded in order to create matched groups. The reduction in sample size can affect power to detect real differences (Berger et al., 2009). Specific to the current study was a further reduction in sample size for the secondary analysis examining attendance and suspensions. However we were still able to detect significant differences in attendance in the matched sample.

Despite these limitations, this study had a number of strengths, including standardised achievement test data, and the history of child protection involvement and covariate information dating back to the children’s births. Our findings confirm and extend recent research suggesting the poor educational outcomes for children who have entered out-of-home care are most likely a result of maltreatment and pre-existing adversity, rather than being caused by placement. The systematic review (Chapter 3) found indications that placement in care may have a varying impact across different outcome areas. Further research is needed to assess possible effects of out-of-home care on a range of other areas of child development.
Chapter 9 Discussion

Preamble

Children involved with the child protection system are an especially vulnerable group who carry a disproportionate burden of adverse health, education, employment and mental health outcomes. Educational outcomes are an important area of child development, and a large body of research had previously highlighted poor educational outcomes for different groups of children likely to be involved with the child protection system (e.g. maltreated children and children in out-of-home care). However few studies have taken into account a broad range of risk factors within different environmental contexts that typically affect maltreated children. This thesis presents an original body of research that examines the relationships between multiple risk factors within different environmental contexts for children with different level of involvement with the child protection system. The final chapter of this thesis summarises the main findings, and discusses the strengths, limitations and implications of this research.
Introduction

Although numerous studies have been conducted that draw attention to the poor educational outcomes for maltreated children, few have been able to examine the outcomes for children involved with the child protection system taking into account multiple risk factors across the child, family, neighbourhood and school levels. This thesis has added significantly to the understanding of this topic by exploring risk factors from multiple developmental contexts simultaneously for children with different levels of child protection involvement. The research explored issues of causality and attempted to disentangle effects of pre-existing adversity, maltreatment and out-of-home care. It detailed the achievement outcomes of children with a range of different out-of-home care characteristics, and highlighted the deeply interwoven nature of different aspects of a child’s care history and their individual, family and community backgrounds. It also investigated the educational trajectories and patterns of stability and change for children with different levels of child protection involvement.

Summary of Findings

Multiple risk factors influence children’s development. In the literature review (Chapter 1 and 2) previous research was presented that links specific risk factors at the child, family, neighbourhood, school and child protection levels to educational outcomes. The systematic review (Chapter 3) focussed on studies that address the selection biases related to children with substantiated maltreatment that remain at home versus those that are placed in out-of-home care in order to assess what is known about causal effects of out-of-home care. These chapters showed the importance of studying child maltreatment within a multiple-risks context, both to gain a better understanding of the influence of different risk factors on educational development, and to try to disentangle the effects of out-of-home care from the effects of other risk factors. Although huge strides have been made in these areas, many important research gaps remained which shaped the research objectives of this research.
The following objectives were achieved:

1. Systematically review studies comparing outcomes for maltreated children placed in out-of-home care and maltreated children who remain at home
2. Describe early reading outcomes (Year 3) for children with different levels of child protection contact
3. Assess the role of adversity (child, family and neighbourhood risk factors), level of child protection involvement and school attendance in predicting early reading achievement
4. Examine characteristics of children’s out-of-home care placement histories associated with low early reading achievement
5. Describe Year 3-9 reading trajectories of children with different levels of child protection contact, and the influence of other risk factors
6. Compare Year 9 educational outcomes for maltreated children who enter out-of-home care and those that do not.

The results are integrated and discussed under the following headings:

- Educational achievement of children involved with the child protection system
- Risk factors at the child, family and neighbourhood levels
- Attendance
- Child maltreatment
- Level of child protection involvement
- Out-of-home care characteristics
- Level of child protection involvement and reading achievement - changes associated with age and time
- The ‘effects’ of out-of-home care

**Educational Achievement of Children Involved with the Child Protection System**

A first step in examining the educational outcomes of children involved with the child protection system was to describe the extent of low achievement among this population. As outlined in Chapter 5, almost one in three children (30.2%) involved with the child protection
system via at least an allegation of maltreatment achieved in the lowest decile for Year 3 reading, compared to 11.4% of children with no allegations. Without adjusting for other risk factors, all three groups of children involved with the child protection system (children with unsubstantiated maltreatment allegations, substantiated allegations, or out-of-home care as well as a substantiation) were at three to fourfold increased likelihood of low reading scores in Year 3 compared to children with no allegations. The first analysis in Chapter 7 assessed the same relationship among students in Year 9. Although there was more variation across the different groups than seen in Year 3 students, all were at increased risk of low reading scores compared to children with no allegations (ranging from over a twofold increased risk of low reading for children with unsubstantiated allegations to almost five-fold increased risk for children who had even entered out-of-home care).

These findings show that low reading achievement is very common among all three groups of children involved with the child protection system. Although different measures and benchmarks were used, our results are consistent with international findings for relevant groups of children. One in four children ‘ever in care’ in Manitoba (43%), and 35% of children who received services from Child and Family Services were found to have Grade 3 reading scores that did not meet or approach expectations, compared to 14% of children who never received either service. Poor educational outcomes have frequently been reported in studies of maltreated children, children with substantiated or unsubstantiated maltreatment (Fantuzzo et al., 2011), and children in care (AIHW, 2015b; Sebba et al., 2015). This result describes the extent of low reading scores for different groups of children involved with the child protection system in Western Australia. However it does not take into account other risk factors that might also be influencing educational outcomes. The influence of other risk factors and outcomes from multivariate analyses are explored below.

**Risk Factors at the Child, Family and Neighbourhood Levels**

The analyses in Chapter 4 (for Year 3s) and Chapter 7 (Year 9s) then examined a wide array of risk factors at the child, family and neighbourhood level in univariate and multivariate models. Risk factors at the child level included age, being older than the typical age range
(and likely to have been retained), gender, Aboriginality, preterm births, low birthweight for gestational age, intellectual disability, birth anomalies, and exposure to maternal smoking during pregnancy. Risk factors at the family level included parents’ highest level of education, maternal age and marital status at the child’s birth, and maternal and paternal hospital contacts for mental health, substance-related issues, or assault injuries. Community level risk factors included neighbourhood social disadvantage and remoteness. Descriptive analysis showed most of the risk factors were more common (and often highly prevalent) among children involved with the child protection system, and that their prevalence tended to be highest among children with higher levels of child protection involvement (i.e. out-of-home care). Almost all of the risk factors were significant in both the univariate and multivariate analyses, showing the many influences on children’s educational achievement.

The risk factors associated with the greatest increased odds of low reading scores were intellectual disability and prior achievement. Intellectual disability was associated with more than a six-fold increased risk of low reading among Year 3 students, and a 14-fold increased risk among Year 9 students (unadjusted). The risk associated with intellectual disability was only slightly attenuated in the multivariate analyses that included child, family and neighbourhood adversity. Early achievement (prior reading scores), which is sometimes considered a measure of ability, was also among the risk factors associated with greatly increased odds of low reading scores. Being above the typical age range for the year, which is likely to reflect having been retained, was also associated with a two to three-fold increased (adjusted) risk of low reading scores.

Other than intellectual disability and prior achievement, the risk factors most strongly associated with low reading scores were related to social disadvantage. Having parents with lower levels of education was associated with a threefold increased risk of low reading, and being Aboriginal or living in the most disadvantaged areas were each associated with an approximately doubled adjusted odds of low reading scores. These factors showed more attenuation in the multivariate models – unadjusted odds associated with Aboriginality and living in the most disadvantaged areas were between five and eight across Year 3 and Year
9 students. Living in the most socially disadvantaged areas was associated with a more than five-fold increased (unadjusted) odds in the Year 3 analysis, but a lower three- to four-fold increased (unadjusted) odds among Year 9s.

Prior to this study, the importance of examining the multiple risk factors influencing educational outcomes for maltreated children and children in care had been highlighted in reviews (e.g. Stone, 2007) and research (e.g. Boden et al., 2007). A number of risk factors have been examined among several studies that account for multiple risk factors. In a study looking at maltreatment and education, gender, race, poverty, birth risks, low maternal education at birth, and experiencing homelessness were included, and all were associated with significantly increased risk of poor reading achievement at the end of second grade (Rouse & Fantuzzo, 2009). Another study (Boden et al., 2007) looking at educational attainment in older children included one of the more comprehensive lists of child and family risk factors to date, including gender and IQ, maternal age, parents’ education level, and family socio-economic status, parents’ alcoholism, parents’ illicit substance use or parent’s criminal offending, inter-parental violence, and changes of parents (includes changes such as fostering, divorce, remarriage). As these were reported as control variables, the relationship between each risk factor and educational outcomes in the multivariate analysis was not reported, however most were significant (except for maternal age, parents alcoholism, and parents criminal offending).

This thesis was able to include a larger number of risk factors than most studies, spanning child, family and neighbourhood risk factors as well as attendance. It included variables such as maternal mental health that previous studies have been unable to include. It built on previous research by detailing the associations between these many risk factors and educational outcomes, as well as controlling for them in order to assess the influence of maltreatment on educational outcomes. The finding that many of the strongest risk factors for poor educational outcomes reflected social disadvantage was in keeping with Rouse and Fantuzzo’s (2009) results showing race, low maternal education and poverty had the highest odds ratios among their covariates.
Attendance

In addition to the child, family and neighbourhood level risk factors outlined above, attendance was also an important risk factor for low reading scores. Descriptive statistics in Chapter 5 showed high levels of absence among children with unsubstantiated or substantiated maltreatment that remained at home. Analyses in Chapter 5 and Chapter 7 showed protective effects on attendance rates associated with out-of-home care. The risk of low reading achievement increased as the level of school absences increased. Among Year 3 and Year 9 students, the highest level of absence (more than 25% of enrolled days) was associated with a five- to six-fold increased risk of low reading scores in the unadjusted analyses, and a two- to three-fold increased risk of low reading scores after adjusting for maltreatment allegations and child, family and neighbourhood risk.

Previous research had established that regular school attendance predicts better academic achievement (Hancock et al., 2014), and that among second grade students, lower attendance rates were found among children with maltreatment reports (Fantuzzo et al., 2011). The results from Chapter 5 regarding worse attendance for children with substantiated and unsubstantiated maltreatment were consistent with results found by Fantuzzo and colleagues. This study, along with Chapter 9, found children who had been in out-of-home care had more favourable attendance rates. Runyan and Gould (1985a) also found higher levels of school attendance among children in out-of-home care than among other maltreated children. High levels of school absence were consistently associated with low reading achievement in the current studies. Attendance was an important predictor of low reading achievement and can be targeted for interventions. As child protection involvement remained significant after including attendance, it is clear that improving attendance should form one of a number of strategies targeting different risk factors associated with poor achievement.

Child Maltreatment

In Chapter 5 and the first section of Chapter 7, results showed that maltreatment allegations were significantly related to low reading scores in Year 3 and Year 9 students even after
adjusting for multiple risk factors at the child, family and neighbourhood levels. Previous research had raised the question of whether the poor educational outcomes observed in maltreated children resulted from child and family risk factors or from maltreatment. In particular, Boden et al., (2007) included a large number of covariates and found the relationship between maltreatment and educational outcomes was attenuated to non-significance after accounting for other risk factors. My results were consistent with Boden’s in that including multiple risk factors did partially attenuate the findings, from a three times increased unadjusted risk of low reading scores, to a one and a half times increased risk associated with having been the subject of a maltreatment allegation. In this study, however, maltreatment remained a significant predictor despite attenuation.

Chapter 5 then examined the relationship between maltreatment type and early reading achievement. A limitation was that no more than two maltreatment types are recorded for each maltreatment allegation, so the data may not fully capture the experiences of children who have experienced multiple maltreatment types. Nonetheless, the analysis was unique in examining all four maltreatment types in a multiple risks context. All four maltreatment types (neglect, physical, sexual and emotional abuse) were associated with a significantly increased risk of low reading scores, at around three to four times increased likelihood of low reading scores compared to children without maltreatment allegations. After adjusting for child, family and neighbourhood risk factors, the risk was somewhat attenuated, but remained significant for neglect, physical and sexual abuse. After adjustment, sexual abuse and neglect were both associated with approximately 50% increased odds of low reading achievement, and physical abuse with a 26% increased odds.

Neglect has previously been the maltreatment type most associated with academic difficulties (Stone, 2007), and this aligns with the current findings. Conversely, there have been more mixed results for sexual abuse. The current finding that sexual abuse had among the highest increase in risk for low reading achievement is consistent with Fergusson and colleagues’ results showing a wide range of adverse outcomes associated with sexual abuse (Fergusson et al., 2013), although not with their non-significant findings for educational outcomes.
(Boden et al., 2007). One difference between the studies is that Fergusson and colleagues surveyed young people on sexual abuse perpetrated by anyone, whereas child protection data typically includes sexual abuse where a parent is the perpetrator or the parents are failing to protect a child from known and ongoing abuse. The current study also had a larger sample size and therefore increased power to detect small but significant differences. It is unclear why emotional abuse was not significantly related to achievement in the multivariate analysis when it has previous been linked to other adverse outcomes (Crow et al., 2014; Gross, 1992; Iwaniec et al., 2006). Emotional abuse is somewhat neglected in the literature and requires further research.

**Level of Child Protection Involvement**

Relationships between level of child protection involvement and educational outcomes are the central focus of this thesis. Analyses in Chapters 5 to 8 examine different aspects of these relationships. Following on from the results from descriptive and univariate analyses of the relationship between level of child protection contact discussed at the start of this section, multivariate analyses were conducted. Chapter 5 showed that among Year 3 students, including child, family and neighbourhood adversities in the model attenuated the relationship between child protection involvement and reading scores. After this attenuation however, both unsubstantiated allegations and substantiated allegations (without out-of-home care) were associated with a significantly increased risk of low reading scores compared to children with no allegations, whereas having ever been in out-of-home care was not. These results, together with the findings over time and for older children are discussed later in this chapter.

**Out-of-Home Care Characteristics**

Chapter 5 found reading outcomes for Year 3 students that had been in out-of-home care did not differ significantly from children with no maltreatment allegations, after adjusting for child, family and neighbourhood risk factors. As out-of-home care is not a homogenous experience, Chapter 6 examined a range of characteristics of children’s out-of-home care
experiences in relation to Year 3 reading outcomes. The univariate analyses identified groups of children among whom the likelihood of low reading scores was particularly high, based on their care experiences. Out-of-home care characteristics associated with the greatest elevation in risk of low reading scores included: children whose main placement type or most recent placement was residential care (seven times more likely than the general population to have low reading scores), and children who had been in their current placement for up to a year (five times increased risk compared to the general population). Although all children who have entered care should receive additional educational supports as required, these subgroups may be particularly in need of interventions.

The multivariate analysis showed that a number of care history characteristics were significantly related to low reading scores after adjusting for child, family and neighbourhood risks. For Aboriginal children, residential care was associated with significantly worse reading scores in the univariate analysis, but was not significant after controlling for other risk factors. For non-Aboriginal children, mixed care type was associated with a doubled risk of poor reading even after adjusting for other risk factors, while kinship care was associated with a smaller but significant increased risk of low reading scores.

Contrary to our expectations, multiple placements were not consistently related to worse reading scores, however for non-Aboriginal children one placement was associated with better outcomes than more than one placement. Other aspects of stability did show significant results. For both placement changes and reunifications, reading outcomes were significantly worse if the living arrangements changed within the year prior to the reading test. Compared to the first year, children who had been reunified achieved significantly better during the second year and then showed a gradual decline. Conversely, more positive reading outcomes were associated with a longer time in a child’s current placement: children who had been in the same placement for over a year were not at significantly elevated risk for low reading scores compared to the general population, after adjusting for other risk factors. After adjusting for other risk factors, children who had been reunified had significantly worse outcomes than the general population, whereas children in care at the time of the Year 3 test
did not. Worse reading achievement was found for children who first entered care at an older age (4 years and above) compared to those that entered care at a younger age (aged 0-3).

Descriptive analysis also revealed that characteristics of children’s care experiences are deeply interconnected with not only a child’s background adversities, but also other characteristics of their care history. For instance, residential care is more commonly used among Aboriginal children. Children from very remote areas are over-represented in residential care as are children whose mothers who had suffered assault injuries. Children with a primary care type of residential care typically had spent less time in out-of-home care overall, and had fewer placements compared to children placed in other care types.

This finding regarding the interwoven nature of children’s individual, family and community characteristics, and multiple aspects of their care history is new. A limitation of the study is that limited sample size of sub-groups of children in care combined with the distributions of variables prevented full exploration of the relationships and potential interactions between these variables, and limited the extent to which an outcome could be attributed to an individual care characteristic. Furthermore, it was unable to account for emotional or behavioural problems that might affect both placement decisions and educational outcomes. Nonetheless, it provides valuable information regarding patterns of care use in Western Australia, and specific sub-groups and times where educational vulnerability is highest.

The research in Chapter 6 controls for a much broader range of child, family and neighbourhood characteristics than has typically been possible, and examines a number of out-of-home care history characteristics in the same population. The findings provide new insights into specific sub-groups of children placed in out-of-home that are at highest risk for low reading achievement. The poor achievement outcomes for children who had been placed in residential care are consistent with previous research showing higher levels of behaviour problems (Lee, 2009) and arrests (Baskin & Sommers, 2011). It has been pointed out that these outcomes may not be caused by residential care, as residential care has increasingly been used as a placement of last resort for young people with severe emotional and behavioural problems (Bath, 2008). Of course, if this is the case, entering a placement where
the other children have severe emotional and behavioural problems may be less than ideal for a vulnerable child or young person. The current study could not examine emotional and behavioural problems, but did find residential care was more commonly used for Aboriginal children and children from very remote areas.

Increased risk of poor reading outcomes was also found among children who had recently had a placement change or reunification. This suggests that children are more educationally vulnerable following transitions in living arrangements. Those that entered care showed a gradual reduction in risk of low reading scores with increased duration since entering care. This finding is somewhat at odds with research that found improved self-reported engagement among children who had entered care relatively recently, but not for children who had been in care for a longer period (Font & Maguire-Jack, 2013). Likewise Barber and Delfabbro (2005) found improvements in adjustment in the first four months that were then maintained at 2 year follow-up. It has been suggested that children may make an effort to please adults while they are adjusting to a new placement. It is possible that the difference between these results and the current findings is because engagement and classroom behaviours can be changed very quickly, whereas for a child that is having reading difficulties, it may take longer to build the necessary skills to catch up. Conversely, a disruptive event may influence children’s academic performance relatively quickly, for example if they are unable to concentrate on the test. Qualitative reports emphasise that placement changes can be very disruptive to children’s schooling and academic performance (Cashmore et al., 2007; Sebba et al., 2015).

The findings regarding reunified children are new, particularly in showing declining outcomes many years after reunification. There were limitations in this analysis in that subsequent events (maltreatment or care entries) that may help to explain this pattern were not examined, however this analysis confirms and extends previous research showing reunified children are at increased risk for a range of adverse outcomes (Taussig, Clyman & Landsverk, 2001; Bellamy, 2008; Wade, Biehal, Farrelly & Sinclair, 2010). Given that policies in Western Australia promote reunification (where deemed appropriate),
understanding the outcomes for this group and how to support more positive outcomes following reunification is important.

An unexpected finding was the limited evidence of worse outcomes associated with higher numbers of placements. Multiple placements have been linked to a range of adverse outcomes for children in care including educational (Zima et al., 2000; Vinnerljug, Öman and Gunnarson (2005) and behavioural outcomes (Runyan & Gould 1985a; Widom, 1991; Lee, 2009). It is important to note that number of placements was related to other care characteristics in sometimes unexpected ways. For instance, although research generally indicates kinship care is associated with greater placement stability (Winokur et al., 2014), the current study found children whose main placement type was kinship care were more likely to have had four or more placements and children placed in residential care were least likely to have had multiple placements. As noted above, this study was unable to account for the full range of possible confounding and interacting effects across out-of-home care variables, which may have resulted in this finding. The results raise the possibility that placement changes may not always be bad for children’s education, particularly if they are a move to a more suitable placement.

**Level of Child Protection Involvement and Reading Achievement - Changes Associated with Age and Time**

The Chapter 5 finding that unsubstantiated and substantiated maltreatment allegations were associated with significantly worse reading outcomes in the multivariate analysis, whereas out-of-home care was not, also raised questions regarding whether these effects were consistent over different age groups. Chapter 8 results showed that for Year 9 students there was some attenuation of the risk associated with each level of child protection involvement in the multivariate model, however all three groups with child protection involvement remained at significantly elevated risk of low reading scores. The unadjusted results also differed between Year 3 and Year 9 students. In the Year 3 results, the unadjusted odds ratios were similar across all three child protection groups, all indicated a three to three and a half times increased odds of low reading scores. The Year 9 results showed more variation
between groups, with the odd ratio lowest for unsubstantiated maltreatment, followed by substantiated maltreatment, and the highest odds for children ever in out-of-home care.

The variation in results for older students compared to younger students raised the question as to whether the reading outcomes for children who had entered care by Year 9 were similar for children who entered care at a young age and those who were older. This could support the premise that having experienced out-of-home care has different effects on children’s educational outcomes as they get older, even if the entry to care occurred at an early age when positive outcomes appear likely for out-of-home care. Alternatively results could differ depending on the age at placement, or the combination of highest placement level at Year 3 and Year 9. Significant effects of age at first placement could indicate that children are more vulnerable to poor educational outcomes if they are older – whether because of the impact of out-of-home care or the precipitating maltreatment event. Age effects were not found. Instead, the study showed that the combination of highest level of contact at both time points was significant. The interpretation of this is more complex, but suggests the timing (and possibly severity) of maltreatment events over time in combination with the level and timing of child protection intervention are related to reading outcomes.

The trajectories of children with different levels of child protection involvement were also examined in Chapter 8. As children’s highest level of child protection involvement can change over time, this analysis examined trajectories of sub-groups of children based on their highest level of child protection involvement at both the start of the trajectory (Year 3) and the end point (Year 9). In the multivariate analyses, for both Aboriginal and non-Aboriginal children the lowest reading trajectory was found for children who by Year 3 had been the subject of an unsubstantiated report as their highest level of child protection involvement, but by Year 9 had maltreatment substantiated and had entered out-of-home care. It is noteworthy that these children had very low reading at the Year 3 test as well as the Year 9 test, suggesting their reading difficulties began prior to entry to care or substantiation of maltreatment. For these children, a longer period of exposure to chronic adversities is likely to have occurred. This could potentially have included maltreatment that was not able to be
substantiated, or poor parenting that initially did not reach the threshold for maltreatment but worsened over time. It could also reflect ongoing child, family and community level risks. Chronic maltreatment or chronic adversity with lower likelihood of supports or interventions may explain the poor outcomes.

For all of the child protection involved groups, achievement was significantly lower than for children with no child protection contact. The trajectories were all relatively flat, with only two patterns of child protection involvement associated with a significantly declining trajectory among non-Aboriginal children. These patterns were children whose highest level of child protection involvement at both time points was substantiated maltreatment, and children with no contact by Year 3 and an unsubstantiated allegation by Year 9. Although significant, the declines were fairly small, with most of the differences occurring at intercept (i.e. in children’s Year 3 reading scores).

Chapter 8 also provided some new insights regarding patterns of stability and change in the reading development of children with different levels of child protection contact. In terms of implications for interventions patterns of stability can either support early identification and intervention of low reading achievement or if reading achievement tends to change a lot over time, investment in early identification may be less worthwhile. This study is unique in showing reading achievement patterns and trajectories for children with different levels of child protection involvement over four tests spanning seven school years. There was some support for stability of reading achievement, including the relatively flat trajectories shown in the multilevel modelling, and the comparatively high odds ratio for Year 3 reading as a predictor of Year 9 reading. Furthermore, children involved with the child protection system were more likely than other children to show a consistently low level of reading achievement across all four test years. All of these suggest targeting strategies at the early years of school, or earlier (prenatal or early childhood). However, children involved in the child protection system were also more likely than other children to show a decline in achievement despite satisfactory or even above average reading scores in Year 3. This finding highlights a need
for early intervention to be supplemented with ongoing identification and intervention for academic difficulties among this group, and exploration of prevention opportunities.

Previous research found more consistent adverse educational outcomes associated with unsubstantiated rather than substantiated maltreatment (Fantuzzo et al., 2011). A greater decline in grade point average was also observed for unsubstantiated cases than substantiated cases following a first report of maltreatment (Leiter, 2007). This was attributed to the public response to substantiated maltreatment reducing the negative impact of maltreatment. The current study builds upon these previous findings by differentiating cases where the response to substantiated maltreatment included out-of-home care, and by assessing level of child protection involvement at two separate points in children’s educational trajectories. The markedly different trajectories for children who only ever have unsubstantiated maltreatment compared to those that have unsubstantiated maltreated allegations early in life and go on to have a substantiation and enter care between Year 3 and Year 9 sheds new light on the relationship between unsubstantiated maltreatment and educational outcomes. Because the latter group already have worse outcomes than the former at Year 3, it suggests that poor outcomes in this group stem from events prior to Year 3, rather than the subsequent maltreatment substantiation or entering care at a later age. These early events may include unrecognised maltreatment, sub-threshold levels of maltreatment/poor parenting, or other chronic adverse circumstances in the home environment coupled with a need for greater intervention than is received. Where maltreatment allegations remain unsubstantiated by Year 9, results are relatively positive compared to other groups of child protection involved children.

**The ‘Effects’ of Out-of-Home Care**

Chapter 3, and to some extent Chapter 2, highlighted the issues of selection bias in assessing possible causal effects of out-of-home care for maltreated children. The systematic review found very few studies, and none in the area of education, have adequately addressed selection bias issues in comparing outcomes for children with maltreatment substantiations who are subsequently placed in care and those that remain at home. The final study, presented
in Chapter 8 led on from the systematic review and used a study design including propensity matching in order to create more comparable groups of children with substantiated maltreatment that are placed in care or remain at home. In the absence of randomisation, propensity matching is considered one of the best approaches to estimating possible causal effects related to out-of-home care. A limitation is that the success of propensity matching in estimating causal relationships relies on there not being important unobserved variables still causing selection bias. This possibility cannot be ruled out, however multiple risk factors from different environmental contexts of the child were included in the matching to optimise the comparability of the groups across a range of variables.

This study found that although there were significant group differences between maltreated children who had ever been in out-of-home care (out-of-home care group) and those who had not (in-home care group), among the propensity matched sample, the groups did not differ on Year 9 achievement or having had a suspension. In the final model, the out-of-home care group had significantly better school attendance than the in-home care group. This original finding suggests that poor educational outcomes for children who have been in care are likely to primarily reflect pre-care experiences of maltreatment and child, family and neighbourhood level risk factors. On average, out-of-home care appears to be related to positive and neutral educational outcomes after addressing other risk factors.

Previous research using propensity scores (Font & Maguire-Jack, 2013) found higher levels of self-reported engagement in second grade associated with out-of-home care (for the subgroup that entered care closer to the time of the assessment). The current study confirms this finding using an objective measure of school participation (attendance) in an older population of students. The same previous study found no difference in academic performance, which could have reflected the limitations of self-reported measures of achievement. However, our findings, using standardised achievement tests also confirmed no differences associated with out-of-home care versus remaining at home following maltreatment. Another rigorous study published recently also drew the conclusion that poor educational outcomes for children in care can best be attributed to pre-care experiences of
adversity and maltreatment (Berger et al., 2015). Similar findings were identified in the systematic review for cognitive and language outcomes (which are closely related to academic achievement). Although some caution must be applied in interpreting results from non-randomised studies, there is a growing body of evidence suggesting that the worse educational outcomes found for children in care at or around the time of the assessment (Berger et al., 2015; Font & Maguire-Jack, 2013) and for children ever in care are more likely to be caused by pre-care experiences. As noted in the systematic review, there are some indications that outcomes associated with out-of-home care may vary across different developmental domains. Using a rigorous method to address selection bias (an instrumental variables approach) Doyle (2011) found worse delinquency outcomes associated with out of home care. Among the studies at higher risk of selection bias, neutral or positive outcomes were more common across language, cognitive and educational areas, and negative outcomes more common across behavioural and offending outcomes. Further research that addresses selection bias issues to estimate possible causal effects of out-of-home care for maltreated children across multiple developmental domains is required.

**Strengths of this Research**

Many of the strengths of this research stem from using population level, linked administrative data. This provides many advantages, as outlined below.

**Population data**

Using data from an entire population of children born in Western Australia provides a large sample size which enables more comprehensive analyses. The use of linked-population data also allows the inclusion of groups that are typically hard to reach using other data collection methods such as surveys. Disadvantaged, vulnerable or highly mobile segments of the population are less likely to take part in surveys, and more likely to drop out, yet these are often the people of most interest when researching complex social problems such as maltreatment. Data linkage studies are less subject to recruitment biases or loss to follow-up issues in obtaining data for these groups.
High Quality, Objective Data

The administrative datasets provide high quality data. The educational data includes standardised, national achievement tests data, which is considered the gold standard in researching academic achievement. Maltreatment is more complicated to measure and it is widely recognised that all measures of maltreatment are flawed. Administrative records of maltreatment do not include maltreatment that is never reported, however it has many strengths. Child protection records do not need to rely on self-reports of maltreatment by parents or the child. Parents who have maltreated their children may be particularly unlikely to be willing to admit to maltreating their children in a survey. Asking minor children about maltreatment is fraught with ethical issues, and retrospective reports of childhood maltreatment may be subject to biases such as recall or reporting biases. Data can also be obtained on other sensitive topics such as parental mental illness, substance abuse and assaults without such biases, and without the risk of causing distress asking about potentially upsetting topics.

Risk Factors From Multiple Levels of a Child’s Environmental Context

The involvement of multiple Government agencies allows the inclusion of a wide variety of risk factors about the child (including birth risks, disabilities and demographics), the family (including demographics as well as health records relating to mental health, substance use and assault injuries), and the community (neighbourhood level social disadvantage and remoteness), along with attendance records and a large number of variables related to the child’s maltreatment and child protection history.

Longitudinal Research

The cohort data covers many birth years and many educational test years, which serves to increase the sample size and also provides repeated measures of the educational outcomes. The cohort includes children born from 1990 to the end of 2009, and outcomes data is available up to 2013, meaning that data for some of the children is available from birth to adulthood. Including more recent birth years is another strength, as social trends and changes
in policy can make older data a less accurate reflection of current circumstances. The Chapters in this thesis include a combination of analyses that focus on more recent cohorts and events and analyses that use earlier cohorts in order to follow children’s developmental trajectories from birth to Year 9. The longitudinal data enables research to examine: the influence of events from the child’s birth and childhood (e.g. birth risks, child protection involvement throughout childhood) on later outcomes; the influence of risk factors for children of different ages during the same period of time (e.g. Year 3 and Year 9 reading achievement on NAPLAN tests between 2008-2010); and how individual children’s reading achievement changes over time.

**Analyses Methods to Address Specific Research Gaps**

The strengths of the linked data outline above combine to allow research designs and techniques aimed at answering questions that have been hard to answer because of data limitations. For instance, a large sample size and data covering a wide variety of important risk factors enables this study to examine outcomes of children involved with the child protection system within a multiple-risks context. It provides a large number of relevant covariates for use in propensity matching. As mentioned, the longitudinal data also facilitates the examination of risk factors from very early in life, and is a requirement for trajectory analysis. Detailed child protection data allows this research to focus solely on children who have been the subject of a maltreatment allegation, and to disentangle the influences of maltreatment and out-of-home care which are frequently confounded.

**Limitations of this Research**

Whilst the administrative datasets have many strengths, they also have a number of limitations. These are outlined below.

**Only Captures Specific Service Events**

Data collection for the administrative datasets only occurs when specific service events occur. It is widely recognised that maltreatment is not always reported (Gilbert et al., 2012).
Consequently administrative datasets under-ascertain maltreatment. Nevertheless, the data on maltreatment that is reported is free from a number of biases described above. The parental hospital data is likewise limited to occurrences where the parent seeks help from public or private inpatient services or public outpatient clinics. Being based on hospital contacts, the data is likely to capture the more severe end of the spectrum of mental illness, substance abuse and assaults requiring hospital treatment. Furthermore, patients that are treated entirely by private outpatient clinics, by general practitioners or private psychologists who may be funded by Medicare will not have mental health, substance abuse or assault events recorded in the data. This is likely to reduce how comprehensively these events are captured, particularly for less severe situations and for parents with the financial resources to use private services. Parents that have a mental illness, substance abuse problem or experience assault but never seek medical care will also not be recorded in the data.

Some Useful Variables Not Captured

Another limitation of the administrative data is that it leaves gaps particularly related to internal or subjective variables. Research has shown that children’s emotional adjustment is related to their educational achievement. Outcomes may also vary depending on factors related to the quality of the out-of-home environment and the relationship of the child with their parents, carers and teachers (Cashmore et al., 2007; Drapeau, Saint-Jacques, Lépine, Bégin, & Bernard, 2007). Inclusion of these variables would allow further exploration of the variables that mediate or moderate the influence of risk factors on educational outcomes, providing further insights into how interventions could best be targeted. These variables would be valuable factors to incorporate in future studies, perhaps via linkage of survey data with administrative data. Furthermore issues of housing (e.g. homelessness, overcrowding or high residential mobility) have been linked to poor child outcomes (Eckenrode, Rowe, Laird, & Brathwaite, 1995; Fantuzzo et al., 2011) and it would be useful to include housing data in future studies.
Data Availability

Some variables could not be used in all studies, generally related to the timing of datasets becoming available, or the differing periods covered by specific data collections.

Study Design and Analysis Limitations

Observational studies cannot draw firm conclusions about causal effects. This study had many design aspects that increase the knowledge that can be gleaned regarding the relationships between different variables, such as inclusion of a large number of covariates, and longitudinal data. The multivariate methods used also increase confidence in the observed relationships, as multiple possible confounders are accounted for. While offering one of the best methods for addressing selection bias that can be feasibly conducted at this time, even propensity matching cannot guarantee to represent causal effects. It is only as good as the variables included: Important variables that are omitted could still result in biases. In the absence of randomisation, a degree of caution must always be applied in interpreting causal relationships between variables.

Implications

This research is one of the few studies internationally to investigate the educational outcomes of children who have been involved with the child protection system within a multiple risks framework, and is unique in covering all three levels of child protection involvement (unsubstantiated allegations, substantiations, and maltreated children who have ever been in care). The results have important implications for policy and practice, theory and research within Australia and internationally.

Implications for Policy and Practice

*The Need for a Whole-of-Government Response*

Children involved with the child protection system are at significant risk of very low academic achievement by the age of eight, with further declines often occurring over time.
The use of linked data from multiple Government agencies has shown that the difficulties facing maltreated children are not simply a child protection issue. Social disadvantage in general and Aboriginal disadvantage are important factors contributing to low educational achievement that require sustained effort from across Government as well as community agencies. The risk factors for low achievement include health issues (e.g. preterm birth and low birth weight), mental health, social and criminal offending problems (e.g. mental health and substance-abuse, teenage pregnancy, assault injuries), disabilities, and child protection issues (maltreatment and child protection responses). As discussed by Stanley and colleagues (2011), the use of “joined up data” illustrates the need for “joined up thinking” such as whole-of-government or cross-agency collaborative approaches. Interventions that are successful in ameliorating the effects of social disadvantage, closing the gaps in Aboriginal and non-Aboriginal outcomes, increasing education levels among current and future parents, improving prenatal and perinatal health along with mental health, addressing substance abuse and violence, and supporting parenting and early childhood development all have a role to play in preventing education problems and child maltreatment. Departments responsible for education and child protection also have a challenging task in helping maltreated children to succeed despite adversity.

**A Difficult and Complex Task**

Closing educational gaps at a population level is certainly not an easy task, but it is necessary. Current National policies and strategy documents include goals to improve educational outcomes for children in care or under guardianship and protection orders (e.g. National Framework for Protecting Australia’s Children), for children from socially disadvantaged backgrounds (e.g. The Melbourne Declaration), and for Aboriginal children (e.g. the Closing the Gap strategy and the Aboriginal and Torres Strait Islander Education Action Plan). These can all be considered “wicked problems”: problems that are socially complex, multi-causal, have no clear ‘correct’ solution, and do not fit simply within the domain of one agency (Stanley et al., 2011). Despite concerted efforts, progress towards closing the educational gaps for Aboriginal children has been limited. A recent progress report found no statistically
significant improvements from 2008 to 2014 in the proportion of Aboriginal students meeting the National Minimum Standards for reading and numeracy (Commonwealth Government of Australia, 2015). Nonetheless, improving educational outcomes for disadvantaged groups is an extremely important goal, with benefits at an individual, social and economic level.

**Monitoring of Progress**

Although there are national goals regarding improving the educational outcomes of children in care or under guardianship and protection orders, there is currently no ongoing data collection to assess progress towards these goals. A project linking national child protection and education data has been conducted (Australian Institute of Health and Welfare, 2015). Ongoing data linkage would provide a means of monitoring whether the education gaps for children in care or on guardianship and protection orders are decreasing or increasing over time, and to evaluate changes in outcomes following the implementation of State or National strategies. This study highlights a number of additional data areas that would be useful to include in ongoing collections and analysis if feasible (such as attendance, social disadvantage, parents’ education levels, children’s disabilities). The inclusion of a broader array of risk factors from multiple agencies is valuable for a more comprehensive understanding of the influences on educational outcomes for these children. Practical constraints (such as differences between States in the collection and measurement of data items) and cost constraints may prohibit the inclusion of a more extensive range of risk factors at a National level. More in-depth analyses can be conducted by States that have the capacity to link data from many agencies (especially Western Australia) as required to answer specific research or evaluation questions and supplement ongoing national monitoring.

**Implications for the Use of Out-of-Home Care**

There is national and international debate regarding the extent to which out-of-home care should be used as an intervention for maltreated children. Central to this debate is differing opinions regarding the impact of out-of-home care on children’s wellbeing and development,
and whether the adverse outcomes experienced by many children in care result from being in care or from pre-existing risk factors such as social disadvantage and maltreatment.

The research in this thesis showed that after accounting for numerous other risk factors, out-of-home care was not associated with significant differences in educational achievement, but was associated with better attendance outcomes. This finding was most strongly demonstrated in Chapter 8, which was designed to examine this issue using a propensity matched comparison group of Year 9 students with substantiated maltreatment. Similar findings were noted for the Year 3 students that had ever been in care compared to children without child protection involvement. Chapter 8 also found no significant differences in suspensions after accounting for other risk factors. These findings are consistent with and build on other research that suggests out-of-home care does not have an adverse impact on achievement in academic (Berger et al., 2015), language and cognitive domains (Berger et al., 2009) and may improve student engagement for subgroups of children placed in care (Font and Maguire-Jack, 2013).

Conversely, Doyle (2007) found worse delinquency outcomes associated with out-of-home care. One explanation for the conflicting findings is that there could be differing impacts of out-of-home care on different domains. The systematic review in Chapter 3 found among all studies (including those with high or low risk of selection bias) more neutral or positive outcomes were found in studies assessing domains such as education, language and cognition, and worse outcomes were more frequently found in studies investigating behavioural problems. It remains unclear whether these inconsistent findings reflect differences in the impact of out-of-home care across different outcomes, or whether they results from differences in the study design or samples used. We cannot recommend any changes to the current extent of the use of out-of-home care based on our current findings as we believe more research needs to be conducted across other outcomes. Education is one important domain, but there is a need for a better understanding of the potential causal effects of out-of-home care across multiple domains (e.g. mental health, behaviour, criminal justice involvement). A solid evidence base regarding impacts of out-of-home care on all important
developmental outcomes, in combination with safety factors, is needed in order to make well-informed policy decisions regarding the extent to which out-of-home care should be used as an intervention. Likewise, the outcomes associated with alternative options (e.g. remaining at home and receiving support or interventions, or adoption) must be understood.

**Improving Educational Outcomes for Children Involved with the Child Protection System**

**Children in Out-of-Home Care**

The level of underachievement by children in out-of-home care is common across many countries and is a cause of international concern. The finding that children who had ever been in care were 3 times as likely as the general population to have very low levels of reading achievement by Year 3, and more than 5 times as likely to have very low reading scores by Year 9 demonstrates the extent of this achievement gap in Western Australia. Although the current research shows low achievement may be attributable to pre-existing risk factors rather than placement in out-of-home care, this group clearly has a need for intervention to improve educational outcomes.

There is a limited amount of knowledge about effective interventions for improving the educational outcomes of children in care. Two recent reviews on the topic have found that the quality of the evaluations prevents firm recommendations about the effectiveness of different interventions (Forsman & Vinnerljung, 2012; Liabo, Gray, & Mulcahy, 2013). However, tutoring programs had the most empirical support, and there was some support for provision of extra learning materials, individualised educational and psychological support and educational liaison (Forsman & Vinnerljung, 2012). Maltreatment may affect children’s educational outcomes through multiple cognitive, attentional, social, emotional and behavioural pathways. In addition to identifying the most effective interventions overall, understanding how specific intervention approaches can be targeted or tailored to the individual needs of the child may increase effectiveness.
The above interventions focus on academic and psychological support. The findings of the current study suggest attendance is another area that is important to address in improving educational outcomes. Students with high rates of absence are much more likely to have low achievement. Attendance can be influenced by a number of parent/carer or child factors, as well as factors in the school environment such as relationships with teachers or bullying by peers. Among older students it may also reflect motivation or commitment to education, or behavioural problems. However, it is a comparatively modifiable factor (compared to parents’ mental health for example), and increasing children’s exposure to school increases their opportunities to learn and achieve.

In Western Australia, the education of children in care is supported by education officers within the Department of Child Protection and Family Support. In 2009, Individualised Education Plans were introduced as a requirement for all children in care of compulsory school age. These supports may have contributed to the positive findings for children in care such as attendance rates. Evaluation of the impact of these plans could be undertaken as the amount of available data on education outcomes increases.

Jackson (1994) criticised the care system as placing more obstacles in the way of academic success for children and young people. Qualitative research illustrates that while there are many examples of support for education from foster carers, child protection staff and teachers, there are also many examples where education is not fully supported or is undermined. Consistent with the current finding of worse achievement following placement changes or reunifications, young people report instances of placement changes around the time of exams can have a particularly disruptive effect (Sebba et al., 2015). This emphasises the importance of providing placements past 18 years of age to allow school completion, and then ongoing supports across the transition to adulthood. Having at least one person who supports and emphasises the importance of education was also identified (e.g. Sebba et al., 2015) as promoting positive educational outcomes, as were good relationships with teachers and a strong collaboration between the school, the foster carers, and the child protection system (and ideally the child).
Children and young people who are or have been in care can play an important role in advising on the issues affecting their education. It is important to include their voices in planning effective strategies. Foster carers, child protection staff and teachers also have first-hand experiences that should be heard and utilised.

This section outlines a number of interventions and factors that may promote positive educational outcomes for children in care, however there is limited research and evaluation data regarding the most effective and cost-effective ways to improve outcomes. The timing of interventions should be considered carefully, in order to meet the needs of children with stable low achievement as well as children who show declining trajectories.

*Overlooked Groups*

Whilst children in out-of-home care have rightfully been the focus of much recent educational research and policy, this thesis highlights that the educational deficits of other children involved with the child protection system are equally concerning. Children who have been reunified following out-of-home placements are an educationally vulnerable group that showed worse outcomes shortly after reunification, and after this disrupted year showed a period of improvement followed by steady declines in achievement. The educational supports provided for children in care (such as educational officers) cease upon reunification. Reunified children were not a central focus of this thesis, however the findings show a need for ongoing support for these children. Monitoring of educational outcomes for children reunified after out-of-home care would contribute to a more comprehensive understanding of outcomes for the care population, many of whom transition between home and placements multiple times during the course of their childhood.

Children with substantiated maltreatment that remain at home have experienced many of the same adversities as children in care (such as maltreatment, poverty, parents affected by substance abuse). Serious achievement gaps and attendance problems have been shown for these children. It is likely that other issues become the focus for support and intervention with these families. Child safety and parenting is obviously a necessary priority, and
problems such as financial problems (which can lead to housing problems), violence, mental health, substance abuse often require urgent action. Creating a safe and stable environment increases children’s opportunity to learn and achieve. However, it is likely that there also needs to be a focus on education for these children. Children with substantiated or unsubstantiated maltreatment significantly underperform in school, and more attention should be paid to developing strategies to improve their outcomes. In addition there needs to be consideration of the level of support such as tutoring provided to children in different placement types. Previous research indicates children in kinship care may be offered less services and support than those in foster care (Geen, 2004).

**Implications for Theory**

The findings have a number of theoretical implications. Firstly, there was support for the use of the sociobioecological models and subsequent life-course developmental health models that incorporate risk factors from multiple settings and levels. The results showed that risk factors from all levels of the model (child, family and neighbourhood characteristics, and school attendance) were significantly related to educational achievement, as was the timing of certain events (e.g. entry to care, and the combined pattern of maltreatment allegations, substantiations and entry to care). And indeed, the predictors with the greatest odds of low reading scores came from across these different levels, including child characteristics (e.g. intellectual disability), parent characteristics (such as level of education) and neighbourhood characteristics (such as level of social disadvantage).

Some aspects of the sociobioecological model are harder to directly measure, such as policy and the broader social and cultural setting. But the importance of these is also implied within some of the findings. For example, Aboriginality was measured as a characteristic of the child, but Aboriginal children’s significantly worse educational outcomes overall can more accurately be considered a reflection of social and cultural influences within Australia. Similarly the comparatively positive outcomes associated with kinship care for Aboriginal children is likely to reflect cultural influences and norms regarding extended family relationships. Although the research did not evaluate policies such as the Aboriginal Child
Placement Principle, and policies around education support officers and Individualised Education Plans, the findings regarding kinship care for Aboriginal children and attendance for children in care are supportive of those policies. This in turn supports the importance of macrosystems factors in studies of outcomes of child protection population. Where they cannot be directly included, they should at least be considered in the interpretation of findings.

The findings also supported the importance of considering children’s outcomes over time. Although studies that look at children’s outcomes at one point in time are informative, the results contained in this thesis show that the timing of the event or the outcome can influence results. For instance the relationship between level of child protection involvement and reading achievement differed for Year 3 versus Year 9 students, and the age at entry to out-of-home care was significantly related to Year 3 reading achievement.

It can also be useful to consider the findings in terms of developmental transitions, turning points and trajectories (from life-course approaches) and cumulative, latent and pathway relationships between exposures and outcomes (from developmental health approaches). The results of the multilevel modelling showed a fair degree of stability in educational achievement from Year 3 to Year 9, meaning that by Year 3, many children in the child protection system are already on a pathway (trajectory) to ongoing academic difficulties. Many of the risk factors predicting low achievement by Year 3 were already in place by the time the child was born, such as parent’s education, and histories of mental health, substance use or violence exposure, and the level of social disadvantage and remoteness of the neighbourhood they resided in.

Entering care might be expected to be an important turning point for maltreated children, however this was not borne out in the results of this study (for instance, only attendance outcomes were significantly better for children who had entered out-of-home care than other maltreated children in Chapter 8). Although small in number, there were children who entered out-of-home care or had other involvement with the child protection system who showed improving achievement trajectories. Further investigation of the protective factors
and processes involved in their positive outcomes may be informative. Existing qualitative research suggests that turning points towards resilience in the lives of children who had entered care often followed on from experiences of success, a positive relationship with an adult, or reflection sometimes triggered by a crisis, and that the process of reaching a turning point often does not happen all at one time (Drapeau et al., 2007). Promising avenues for further qualitative investigation include child, carer and staff perspectives of the specific processes used by education officers where attendance is better than expected, and also exploration of the influences on kinship carers (Aboriginal and non-Aboriginal) capacity to support children’s attendance and achievement.

Transitions emerged as an important, although temporary, influence on children’s outcomes. This was most notable with regard to children’s out-of-home care experiences as outlined in Chapter 6. Children who had recently experienced a transition such as reunification or entry to care had an increased likelihood of low scores. These children often experience numerous such changes in their lives, well beyond the normative transitions such as moving from primary to secondary school. All types of transitions can be times of disruption and stress (Newman and Blackburn, 2002), and these changes in living arrangements are non-normative and major transitions, so their impact is not surprising. Changes in living arrangements can also involve changes in schools, further compounding the potential disruptiveness of these transitions.

Although the cumulative relationship between exposures to multiple placements in out-of-home care and academic outcomes was not found to be significant, other cumulative effects were observed where children had multiple risk factors. As many of the children involved with the child protection system had a constellation of risk factors, cumulative risk is important in understanding their lives. In addition to experiences of maltreatment, children in the child protection system had high rates of risk factors at the child, family and neighbourhood levels. The additive effect of these multiple risk factors places children at further risk of educational failure.
Latent versus pathway relationships were less useful in this study, partly because the occurrence and true timing of maltreatment is often hidden. Therefore, for example, if a child had a substantiation of maltreatment in 2000 and a decline in reading achievement in 2005 it would be unclear whether this reflected a latent relationship, or unreported recurrence of maltreatment. In addition, the vast number of potentially relevant out-of-home care placements, reunifications, and care type variables make it difficult to pinpoint a specific event as the relevant event within the care population’s complex (and confounded) experiences. They remain useful concepts but may be better assessed in a different style of study such as qualitative research where an individual can pinpoint specific pivotal experiences in their lives, or at least a study specifically designed for theory testing rather than broader policy and practice applications.

Overall, a sociobioecological model is particularly useful for understanding the multiple risks within multiple contexts that shape maltreated children’s educational development, however it is enhanced by the inclusion of concepts from life-course developmental health approaches to further describe how development occurs over time.

**Implications for Future Research**

This thesis has explored many risk factors that influence the reading outcomes and trajectories of children with child protection involvement as they move from middle primary years to middle high school years. Using a multiple risks framework and data covering many subgroups and aspects of child protection involvement, the research has answered many important questions and also provided many avenues worthy of further exploration. Two priority areas can be identified.

First, there is a need for research and evaluation of intervention strategies. This thesis clearly shows that children involved with the child protection system are at high risk of poor educational outcomes. Yet there is a lack of empirical knowledge regarding effective strategies to improve educational outcomes. Using a multiple risks framework, the findings suggest a need for preventative interventions at a broader societal level in addressing social
disadvantage, ‘closing the gap’ between Aboriginal and non-Aboriginal Australians, and addressing health, mental health, substance abuse and violence, and ameliorating the effects of early disadvantage. However there is also a need for more targeted interventions. There is some support for specific educational interventions, and a range of other factors that may promote positive educational achievement in child protection populations have been identified. Evaluating current strategies, and trialling and evaluating specific interventions would greatly assist in knowing how to improve educational outcomes for children already in the child protection system.

Second, the current research focussed on children from Year 3 to Year 9. Changes over time were observed. This research using linked-data should be extended to examine the outcomes and effects of outcomes on older children or young people as they transition to adulthood. Some of the risk factors for poor educational achievement, such as placement changes around the time of the reading tests may have particularly adverse effects on young people sitting important school exams. Young people in the latter high school and post-school years are also likely to be exposed to increasing opportunities for risky behaviours (alcohol and substance use, unprotected sex leading to early pregnancy, risky driving leading to road crash injury) and those in care face the challenges of transitioning to independence without the family support and housing stability most young people rely on. Following the educational trajectories of these young people to early adulthood would be valuable. Some young people are receiving support from the Department of Child Protection and Family support beyond 18 to complete educational courses. An evaluation of the effect on outcomes of extending support to an older age would be useful.

Future linked data research could examine a range of other important outcomes and how they combine to create young people’s developmental pathways. In exploring outcomes across different domain areas, there is a need for further research that aims to address selection bias and estimate causal impacts of out-of-home care across other developmental domains (e.g. mental health, behaviour, criminal justice involvement). The current study found educational deficits across different subgroups of children involved in the child protection system, and
also variation between subgroups. Further research should continue to examine outcomes for
groups that are often overlooked or excluded from research, such as reunified children and
children with unsubstantiated maltreatment, both of which were academically vulnerable.
Children with substantiated maltreatment that remain at home are less overlooked in the
general research literature, but are often ignored in policies and strategies that set goals and
provide support for children with substantiated maltreatment that are in care. Finally, the
linked data research could be extended via linkage with survey data that captures more
internal or subjective aspects of children’s wellbeing and feelings about home and school.

Contribution

Despite extensive previous research showing poor educational outcomes for maltreated
children, few studies have been able to examine the outcomes for children involved with the
child protection system taking into account multiple risk factors across the child, family,
neighbourhood and school levels. This thesis has greatly extended the knowledge base by
exploring risk factors from all of these developmental contexts simultaneously for children
with different levels of child protection involvement. The research has explored issues of
causality and attempted to disentangle effects of maltreatment, out-of-home care and pre-
existing adversity. It described the achievement outcomes of children with a range of
different out-of-home care characteristics, and drew attention to the complexly interwoven
nature of children’s care characteristics and their child and family characteristics. It also
examined children’s educational trajectories and the patterns of stability and change for
children with different levels of child protection involvement. Overall this study contributes
a richer understanding of the extent, influences and trajectories of educational risk for
children involved with the child protection system. It is hoped that this information will be
used to inform both Whole-of-Government strategies and targeted interventions that enable
this vulnerable group of children to develop to their full potential and access the life
opportunities that educational achievement can provide.
References


King, J. M., & Taitz, L. S. (1985). Catch up growth following abuse. *Archives of Disease in Childhood, 60*, 1152-1154. doi: 10.1136/adc.60.12.1152


236


Wong, J. (2015). Using population level linked data to examine the relationship between mental health and educational achievement: A longitudinal study. (Doctoral Thesis), The University of Western Australia, Perth, Western Australia.


Appendices

Appendix 1. Criteria for Risk of Bias Assessment from Chapter 3

Appendix 2. Search Strategy from Chapter 3

Appendix 3. Risk of Bias Assessment from Chapter 3

Appendix 4. Additional Methodology Information from Chapter 3

Appendix 5. Characteristics of Studies at Low Risk of Selection Bias from Chapter 3

Appendix 6. Additional Pairwise Comparison Tables from Chapter 8

Appendix 7. Comparison of Results Using Non-Dichotomised Outcome Variables

Appendix 8. Published Manuscript from Chapter 5
# Appendix 1. Criteria for Risk of Bias Assessment

<table>
<thead>
<tr>
<th>Type of bias risk</th>
<th>Criteria for classification as ‘low risk of bias’</th>
</tr>
</thead>
</table>
| **Selection bias**| (1) Children had been randomised to out-of-home or in-home care, or had been allocated using quasi randomisation (e.g. systematic allocation such as odd or even day of birth); or (2) if a cohort study had adequately taken into account in the analyses variation in baseline characteristics via:  
  a) Adjusted analyses that took into account all four domains of baseline characteristics (described in the inclusion criteria) that are strongly associated with both placement and long terms outcomes of placement. Baseline characteristics had to be recorded before the intervention started or retrieved from records made before the intervention started (e.g. social care history of previous placements); or  
  b) Using an instrumental variable (e.g.: caseworker) that exploits systematic variation in thresholds for allocation to out-of-home or in-home care that is unrelated to baseline characteristics. |
| **Performance bias**| (1) There were no important differences in other aspects of care relevant to the child’s outcomes after placement in-home or OoHC (e.g. social care support, access to education), or (2) important differences in other aspects of care relevant to the child’s outcomes were taken into account in the analysis. |
| **Attrition bias** | (1) Missing outcomes were imputed using multiple imputation, or sensitivity analyses regarding outcome measures performed with attrition rates (loss to follow-up) for the intervention and comparison groups clearly documented for each outcome, or (2) Attrition was minimised by use of a population sample and record linkage |
| **Detection bias** | (1) The outcome is unlikely to be biased or measured or recorded differently between intervention groups (e.g. measurement conducted by same person, objective standardised instruments, decisions where it is unlikely that the child’s intervention status would affect decision-making). |
Appendix 2. Flow Diagram of Study Selection

Records identified through database searching (n = 2422)

Additional records identified through other sources (n = 4)
Subject experts / authors: 2
Cited in included studies: 2

Round 1 Screening: Records initially screened by one reviewer (MM or MOD) (n = 2426)

Round 2 Screening: Records screened by both reviewers (n = 188)

Records excluded (n = 2238)

Full-text papers excluded, with reasons (n = 56)
Groups not compared n=3
Ineligible sample (e.g. non-maltreated or clinical, not from same population, <30 days of IHC/OOHC) n=14
Lacks eligible intervention or comparison group n=23
Language constraints prevented full eligibility assessment n = 1
No covariates n=2
No eligible outcomes (e.g. OOHC is outcome) n=9
Small sample (<100) n = 4

Papers included in qualitative synthesis (n = 31)
Study cohorts (n = 11)
Outcomes reported n = 72 (63 distinct + 9 duplicated)

Papers included in quantitative summary with significance tested wellbeing outcomes (n = 19)
Main effects n = 17
Stratified but some results extractable n = 2
Outcomes n = 40

Papers not included in quantitative summary with reasons (n = 12)
Significance tests used reference group other than OOHC or IHC n=4
Only stratified analysis and duplicated elsewhere n=2
Service outcomes only, not direct wellbeine analysis n=6

Papers with low selection bias risk potentially eligible for future meta-analysis (n = 3)
Study cohorts n = 3

Notes: 'distinct outcomes' excludes studies that use same cohort, same age group, and same outcome, but allows closely related outcomes to be counted more than once in the same or different studies e.g. moderate-high substance use, marijuana use, any illicit drug use classed as 3 distinct outcomes.
## Appendix 3. Risk of Bias Assessment for Included Studies

<table>
<thead>
<tr>
<th>Study (1st Author)</th>
<th>Selection</th>
<th>Performance</th>
<th>Detection, Outcome #</th>
<th>Attrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baskin (2011)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Berger (2009)</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Berlin (2011)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Casaneuva (2014)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Cheng (2012)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>DeGue (2009)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Doyle (2011)</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Font (2013)</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Fowler (2014)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Goodkind (2013)</td>
<td>High</td>
<td>Low/Unclear</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Horwitz (2012)</td>
<td>High</td>
<td>Low/Unclear</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Hurlbert (2004)</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Kolko (2009)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Lee (2009)</td>
<td>Low</td>
<td>Low/Unclear</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Leslie (2005)</td>
<td>High</td>
<td>Low/Unclear</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Leslie (2010)</td>
<td>High</td>
<td>Low/Unclear</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>McMahon (2002)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Mennen (2010)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Negriff (2015)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Pinto (2013)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Raghavan (2014)</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Ringeisen (2009)</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Runyan (1985a)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Runyan (1985b)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Stacks (2011)</td>
<td>High</td>
<td>Low/Unclear</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Stahmer (2009)</td>
<td>High</td>
<td>Low/Unclear</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Traube (2012)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Vinnerlujung (2006)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Vinnerlujung (2007)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Wall (2007)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Widom (1991)</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
Appendix 4: Additional Methodology Information

Study selection, bias risk assessment and other aspects of the methodology were documented in advance in a protocol. Due to space constraints in reporting the results of 31 included papers in a narrative review format, we have kept the methods section of the paper brief. Further details are provided here, along with Appendix 1 (criteria for bias risk assessment), Appendix 2 (study selection flow diagram), and Appendix 3 (risk of bias assessment for included studies).

Search Strategy

Electronic searches were initially conducted in 2012 in the following databases: ACP Journal Club (1991 to March 2012), Cochrane Central Register of Controlled Trials (April 2012), Cochrane Database of Systematic Reviews (2005 to March 2012), Database of Abstracts of Reviews of Effects (1st Quarter 2012), Health Technology Assessment (1st Quarter 2012), NHS Economic Evaluation Database (1st Quarter 2012), Embase (1988 to 2012 Week 14), Ovid MEDLINE(R) (1946 to Present with Daily Update), PsycINFO (1806 to April Week 1 2012), CINAHL Plus (1937-2012) and SocIndex (1895-2012). The search was updated in 2015.

The search terms used were as follows: (epidemiologic or case-control or cohort or cross-sectional or case control or cohort or follow up or longitudinal or cross sectional or observational or retrospective or prospective or epidemiologic*) (child abuse or child abus* or child maltreat* or physical abuse or deliberate injury or non-accidental injury or nonaccidental injury or shaken baby or intentional injury or child protection or neglect or victimisation or victimization or emotional abuse or psychological abuse or sexual abuse) (out of home care or out-of-home care or out-of-home or foster care or foster or kinship or residential care or institutional* or detention) (child* or youth or young people or adolescen* or infant) (random* or factorial* or crossover* or cross over* or cross-over* or placebo* or doubl* blind* or singl* blind* or assign* or allocat* randomised control* trial or
randomized or randomised or controlled clinical trial or placebo or randomly or trial or groups)

No date or language restrictions were applied to the search. The dates were from the first available date in each database search to the search date (final search 8th August 2015). Grey literature was not excluded from the review. Potentially eligible references cited in the included studies, and papers suggested by experts were also reviewed.

**Study Selection**

The study selection process is outlined in the flowchart in Appendix 1. The screening was conducted by two reviewers (MM and MOD). A three stage screening process was used. Initial screening aimed for high sensitivity to avoid excluding potentially relevant studies. Subsequent screening involved increasing scrutiny. Any uncertainty or disagreements were resolved through discussion and consultation with the third reviewer (RG).

Although no language restrictions were applied, most title/abstracts not in English could not be screened. A number of studies published in other languages had an English language abstract that allowed them to be screened out.

**Data Extraction and Management**

A data extraction/coding form was developed for this review. Two reviewers (MM and MO) independently extracted data to collect information about the study design, sources of bias, characteristics of the study population, intervention and comparison, and outcome measures. Any uncertainty or disagreements were resolved through discussion and consultation with the third reviewer (RG).

**Assessment of Risk of Bias in Included Studies**

Each reviewer (MO and MM) independently assessed the risk of bias in each study. Where there were differences of opinion, a third reviewer (RG) was consulted. A coding framework was developed based on the tool provided in the Cochrane handbook to separately assess the
risks of selection bias, performance bias, attrition bias, and detection bias (Higgins & Green, 2011). See Appendix 1 for criteria for bias risk assessment, and Appendix 3 for the assessment of risk of bias assessment for each of the included studies.

**Notes Regarding Collation of Study Results**

The studies reported comparisons for 72 outcomes. In total 63 were distinct outcomes, after removing outcomes that were duplicated elsewhere with the same sample. Distinct outcomes exclude studies that use same cohort, same age group, and same outcome, but allows closely related outcomes to be counted more than once in the same or different studies e.g. moderate high substance use, marijuana use, any illicit drug use would be counted as three outcomes. The use of the same study cohorts in multiple papers is highlighted in the review. The three studies with low risk of selection bias came from separate cohorts.

Outcomes were very heterogeneous in topic, operationalisation and analysis methods. Analysis included a wide range of outcome measures including binary and continuous outcomes, as well as incidence density and time to event. Only 40 of the distinct outcomes were reported with a significance test comparing the IHC group to the total OoHC sample. Where only stratified or subgroup analysis are reported, or significance was not reported for a direct comparison of the two groups results are described narratively. Service use is not included in the main analysis as it is a secondary outcome which can reflect either the child’s problems and service needs, or the responsiveness of the carer in seeking help for the child. Service use results are summarised separately.
Appendix 5. Characteristics of Studies with Low Risk of Selection Bias

Sample: National sample of children undergoing an investigation by CPS in USA between 1999 and 2000 aged 4-14 years (n=2453). Children not observed in-home at baseline or Wave 1 prior to placement were excluded, in order to provide a true (pre-intervention) baseline measure.
Sample restrictions: The sample was restricted to children who were in home care at baseline assessments, in order to avoid biasing assessment results. It should be noted that this limits the sample to children placed in care at least approximately 2-6 months after the investigation. Excluding children who were placed quickly after the investigation may leave out the more severe cases. This may reduce selection bias (making the IHC and OOHC groups more comparable), but reduces generalisability of results to quickly placed children.
Location: USA
Intervention: Any out of home placement (including kin or non-kin foster home, residential or detention centres, psychiatric hospital or transitional living). 14% of cohort exposed for an average of 0.48 of follow up period. Average of 2.3 placements.
Comparison: In home
Outcome measures: Cognitive skills (Kaufman Brief Intelligence Test) and behaviour problems (Achenbach Child Behaviour Checklist) at 18m and 36m after baseline (average 2.5 y of observations).
Methods: Use a series of analytic approaches including ordinary least squares regression, residualised change regression, simple change, difference-in-difference and fixed effects models. Numerous relevant control variables were used, and the analyses were conducted with and without propensity score matching. Propensity score matching involves using a range of observed characteristics to predict the likelihood that each child would be placed in out-of-home care, regardless of whether they actually were placed. These scores can then be used to create matched groups to control for selection biases related to observed variables.
Variation in intervention (eg duration of out of home placement or number of changes ie dose effect) taken into account? Yes, additional analysis addressed variation in placement length and stability as well as type.
Control Variables: Child age, caregiver age, family income to poverty ratio, gender, race/ethnicity, primary caregiver relationship status, caregiver born outside US, caregiver education, grandparent present, type of abuse for initial CPS investigation, initial investigation substantiated, whether child experienced out of home placement prior to baseline assessment. Family of Origin Risk score (comprised of prior maltreatment, poor ability to self-protect, special needs, caregivers – substance abuse, mental health problems, criminal justice involvement, cognitive impairments, poor physical health, poor parenting, unrealistic expectations for child, history of maltreatment, excessive discipline, recognition of problems in home, motivation to change them, reasonable level of co-operation with CP, family – high stress, low social support, trouble accessing basic necessities, domestic violence).
Overall quality of the evidence for the review aims: High, with a low risk of selection bias. The evidence regarding cognitive outcomes is stronger than the evidence regarding behaviour problems, because of the level of risk of detection bias when the CBCL is completed by different caregivers.
Doyle (2011)


Sample restrictions:
1. Non-sexual abuse cases and non-drug exposure cases
2. All children receiving Medicaid prior to abuse/neglect report to compare children with the same known identifiers (82% received Medicaid prior to abuse report). Note that 82% of foster children but only 42% of all first-time abuse reports received Medicaid (Doyle 2007). However, this is likely to make maltreated in-home sample more similar to foster sample
3. Children at least 15 years old in 2000 to observe longer term outcomes. Analysis focuses on children between age of 5 and 15 at time of abuse investigation (at least one half of children investigated for abuse and neglect are at least 5 years old).
4. Intervention sample limited to children placed in foster care within 30 days of the initial report, in order to ensure placement occurs before measured outcomes. Thus the comparison is between those placed quickly and those investigated but never placed (this increases internal validity at the expense of reducing external validity).
5. Where child was delinquent prior to abuse report these cases were excluded from delinquency analysis.

Excluding children placed more than 30 days after the initial report may results in the OoHC sample reflecting more urgent, severe or clear cut cases, and reduce similarity to IHC group. The nature of the instrumental variable design however means that the study still focuses on ‘marginal cases’ and selection bias risk is reduced.

Location: Illinois, USA.

Methods, Intervention and Comparison: The study used an instrumental variables approach, in which the two groups of children compared in the study were those with investigators with a high threshold to place children in out-of-home care versus children with investigators with a low threshold to place children in care. Because children are randomly allocated to a child protection investigator, this approach uses this random assignment to create a ‘natural experiment’ that mimics a randomised trial. Analysis confirmed that the groups did not differ on age at report, gender, alleged maltreatment type, and initial reporter.

Variation in intervention (e.g. duration of out of home placement or number of changes i.e. dose effect) taken into account? No.

Outcomes measures: Whether the child received emergency healthcare between 90 and 365 days from initial report (this is to focus on new emergencies not related to abuse and neglect which led to initial report). Entry into juvenile court – a court appearance entails three juvenile arrests or an arrest for a serious charge.

Control variables: Type of initial reporter, year of age, sex, race, type of allegation, ZIP code of residence.

Overall quality of the evidence for the review aims: High, given the low selection bias. This approach is the closest to a randomisation in addressing selection bias. Results are most applicable to ‘marginal cases’ where the decision to place children in OoHC would vary between investigators. Caution should be applied in interpreting emergency admission results, as detection bias makes it unclear whether group differences in emergency admissions reflect different rates of injury/illness or different levels of responsiveness by caregivers.

Sample: Data drawn from larger longitudinal study (Child Neglect: Service Paths and Young Adult Outcomes - Melissa Jonson-Reid). Sample from the parent study drawn from a group of children and their families receiving Aid to Families with Dependent (AFDC) children between 1991 and 1994 including a group with a child abuse and neglect report (n=5019), and a matched comparison without CAN (n=5070) and the remaining children with a CAN report but no history of ADFC prior to or at the time of the report. For this study only children with a history of CAN were included. Final sample varies from 467 for pregnancies (female only), to 1076 for delinquency.

Sample restrictions: Lee states “To avoid differences in risk caused by being in care due to, for example, increased supervision all children in the present study had exited from at least one spell in foster care and those remaining in foster care until the end of the study period were excluded. For research question 1, the sample includes children who entered and exited foster care during the study period and a comparison group of similar aged children who received Family Preservation Services (FPS) but did not enter care” (2009, p28).

The exclusion of children remaining in care until the end of the study may affect the generaliseability of the results across all OoHC children, e.g. excluding some of the most severe maltreatment cases where attempts are never made at reunification, and/or excluding some children who may have the most long-term and potentially stable (or chronically unstable) OoHC experiences.

Location: A large metropolitan area of the Midwest, USA

Intervention: Foster care (with or without prior family preservation services)

Comparison: In-home care with family preservation services.

Outcome measures: Child had a juvenile court petition after exit from foster care placement, court petition for truancy, court petition for runaway or runaway shelter, child gave birth before 18.

Methods: Propensity score matching used to create more comparable intervention and comparison groups. Propensity score is the conditional probability of being treated given covariates. PSM balances observed covariates in the two groups. The limitations of PSM are acknowledged – this score can balance only observed covariates therefore unobserved covariates may cause violation of key assumptions of the PSM that the receipt of treatment is independent of the outcomes. This technique works better on large samples. While this method cannot substitute for random assignment, it has recognised benefits in reducing the effects of selection bias.

Control variables: Propensity matching balanced ethnicity, gender, parent education, parent age, community median income, number of maltreatment reports, type of maltreatment, age at service initiation, substantiation, single centred service, multiple family centred service, AFDC prior to service, and parental mental health treatment prior to placement. Cox regression included ethnicity, gender, age at placement, caregiver education, placement reason, length of stay, placement pattern, number of placements, number of spells, family centred service pattern, family preservation service pattern, parental mental health treatment, special education.

Variation in intervention (e.g. duration of out of home placement or number of changes i.e. dose effect) taken into account? Yes.

Overall quality of the evidence for the review aims: Fairly high, because propensity matching has been undertaken to address the risk of selection bias. There are important aspects of study design that are not described clearly and we were unable to contact the author, however in other aspects, a great deal of detail is provided and efforts have clearly been made to address bias risks.
## Appendix 6. Additional Tables from Chapter 8

Pairwise comparisons for pattern of highest level of child protection involvement (non-Aboriginal)

<table>
<thead>
<tr>
<th>Patterns</th>
<th>Contrast</th>
<th>Standard Error</th>
<th>$z$</th>
<th>$p$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 vs 0</td>
<td>-0.293</td>
<td>0.021</td>
<td>-14.200</td>
<td>0.000</td>
<td>-0.334, -0.253</td>
</tr>
<tr>
<td>2 vs 0</td>
<td>-0.335</td>
<td>0.029</td>
<td>-11.530</td>
<td>0.000</td>
<td>-0.391, -0.278</td>
</tr>
<tr>
<td>3 vs 0</td>
<td>-0.304</td>
<td>0.058</td>
<td>-5.210</td>
<td>0.000</td>
<td>-0.418, -0.190</td>
</tr>
<tr>
<td>11 vs 0</td>
<td>-0.231</td>
<td>0.016</td>
<td>-14.100</td>
<td>0.000</td>
<td>-0.263, -0.199</td>
</tr>
<tr>
<td>12 vs 0</td>
<td>-0.452</td>
<td>0.067</td>
<td>-6.780</td>
<td>0.000</td>
<td>-0.583, -0.322</td>
</tr>
<tr>
<td>13 vs 0</td>
<td>-0.625</td>
<td>0.088</td>
<td>-7.140</td>
<td>0.000</td>
<td>-0.797, -0.454</td>
</tr>
<tr>
<td>22 vs 0</td>
<td>-0.253</td>
<td>0.025</td>
<td>-10.300</td>
<td>0.000</td>
<td>-0.301, -0.205</td>
</tr>
<tr>
<td>23 vs 0</td>
<td>-0.398</td>
<td>0.085</td>
<td>-4.680</td>
<td>0.000</td>
<td>-0.564, -0.231</td>
</tr>
<tr>
<td>33 vs 0</td>
<td>-0.283</td>
<td>0.033</td>
<td>-8.700</td>
<td>0.000</td>
<td>-0.347, -0.220</td>
</tr>
<tr>
<td>2 vs 1</td>
<td>-0.041</td>
<td>0.035</td>
<td>-1.170</td>
<td>0.242</td>
<td>-0.111, 0.028</td>
</tr>
<tr>
<td>3 vs 1</td>
<td>-0.011</td>
<td>0.062</td>
<td>-0.170</td>
<td>0.862</td>
<td>-0.132, 0.110</td>
</tr>
<tr>
<td>11 vs 1</td>
<td>0.062</td>
<td>0.026</td>
<td>2.400</td>
<td>0.016</td>
<td>0.011, 0.113</td>
</tr>
<tr>
<td>12 vs 1</td>
<td>-0.159</td>
<td>0.070</td>
<td>-2.290</td>
<td>0.022</td>
<td>-0.296, -0.023</td>
</tr>
<tr>
<td>13 vs 1</td>
<td>-0.332</td>
<td>0.090</td>
<td>-3.700</td>
<td>0.000</td>
<td>-0.508, -0.156</td>
</tr>
<tr>
<td>22 vs 1</td>
<td>0.040</td>
<td>0.032</td>
<td>1.280</td>
<td>0.202</td>
<td>-0.022, 0.103</td>
</tr>
<tr>
<td>23 vs 1</td>
<td>-0.104</td>
<td>0.087</td>
<td>-1.200</td>
<td>0.232</td>
<td>-0.275, 0.067</td>
</tr>
<tr>
<td>33 vs 1</td>
<td>0.010</td>
<td>0.038</td>
<td>0.260</td>
<td>0.796</td>
<td>-0.065, 0.085</td>
</tr>
<tr>
<td>3 vs 2</td>
<td>0.031</td>
<td>0.065</td>
<td>0.470</td>
<td>0.638</td>
<td>-0.097, 0.158</td>
</tr>
<tr>
<td>11 vs 2</td>
<td>0.104</td>
<td>0.033</td>
<td>3.140</td>
<td>0.002</td>
<td>0.039, 0.168</td>
</tr>
<tr>
<td>12 vs 2</td>
<td>-0.118</td>
<td>0.073</td>
<td>-1.620</td>
<td>0.104</td>
<td>-0.260, 0.024</td>
</tr>
<tr>
<td>13 vs 2</td>
<td>-0.291</td>
<td>0.092</td>
<td>-3.160</td>
<td>0.002</td>
<td>-0.471, -0.110</td>
</tr>
<tr>
<td>22 vs 2</td>
<td>0.082</td>
<td>0.038</td>
<td>2.170</td>
<td>0.030</td>
<td>0.008, 0.156</td>
</tr>
<tr>
<td>23 vs 2</td>
<td>0.063</td>
<td>0.090</td>
<td>0.700</td>
<td>0.482</td>
<td>-0.239, 0.113</td>
</tr>
<tr>
<td>33 vs 2</td>
<td>0.051</td>
<td>0.043</td>
<td>1.180</td>
<td>0.237</td>
<td>-0.034, 0.136</td>
</tr>
<tr>
<td>11 vs 3</td>
<td>0.073</td>
<td>0.060</td>
<td>1.210</td>
<td>0.227</td>
<td>-0.045, 0.191</td>
</tr>
<tr>
<td>12 vs 3</td>
<td>-0.148</td>
<td>0.088</td>
<td>-1.680</td>
<td>0.093</td>
<td>-0.322, 0.025</td>
</tr>
<tr>
<td>13 vs 3</td>
<td>-0.321</td>
<td>0.105</td>
<td>-3.060</td>
<td>0.002</td>
<td>-0.527, -0.115</td>
</tr>
<tr>
<td>22 vs 3</td>
<td>0.051</td>
<td>0.063</td>
<td>0.810</td>
<td>0.417</td>
<td>-0.072, 0.175</td>
</tr>
<tr>
<td>23 vs 3</td>
<td>-0.094</td>
<td>0.103</td>
<td>-0.910</td>
<td>0.363</td>
<td>-0.295, 0.108</td>
</tr>
<tr>
<td>33 vs 3</td>
<td>0.021</td>
<td>0.067</td>
<td>0.310</td>
<td>0.757</td>
<td>-0.110, 0.151</td>
</tr>
<tr>
<td>12 vs 11</td>
<td>-0.221</td>
<td>0.069</td>
<td>-3.230</td>
<td>0.001</td>
<td>-0.356, -0.087</td>
</tr>
<tr>
<td>13 vs 11</td>
<td>-0.394</td>
<td>0.089</td>
<td>-4.440</td>
<td>0.000</td>
<td>-0.569, -0.220</td>
</tr>
<tr>
<td>22 vs 11</td>
<td>-0.022</td>
<td>0.029</td>
<td>-0.750</td>
<td>0.455</td>
<td>-0.079, 0.035</td>
</tr>
<tr>
<td>23 vs 11</td>
<td>-0.167</td>
<td>0.086</td>
<td>-1.930</td>
<td>0.054</td>
<td>-0.336, 0.003</td>
</tr>
<tr>
<td>33 vs 11</td>
<td>-0.052</td>
<td>0.036</td>
<td>-1.460</td>
<td>0.145</td>
<td>-0.123, 0.018</td>
</tr>
<tr>
<td>13 vs 12</td>
<td>-0.173</td>
<td>0.110</td>
<td>-1.570</td>
<td>0.116</td>
<td>-0.388, 0.042</td>
</tr>
<tr>
<td>22 vs 12</td>
<td>0.200</td>
<td>0.071</td>
<td>2.820</td>
<td>0.005</td>
<td>0.061, 0.339</td>
</tr>
<tr>
<td>23 vs 12</td>
<td>0.055</td>
<td>0.108</td>
<td>0.510</td>
<td>0.611</td>
<td>-0.156, 0.266</td>
</tr>
<tr>
<td>33 vs 12</td>
<td>0.169</td>
<td>0.074</td>
<td>2.290</td>
<td>0.022</td>
<td>0.024, 0.314</td>
</tr>
<tr>
<td>22 vs 13</td>
<td>0.373</td>
<td>0.091</td>
<td>4.110</td>
<td>0.000</td>
<td>0.195, 0.550</td>
</tr>
<tr>
<td>23 vs 13</td>
<td>0.228</td>
<td>0.122</td>
<td>1.870</td>
<td>0.062</td>
<td>-0.011, 0.466</td>
</tr>
<tr>
<td>33 vs 13</td>
<td>0.342</td>
<td>0.093</td>
<td>3.670</td>
<td>0.000</td>
<td>0.159, 0.524</td>
</tr>
<tr>
<td>22 vs 22</td>
<td>-0.145</td>
<td>0.088</td>
<td>-1.640</td>
<td>0.101</td>
<td>-0.318, 0.028</td>
</tr>
<tr>
<td>33 vs 22</td>
<td>-0.031</td>
<td>0.040</td>
<td>-0.760</td>
<td>0.447</td>
<td>-0.110, 0.048</td>
</tr>
<tr>
<td>33 vs 23</td>
<td>0.114</td>
<td>0.091</td>
<td>1.260</td>
<td>0.208</td>
<td>-0.064, 0.292</td>
</tr>
</tbody>
</table>

Note. Patterns: 0=Y3 No CMA Y9 No CMA; 1=Y3 No CMA Y9 Unsubstantiated; 2=Y3 No CMA Y9 Substantiated; 3=Y3 No CMA Y9 OoHC; 11=Y3 Unsubstantiated Y9 Unsubstantiated; 12=Y3 Unsubstantiated Y9 Substantiated; 13=Y3 Unsubstantiated Y9 OoHC; 22=Y3 Substantiated Y9 Substantiated; 23=Y3 Substantiated Y9 OoHC; 33=Y3 OoHC Y9 OoHC
Pairwise comparisons for pattern of highest level of child protection involvement (Aboriginal)

<table>
<thead>
<tr>
<th>Patterns</th>
<th>Contrast</th>
<th>Standard Error</th>
<th>z</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 vs 0</td>
<td>-0.222</td>
<td>0.032</td>
<td>-6.910</td>
<td>0.000</td>
<td>-0.285</td>
</tr>
<tr>
<td>2 vs 0</td>
<td>-0.188</td>
<td>0.044</td>
<td>-4.300</td>
<td>0.000</td>
<td>-0.274</td>
</tr>
<tr>
<td>3 vs 0</td>
<td>-0.212</td>
<td>0.073</td>
<td>-2.920</td>
<td>0.003</td>
<td>-0.355</td>
</tr>
<tr>
<td>11 vs 0</td>
<td>-0.117</td>
<td>0.032</td>
<td>-3.620</td>
<td>0.000</td>
<td>-0.181</td>
</tr>
<tr>
<td>12 vs 0</td>
<td>-0.110</td>
<td>0.096</td>
<td>-1.140</td>
<td>0.254</td>
<td>-0.298</td>
</tr>
<tr>
<td>13 vs 0</td>
<td>-0.327</td>
<td>0.104</td>
<td>-3.130</td>
<td>0.002</td>
<td>-0.532</td>
</tr>
<tr>
<td>22 vs 0</td>
<td>-0.138</td>
<td>0.040</td>
<td>-3.450</td>
<td>0.001</td>
<td>-0.217</td>
</tr>
<tr>
<td>23 vs 0</td>
<td>-0.301</td>
<td>0.093</td>
<td>-3.220</td>
<td>0.001</td>
<td>-0.484</td>
</tr>
<tr>
<td>33 vs 0</td>
<td>-0.133</td>
<td>0.040</td>
<td>-3.350</td>
<td>0.001</td>
<td>-0.211</td>
</tr>
<tr>
<td>2 vs 1</td>
<td>0.033</td>
<td>0.053</td>
<td>0.640</td>
<td>0.525</td>
<td>-0.070</td>
</tr>
<tr>
<td>3 vs 1</td>
<td>0.009</td>
<td>0.078</td>
<td>0.120</td>
<td>0.905</td>
<td>-0.144</td>
</tr>
<tr>
<td>11 vs 1</td>
<td>0.105</td>
<td>0.044</td>
<td>2.400</td>
<td>0.016</td>
<td>0.019</td>
</tr>
<tr>
<td>12 vs 1</td>
<td>0.112</td>
<td>0.101</td>
<td>1.110</td>
<td>0.266</td>
<td>-0.085</td>
</tr>
<tr>
<td>13 vs 1</td>
<td>-0.105</td>
<td>0.108</td>
<td>-0.970</td>
<td>0.331</td>
<td>-0.318</td>
</tr>
<tr>
<td>22 vs 1</td>
<td>0.083</td>
<td>0.049</td>
<td>1.680</td>
<td>0.092</td>
<td>-0.014</td>
</tr>
<tr>
<td>23 vs 1</td>
<td>-0.079</td>
<td>0.098</td>
<td>-0.810</td>
<td>0.416</td>
<td>-0.271</td>
</tr>
<tr>
<td>33 vs 1</td>
<td>0.089</td>
<td>0.049</td>
<td>1.810</td>
<td>0.071</td>
<td>-0.007</td>
</tr>
<tr>
<td>3 vs 2</td>
<td>-0.024</td>
<td>0.084</td>
<td>-0.290</td>
<td>0.773</td>
<td>-0.188</td>
</tr>
<tr>
<td>11 vs 2</td>
<td>0.071</td>
<td>0.053</td>
<td>1.350</td>
<td>0.177</td>
<td>-0.032</td>
</tr>
<tr>
<td>12 vs 2</td>
<td>0.078</td>
<td>0.105</td>
<td>0.750</td>
<td>0.454</td>
<td>-0.127</td>
</tr>
<tr>
<td>13 vs 2</td>
<td>-0.139</td>
<td>0.112</td>
<td>-1.240</td>
<td>0.216</td>
<td>-0.359</td>
</tr>
<tr>
<td>22 vs 2</td>
<td>0.050</td>
<td>0.058</td>
<td>0.870</td>
<td>0.387</td>
<td>-0.063</td>
</tr>
<tr>
<td>23 vs 2</td>
<td>-0.113</td>
<td>0.102</td>
<td>-1.110</td>
<td>0.269</td>
<td>-0.313</td>
</tr>
<tr>
<td>33 vs 2</td>
<td>0.055</td>
<td>0.057</td>
<td>0.960</td>
<td>0.336</td>
<td>-0.057</td>
</tr>
<tr>
<td>11 vs 3</td>
<td>0.095</td>
<td>0.078</td>
<td>1.220</td>
<td>0.222</td>
<td>-0.058</td>
</tr>
<tr>
<td>12 vs 3</td>
<td>0.103</td>
<td>0.120</td>
<td>0.860</td>
<td>0.391</td>
<td>-0.132</td>
</tr>
<tr>
<td>13 vs 3</td>
<td>-0.115</td>
<td>0.126</td>
<td>-0.910</td>
<td>0.363</td>
<td>-0.362</td>
</tr>
<tr>
<td>22 vs 3</td>
<td>0.074</td>
<td>0.082</td>
<td>0.910</td>
<td>0.364</td>
<td>-0.086</td>
</tr>
<tr>
<td>23 vs 3</td>
<td>-0.089</td>
<td>0.117</td>
<td>-0.760</td>
<td>0.449</td>
<td>-0.318</td>
</tr>
<tr>
<td>33 vs 3</td>
<td>0.079</td>
<td>0.081</td>
<td>0.980</td>
<td>0.328</td>
<td>-0.079</td>
</tr>
<tr>
<td>12 vs 11</td>
<td>0.007</td>
<td>0.101</td>
<td>0.070</td>
<td>0.942</td>
<td>-0.190</td>
</tr>
<tr>
<td>13 vs 11</td>
<td>-0.210</td>
<td>0.108</td>
<td>-1.940</td>
<td>0.052</td>
<td>-0.422</td>
</tr>
<tr>
<td>22 vs 11</td>
<td>-0.021</td>
<td>0.049</td>
<td>-0.430</td>
<td>0.667</td>
<td>-0.118</td>
</tr>
<tr>
<td>23 vs 11</td>
<td>-0.184</td>
<td>0.098</td>
<td>-1.880</td>
<td>0.060</td>
<td>-0.375</td>
</tr>
<tr>
<td>33 vs 11</td>
<td>-0.016</td>
<td>0.049</td>
<td>-0.330</td>
<td>0.741</td>
<td>-0.112</td>
</tr>
<tr>
<td>13 vs 12</td>
<td>-0.217</td>
<td>0.141</td>
<td>-1.540</td>
<td>0.124</td>
<td>-0.494</td>
</tr>
<tr>
<td>22 vs 12</td>
<td>-0.029</td>
<td>0.103</td>
<td>-0.280</td>
<td>0.782</td>
<td>-0.231</td>
</tr>
<tr>
<td>23 vs 12</td>
<td>-0.191</td>
<td>0.133</td>
<td>-1.440</td>
<td>0.151</td>
<td>-0.452</td>
</tr>
<tr>
<td>33 vs 12</td>
<td>-0.023</td>
<td>0.103</td>
<td>-0.230</td>
<td>0.820</td>
<td>-0.225</td>
</tr>
<tr>
<td>22 vs 13</td>
<td>0.189</td>
<td>0.111</td>
<td>0.700</td>
<td>0.089</td>
<td>-0.028</td>
</tr>
<tr>
<td>23 vs 13</td>
<td>0.026</td>
<td>0.139</td>
<td>-0.190</td>
<td>0.852</td>
<td>-0.247</td>
</tr>
<tr>
<td>33 vs 13</td>
<td>0.194</td>
<td>0.110</td>
<td>1.760</td>
<td>0.079</td>
<td>-0.022</td>
</tr>
<tr>
<td>23 vs 22</td>
<td>-0.163</td>
<td>0.100</td>
<td>-1.620</td>
<td>0.105</td>
<td>-0.360</td>
</tr>
<tr>
<td>33 vs 22</td>
<td>0.005</td>
<td>0.054</td>
<td>0.100</td>
<td>0.923</td>
<td>-0.101</td>
</tr>
<tr>
<td>33 vs 23</td>
<td>0.168</td>
<td>0.100</td>
<td>1.680</td>
<td>0.093</td>
<td>-0.028</td>
</tr>
</tbody>
</table>

Note: Patterns: 0=Y3 No CMA Y9 No CMA; 1=Y3 No CMA Y9 Unsubstantiated; 2=Y3 No CMA Y9 Substantiated; 3=Y3 No CMA Y9 OoHC; 11=Y3 Unsubstantiated Y9 Unsubstantiated; 12=Y3 Unsubstantiated Y9 Substantiated; 13=Y3 Unsubstantiated Y9 OoHC; 22=Y3 Substantiated Y9 Unsubstantiated; 23=Y3 Substantiated Y9 OoHC; 33=Y3 OoHC Y9 OoHC
Appendix 7. Comparison of Results Using Non-Dichotomised Outcome Variables

In order to address the possibility that dichotomising the outcome variables may affect the results, we ran linear regression models equivalent to each of the logistic regressions. These used reading achievement converted to z-scores, number of suspensions, and percentage of enrolled days absent from school. Most of the results were the same or similar to those of the logistic regression analyses.

Chapter 5

1. Maltreatment Type:
In the logistic regression emotional abuse was non-significant in multivariate analysis when included as the only maltreatment variable and when included with the other 3 types. In the linear regression emotional abuse was only non-significant when included with the other 3 maltreatment types. In the logistic regression physical abuse was significant when it was the only maltreatment type in the multivariate analysis, in the linear regression it was significant in both multivariate analyses. Results for sexual abuse and neglect were the same in all analyses.

2. Level of Child Protection Involvement:
The finding that the out-of-home care group did not differ significantly from no allegations group after adjusting for all other risk factors except attendance was no longer found for the total population, but was found for Aboriginal children. The addition of attendance resulting in out-of-home care reaching significance was now found for Aboriginal children (in the presented results it was non-significant for Aboriginal children, but significant for total population).

All other linear regression results were consistent with the logistic regression results.

Chapter 6

1. Number of Placements:
Linear regression analysis results were partially but not entirely consistent with the logistic regression results. For children overall and non-Aboriginal children, the linear
results did not show a dose-response pattern and all numbers of placements were associated with significantly worse outcomes than no placements. For Aboriginal children the direction and significance of results from the linear regression were the same as the results from the logistic regression.

2. Reunification and Time Since Reunification:
The results from the linear regression analyses were only partially consistent with the findings from the logistic regressions. Regarding reunification status, the trend was similar, however both reunified children and those in care at the time of the test had significantly worse outcomes than children never in care. The time trend for reunified children was not observed in the linear regression results.

3. Primary Type of Care
Comparisons to the results from equivalent linear regressions were broadly consistent but differed in that several additional categories of care type reached significance compared to the reference group. For children overall, similar to the logistic regression findings, kinship care did not differ significantly from the reference level, and outcomes for mixed/no primary type was significantly worse. In the linear regression, foster care and residential care were also significantly worse than comparison group. For non-Aboriginal children, all care types had significantly worse outcomes than the comparison group, which was similar to logistic regression results except that the worse outcomes for foster care reached significance. For Aboriginal children the findings were similar in both pattern and lack of statistical significance.

4. Most Recent Type of Care
Results from the linear regression were broadly similar to findings from the logistic regression, although some differences were noted. Consistent with the logistic regression results for children overall, reading scores for children in kinship care did not differ significantly from the comparison group, and reading scores for children in residential care were significantly worse. In the linear regression, outcomes for children most recently in foster care reached significance (worse than comparison group). For non-Aboriginal children, foster care reached significance in the linear analysis meaning that
all care types had significantly worse outcomes than the comparison group. For Aboriginal children there were still no significant differences based on care type (although the lower reading scores associated with residential care approached significance at $p=0.055$)

All other linear regression results were consistent with the logistic regression results.

**Chapter 7**
Results from all of the linear regression analyses were consistent with those from the equivalent logistic regression analyses.

**Chapter 8**
Linear regression equivalents of the logistic regression analyses were consistent with logistic regression findings for suspensions.

For attendance, the results in the final model approached but did not reach significance at $p=0.06$. In the restricted sample univariate analysis, lower readings scores for the out-of-home care group reached significance.
Research article

Pre-existing adversity, level of child protection involvement, and school attendance predict educational outcomes in a longitudinal study

Miriam J. Maclean*, Catherine L. Taylor, Melissa O'Donnell

Telethon Kids Institute, The University of Western Australia, Perth, Australia

**A R T I C L E   I N F O**

**Article history:**
Received 22 June 2015
Received in revised form 26 October 2015
Accepted 28 October 2015
Available online xxx

**Keywords:**
Maltreatment
Educational outcomes
Academic achievement
Child protection
Out-of-home care
Record linkage

**A B S T R A C T**

Maltreatment largely occurs in a multiple-risk context. The few large studies adjusting for confounding factors have raised doubts about whether low educational achievement results from maltreatment or co-occurring risk factors. This study examined prevalence, risk and protective factors for low educational achievement among children involved with the child protection system compared to other children. We conducted a population-based record-linkage study of children born in Western Australia who sat national Year 3 reading achievement tests between 2008 and 2010 (N = 46,838). The longitudinal study linked data from the Western Australian Department of Education, Department of Child Protection and Family Support, Department of Health, and the Disability Services Commission. Children with histories of child protection involvement (unsubstantiated maltreatment reports, substantiations or out-of-home care placement) were at three-fold increased risk of low reading scores. Adjusting for socio-demographic adversity partially attenuated the increased risk, however risk remained elevated overall and for substantiated (OR = 1.68) and unsubstantiated maltreatment (OR = 1.55). Risk of low reading scores in the out-of-home care group was fully attenuated after adjusting for socio-demographic adversity (OR = 1.16). Attendance was significantly higher in the out-of-home care group and served a protective role. Neglect, sexual abuse, and physical abuse were associated with low reading scores. Pre-existing adversity was also significantly associated with achievement. Results support policies and practices to engage children and families in regular school attendance, and highlight a need for further strategies to prevent maltreatment and disadvantage from restricting children’s opportunities for success.

© 2015 Elsevier Ltd. All rights reserved.

**Introduction**

There is a sizeable body of research investigating the link between child maltreatment and adverse educational outcomes. Children who have experienced abuse or neglect are at increased risk of lower levels of cognitive functioning, language
development, achievement in reading and maths, grades, and school attendance, suspensions and decreased personal expectations of attending college (Eigsti & Cicchetti, 2004; Lansford et al., 2002; Leiter, 2007; Rowe & Eckenrode, 1999; Stone, 2007). Maltreated children are also less likely to finish high school and gain university qualifications, which in turn leads to unemployment and lower incomes (Mersky & Topizes, 2010). However, as capacity has increased for larger studies that address a greater number of confounding factors, questions have been raised regarding whether such outcomes are attributable to maltreatment, or are a result of co-occurring risk factors (Boden, Horwood, & Fergusson, 2007). Given that millions of children around the world have experienced abuse or neglect (Sethi et al., 2013), it is important to understand the prevalence and risk of low educational achievement among maltreated children and to inform prevention and intervention strategies.

Maltreatment is both an adverse outcome resulting from a constellation of risk factors as well as an independent risk factor for other adverse child outcomes. Risk factors associated with maltreatment include parents being young or single, with low educational achievement and low socio-economic status, lack of social support, maternal smoking during pregnancy, substance use, or mental health problems (Sethi et al., 2013). A Western Australian cohort study found risk factors for substantiated child maltreatment include parental hospital admissions related to mental health, substance abuse and assault, along with social disadvantage and younger parental age. Children who were Aboriginal, and children with disabilities were at increased risk for substantiated maltreatment (O’Donnell et al., 2010).

Many of the same or similar factors are associated with low educational achievement, including low gestational age and birthweight, low maternal education, young parenthood, disadvantaged minority status, low SES, single parent status or changes in family structure, rigid parenting beliefs, negative parent-child interaction style, substance abuse, stressful life events, mental health problems, and domestic violence (Bradley & Corwyn, 2002; Fergusson, Boden, & Horwood, 2008; Gutman, Sameroff, & Cole, 2003; Kitzmann, Gaylord, Holt, & Kenny, 2003; Kolar, Brown, Haerten, & Michaelson, 1994; Malacova et al., 2008; Moore et al., 2014).

Many studies of maltreated children have had to rely on small or highly selected samples, use of cross-sectional data, data from a single source (such as welfare records or survey data), with limited access to comparison groups and data on the broader range of risk factors affecting the child and their family. The use of linked administrative data is increasingly becoming recognised as a valuable tool in understanding the effects of maltreatment in a multiple-risk context (Fantuzzo, Perlman, & Dobbins, 2011).

Very few population level linked record studies (Fantuzzo et al., 2011; Rouse & Fantuzzo, 2009) and large surveys (Boden et al., 2007) have been conducted examining the relationship between maltreatment and low educational achievement. These studies have found mixed results regarding the impact of maltreatment on educational achievement after taking into account co-occurring risk factors, raising questions about the widely held belief that maltreatment causes poor educational outcomes. In particular, Boden et al. (2007) in a longitudinal survey of 1,265 New Zealand children found that after controlling for confounding social, parent and child factors, the associations between child physical and sexual abuse and educational achievement (high school and tertiary qualifications) became non-significant. They concluded that social, family and individual context, rather than the child’s maltreatment experiences were responsible for later educational outcomes. Conversely, Fantuzzo and colleagues found maltreatment was the strongest risk factor (adjusted OR = 1.6) for low educational achievement in second grade students, measured by the California Achievement Tests (Rouse & Fantuzzo, 2009). Subsequent analysis showed results were only significant for some subgroups of maltreated children (Fantuzzo et al., 2011). Both studies used sound measures of educational achievement (standardised tests or attainment of qualifications) and controlled for additional risk factors, although Boden et al. (2007) controlled for many more risk factors than Rouse and Fantuzzo (2009). The conflicting and mixed results point to a need for further research to clarify the relationship between maltreatment and educational outcomes, taking into account pre-existing adversity and possible subgroup variations.

In addition, the influence of school attendance on educational achievement in child protection populations has not been studied widely. Within the general population, regular school attendance is associated with academic achievement (Hancock, Shepherd, Lawrence, & Zubrick, 2014). Reduced attendance has been found among child protection groups, especially neglected children (Fantuzzo et al., 2011). School attendance is therefore an important factor to include in relation to educational achievement with clear policy implications.

**Level of Child Protection Involvement**

Although maltreated children are often treated as a homogenous group in research, it is also recognised that outcomes are likely to differ across subgroups. First, results may differ for children with unsubstantiated maltreatment reports and substantiated maltreatment. Fantuzzo et al. (2011) found that the most consistent findings for poor educational outcomes were associated with unsubstantiated maltreatment reports prior to kindergarten, which may be an indicator of chronic adverse conditions.

In addition, after substantiation some children are placed in out-of-home care while others remain at home. Although children placed in out-of-home care are generally considered to be at particularly high risk for poor educational outcomes (Trout, Hagaman, Casey, Reid, & Epstein, 2008), the limited available evidence from studies that control for co-occurring risk factors suggests out-of-home care may have positive effects on academic engagement (Font & Maguire-Jack, 2013), and no significant effect on educational achievement (Fantuzzo et al., 2011; Font & Maguire-Jack, 2013). However, as there are few large-scale studies that address co-occurring risk factors, and the study by Font and Maguire-Jack relies on children’s...
self-reports of academic achievement, further examination of whether maltreated children’s educational outcomes are similar for children who have and have not experienced out-of-home care is warranted.

Type of Maltreatment

Educational outcomes may also vary depending on the type of maltreatment the child experienced. Reviews have suggested that neglect may be more strongly associated with academic difficulties, whereas physical abuse may be more strongly associated with behavioural problems (Stone, 2007; Trocmé & Caunce, 1995). Fantuzzo and colleagues (2011) found poor educational achievement was associated with neglect, but not physical abuse. Sexual and emotional abuse were not included. None of the larger-scale studies examined all four types of maltreatment, and none assessed the relationship between emotional abuse and educational achievement.

In summary, although it is clear that children who have been maltreated are at increased risk for poor educational outcomes, larger studies that control for social and demographic risk factors have cast doubt over the relationship once confounding variables are controlled for. In addition, there are gaps regarding potential differences in outcomes for children with different levels of contact with the child protection system, and different maltreatment types, especially emotional abuse. The role of school attendance in this vulnerable population also requires examination.

The current study has three aims. First, to identify the prevalence of low educational achievement among children with different levels of contact with the child protection system. Second, to examine risk and protective factors for low educational achievement, including maltreatment, level of contact with the child protection system, type of maltreatment, attendance, and child, parent and neighbourhood factors. Third, to assess whether maltreatment remains a significant risk factor for low educational achievement after controlling for multiple risk factors.

Method

Procedure

We conducted a population based cohort study using linked records from administrative datasets. Data linkage was undertaken by the WA Data Linkage Branch within the Department of Health, following strict procedures to preserve privacy and maximise quality of the record linkage (Kelman, Bass, & Holman, 2002). De-identified datasets with a unique identification number for each individual were provided to the researchers.

Participants

The initial cohort was all children born in Western Australia who were enrolled in Year 3 and potentially eligible to sit the National Assessment Literacy and Numeracy (NAPLAN) reading test between 2008 and 2010 (N = 66,098). The study included only the 70.9% of students with attendance data available (N = 46,838), which excluded private school students. Half the children were male, and 10.4% were Aboriginal. The average age at the Year 3 test was 8 years and 5 months. In total, reading outcome data were available for 44,539 students (95.1%). Exemptions from the NAPLAN tests are made in certain cases, such as children with severe disabilities or recent migrants from non-English speaking backgrounds. Parents can also withdraw their children from the tests, and some children are absent from school on the day of the test.

Measures

Child Characteristics. From the Midwives Notification System and Births Registrations we obtained information on gender, Aboriginality, date of birth (used to calculate age in months at the time of Year 3 tests), preterm birth (<37 weeks gestation), and birthweight. Birthweight percentile for gestational age was calculated separately for boys and girls using percentile reference levels for singletons born 1990–1994 (Roberts & Lancaster, 1999a), multiples born 1990–1994 (Roberts & Lancaster, 1999b), and children born after 1995 (Dobbins, Sullivan, Roberts, & Simpson, 2013). Children in the lowest 10% were classified low birthweight for gestational age.

Disability. Information on children’s disability status was obtained from the Intellectual Disabilities Exploring Answers (IDEA) database and Western Australian Register of Developmental Anomalies (WARDA). IDEA is a population-based database on individuals with disabilities, using information provided by the Disability Services Commission and the Department of Education. WARDA contains information on birth anomalies for diagnoses made any time from conception to 6 years of age. Children with a record in the IDEA or WARDA datasets were classified as having one or both of the following disability types: (1) intellectual disabilities, or (2) birth anomalies.

Child Protection Involvement. The Department for Child Protection and Family Support provided information on child maltreatment allegations (reports to the Department of suspected abuse or neglect), substantiations of maltreatment and out-of-home care. All coding was based on the child’s records from birth until the time of their Year 3 NAPLAN test. For the main analysis, children were coded as having a maltreatment allegation if they had any recorded allegation. For the
secondary analysis children were categorised based on their highest level of child protection contact (none, unsubstantiated allegation, substantiation with no out-of-home care, or had substantiated maltreatment and ever entered out-of-home care). Maltreatment type was based on the presence or absence of an allegation of each of the four types of maltreatment (physical, sexual and emotional abuse, and neglect) within the child’s records. Children therefore may have more than one type of maltreatment recorded, although only one maltreatment type is recorded per allegation.

**School Attendance.** Attendance data was provided by the Department of Education for the first semester of each year. Attendance was calculated as the percentage of days attended from the potential days enrolled during the first semester of Year 3. For students that changed schools, attendance days and enrolment days were summed across two or more schools.

**Parent Characteristics.** From the Midwives and Births data, we obtained maternal and paternal age and marital status at the child’s birth, and maternal smoking during pregnancy.

**Parent Education.** Self-reported information on both parents’ highest completed level of education was provided by the WA Department of Education. We coded the highest level of completed education for either parent as (1) Year 11 or less, (2) Year 12 (the final year of secondary schooling in Western Australia), Advanced certificate, or Diploma, (3) University Degree, or (0) missing data. Missing parent education data was relatively common overall (31%), and higher among the child protection groups (48–56% of children).

**Maternal and Paternal Psychosocial Risk Factors.** Parents’ mental health information includes public and private in-patient admissions and public out-patient admission obtained from two sources: the Mental Health Information System and the Hospital Morbidity Data System. International Classification of Disease codes from ICD8, ICD9 and ICD10 provide diagnostic information in both data sources. Mental health contacts by mothers included a mental health diagnosis across major diagnostic categories (such as depression, anxiety disorder, schizophrenia, bipolar disorder but excluding substance-related diagnoses) prior to the child’s NAPLAN test. Parents’ substance-related admissions were included where ICD codes indicated an alcohol or drug related contact.

Maternal and paternal assault related admissions included any hospital admission for an assault related injury inflicted on the parent (ICD-9: E960–969, ICD-10: X85–Y09) that occurred any time before the child’s NAPLAN test.

**Community Characteristics.** Community variables from the Australian Bureau of Statistics were included to account for socio-economic differences ([Australian Bureau of Statistics, 2008](http://www.abs.gov.au)) and disparities by level of remoteness ([Department of Health & Aged Care, 2001](http://www.health.gov.au)). The Socio Economic Indices for Area (SEIFA) is a neighbourhood level measure of relative social disadvantage based on place of residence at the time of the child’s birth. SEIFA scores for areas are based on the national population census which is conducted every 5 years. SEIFA was grouped into five categories, from least disadvantaged (5), plus missing. The Accessibility/Remoteness Index of Australia (ARIA) is also grouped into five categories from least remote (1) to most remote (5) and indicates the accessibility of the area in which the family lives at the time of the child’s birth. Community data by collection district (approximately 400 households) was available for 91% of children. Missing SEIFA and ARIA were filled using a less precise version of the variables - more recent data from larger geographical areas (postcodes), for cases missing collection district level information.

**Outcome Variable – Low Reading Achievement.** The National Assessment Program – Literacy and Numeracy (NAPLAN) was introduced in 2008, and is sat by all Australian Year 3 students in May of each year. Children were categorised as having low reading achievement if they scored in the lowest 10% of students within their test year on the NAPLAN reading test.

**Data Analysis**

In addition to descriptive analysis, the risk of low reading achievement for children with a maltreatment allegation, adjusted for confounding individual, parental and neighbourhood factors was examined using a multivariate logistic regression analyses. Supplementary multivariate logistic regression analyses were conducted using (a) level of child protection involvement to assess differences between these subgroups and (b) maltreatment type.

Our analysis was undertaken in three steps. First, we conducted univariate logistic regression to estimate the association between each predictor variable and the outcome variable. Second, we conducted each of the multivariate logistic regression analyses described above with child, parent and community risk factors included as covariates. Third we added school attendance to each of the multivariate models. Where adding attendance substantively changed the results, both are presented, otherwise only the univariate and final multivariate model results are presented. Paternal age was excluded from the models because it is closely correlated with maternal age. Results are presented using odds ratios (ORs) and 95% confidence intervals (CIs) ([Tabachnick & Fidell, 2001](http://www.tabachnick.org))). The data were analysed using SPSS version 22 software.

A ‘missing’ category was created for parent education ([Cooper, McNamara, de Klerk, Davis, & Jones, 2014](http://www.coe.edu.au)). Sensitivity analysis was conducted in order to assess the impact of missing data on results. For the sensitivity analysis, parent education was imputed using multiple imputation with 25 imputed datasets in SPSS ([Graham, Olchowski, & Gilreath, 2007](http://dx.doi.org/10.1016/j.chiabu.2015.10.026)) and [Takahashi](http://dx.doi.org/10.1016/j.chiabu.2015.10.026) version 22 software.

Please cite this article in press as: Maclean, M. J., et al. Pre-existing adversity, level of child protection involvement, and school attendance predict educational outcomes in a longitudinal study. *Child Abuse & Neglect* (2015), [http://dx.doi.org/10.1016/j.chiabu.2015.10.026](http://dx.doi.org/10.1016/j.chiabu.2015.10.026)
Additional sensitivity analyses included using the full 2008–2012 dataset which had a larger sample but less complete ascertainment of child protection events, and using ‘missing’ data categories for SEIFA and ARIA.

Children’s age in months had a positive linear effect however children who were sufficiently old to fall outside the typical range for Year 3 tests (most likely children who had been retained) scored markedly worse. An indicator variable was added to the model to account for these children.

Ethics

Ethics approval for the study was granted by the University of WA Human Research Ethics Committee, the Department of Health Human Research Ethics Committee, and the WA Aboriginal Human Information and Ethics Committee.

Results

Descriptive statistics

Of the 46,838 children in the sample 2,716 (5.8%) had been the subject of a maltreatment allegation. Of these 1,343 had unsubstantiated allegations, 622 had substantiated maltreatment and remained at home, and 751 had substantiated maltreatment and entered out-of-home care at least once (Table 1). The prevalence of low reading achievement in the maltreatment allegation group was 30.2% compared to 11.4% of children with no allegations. Children with maltreatment allegations were over-represented in the low reading achievement group (13.2% of low scorers vs. 4.3% of children scoring above the bottom decile). Across different levels of child protection involvement, low reading achievement scores were obtained by 28.9% of children with unsubstantiated allegations only, 32.1% of children with a substantiation, and 31.1% of children who had entered out-of-home care.

The characteristics of the study population, including prevalence of risk factors is shown in Table 1. Almost all of the individual, parental and neighbourhood risk factors were more common among children with maltreatment allegations, and many had increased frequency among children with higher levels of involvement with the child protection system. In total 22.3% of children without an allegation were from the most socially disadvantaged areas, compared to 42.7% of children with unsubstantiated allegations, 46.7% of those with substantiated allegations, and 50.0% of those who had entered out-of-home care. Maternal mental health contact was especially common among children who had entered out-of-home care 62.3%, compared to 15.4% of children with no allegations, 38.7% of those with unsubstantiated allegations and 38.3% of those with substantiated allegations. A high proportion of children with child protection involvement had missing education data for both parents (from 48.0% to 56.5%). Almost half (45.3%) of the children who had entered out-of-home care were Aboriginal, although Aboriginal children only comprised 10.4% of the study population.

Intellectual disabilities were most common among children who entered out-of-home care (8.4%). As children with intellectual disabilities can be exempted from the test, we examined participation rates and found a higher percentage of children with an intellectual disability participated in the reading test among the children with a substantiation (55.2%) than among children with other types of child protection contact (ranging from 44.3% to 46.0%).

For non-Aboriginal children school absence was highest among children with substantiated maltreatment who never entered out-of-home care (absent for 10.0% of enrolled days), followed by unsubstantiated cases (9.2% days absent), children who had entered out-of-home care (8.0% days absent) and lowest for children with no allegations (6.6% days absent). For Aboriginal children school absence levels were higher, at 26.9% among children with substantiated maltreatment who never entered out-of-home care, 25.4% among children with unsubstantiated allegations, and 18.9% among children with no allegations. School absences were lowest among children who had entered out-of-home care (15.7%).

Logistic Regression Analysis of Risk. Table 2 shows the odds ratios for the risk of low reading achievement. Children with a maltreatment allegation remained at significantly elevated risk of low reading achievement after adjusting for other risk factors compared to children without an allegation (OR = 1.46, 95% CI [1.31, 1.63]).

With the exception of paternal substance-related contacts, paternal assaults and birth anomalies, all of the risk factors were significantly associated with reading scores in both the univariate and fully adjusted models. Paternal assaults were significant in a number of the sensitivity analyses but not in the main analysis. The highest odds ratios were for intellectual disability (OR = 5.19, 95% CI [4.22, 6.39]), low parental education especially where both parent’s education is less than Year 12 (OR = 3.71, 95% CI [3.19, 4.31]) or missing (OR = 3.30, 95% CI [2.86, 3.79]), being older than typical (OR = 2.67, 95% CI [2.09, 3.40]), poor attendance (OR = 2.37, 95% CI [2.08, 2.69]), living in the most socially disadvantaged areas (OR = 2.17, 95% CI [1.91, 2.46]) and being Aboriginal (OR = 2.00, 95% CI [1.82, 2.19]). To ensure that the results are not biased by the inclusion of unsubstantiated maltreatment reports, we also ran the analysis limiting maltreatment to substantiations rather than allegations. As results were similar, indicating a significantly elevated risk for low reading scores (OR = 1.36, 95% CI [1.17, 1.57]) associated with substantiated maltreatment, we continued the analysis based on maltreatment allegations.

Multivariate logistic regression analyses were also undertaken using the four types of maltreatment (Table 3). The same risk factors were controlled for (odd ratios for these risk factors remain almost the same so are not presented again). Logistic regression analysis examining all four types of maltreatment allegations found that after adjusting for other risk factors, elevated risk was associated with allegations of sexual abuse (OR = 1.53, 95% CI [1.29, 1.82]), neglect (OR = 1.52, 95% CI [1.30, 1.76]), and emotional abuse (OR = 1.70, 95% CI [1.44, 2.00]).
Table 1  
Characteristics of study population by level of child protection involvement.  

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No allegations</th>
<th>Unsubstantiated</th>
<th>Substantiated</th>
<th>OOH</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 44,122)</td>
<td>(n = 1,343)</td>
<td>(n = 622)</td>
<td>(n = 751)</td>
<td>(n = 46,838)</td>
</tr>
<tr>
<td>Age months (mean)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>21,506</td>
<td>695</td>
<td>316</td>
<td>349</td>
<td>22,866</td>
</tr>
<tr>
<td>Male</td>
<td>22,616</td>
<td>648</td>
<td>306</td>
<td>402</td>
<td>23,972</td>
</tr>
<tr>
<td>Aboriginality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aboriginal</td>
<td>3,870</td>
<td>432</td>
<td>232</td>
<td>327</td>
<td>4,861</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td>40,252</td>
<td>911</td>
<td>390</td>
<td>424</td>
<td>41,977</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>804</td>
<td>61</td>
<td>29</td>
<td>63</td>
<td>957</td>
</tr>
<tr>
<td>Cerebral palsy or birth anomaly</td>
<td>2,701</td>
<td>72</td>
<td>39</td>
<td>68</td>
<td>2,880</td>
</tr>
<tr>
<td>Preterm</td>
<td>3,197</td>
<td>168</td>
<td>72</td>
<td>128</td>
<td>3,565</td>
</tr>
<tr>
<td>Birthweight percentile low for</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gestational age</td>
<td>4,447</td>
<td>213</td>
<td>118</td>
<td>175</td>
<td>4,493</td>
</tr>
<tr>
<td>Maternal smoking</td>
<td>10,554</td>
<td>722</td>
<td>359</td>
<td>473</td>
<td>12,108</td>
</tr>
<tr>
<td>Highest parent education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to Yr 11</td>
<td>5,398</td>
<td>324</td>
<td>147</td>
<td>163</td>
<td>6,032</td>
</tr>
<tr>
<td>Yr 12/Certificate/diploma</td>
<td>17,412</td>
<td>314</td>
<td>129</td>
<td>136</td>
<td>17,991</td>
</tr>
<tr>
<td>University degree</td>
<td>8,245</td>
<td>61</td>
<td>23</td>
<td>28</td>
<td>8,357</td>
</tr>
<tr>
<td>Missing</td>
<td>13,067</td>
<td>644</td>
<td>323</td>
<td>424</td>
<td>14,458</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/defacto</td>
<td>39,328</td>
<td>938</td>
<td>434</td>
<td>438</td>
<td>41,138</td>
</tr>
<tr>
<td>Not married/unknown</td>
<td>4,794</td>
<td>405</td>
<td>188</td>
<td>313</td>
<td>5,700</td>
</tr>
<tr>
<td>Maternal age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>2,945</td>
<td>225</td>
<td>102</td>
<td>156</td>
<td>3,428</td>
</tr>
<tr>
<td>20–29</td>
<td>21,695</td>
<td>772</td>
<td>387</td>
<td>419</td>
<td>23,273</td>
</tr>
<tr>
<td>30+</td>
<td>19,482</td>
<td>346</td>
<td>133</td>
<td>176</td>
<td>20,137</td>
</tr>
<tr>
<td>Maternal substance contact</td>
<td>2,872</td>
<td>387</td>
<td>230</td>
<td>484</td>
<td>3,973</td>
</tr>
<tr>
<td>Maternal assault</td>
<td>1,150</td>
<td>183</td>
<td>160</td>
<td>290</td>
<td>1,846</td>
</tr>
<tr>
<td>Maternal mental health contact</td>
<td>6,784</td>
<td>520</td>
<td>238</td>
<td>468</td>
<td>8,010</td>
</tr>
<tr>
<td>Paternal substance contact</td>
<td>3,489</td>
<td>214</td>
<td>143</td>
<td>249</td>
<td>4,169</td>
</tr>
<tr>
<td>Paternal assault</td>
<td>2,125</td>
<td>153</td>
<td>152</td>
<td>152</td>
<td>2,577</td>
</tr>
<tr>
<td>Paternal mental health contact</td>
<td>3,486</td>
<td>169</td>
<td>162</td>
<td>210</td>
<td>3,974</td>
</tr>
<tr>
<td>Social disadvantage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>9,804</td>
<td>571</td>
<td>289</td>
<td>373</td>
<td>11,037</td>
</tr>
<tr>
<td>2</td>
<td>9,379</td>
<td>323</td>
<td>137</td>
<td>190</td>
<td>10,029</td>
</tr>
<tr>
<td>3</td>
<td>8,858</td>
<td>210</td>
<td>95</td>
<td>117</td>
<td>9,280</td>
</tr>
<tr>
<td>4</td>
<td>8,167</td>
<td>151</td>
<td>62</td>
<td>42</td>
<td>8,422</td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>7,781</td>
<td>83</td>
<td>36</td>
<td>24</td>
<td>7,924</td>
</tr>
<tr>
<td>Remoteness</td>
<td>29,273</td>
<td>739</td>
<td>355</td>
<td>482</td>
<td>30,849</td>
</tr>
<tr>
<td>2</td>
<td>5,034</td>
<td>214</td>
<td>67</td>
<td>83</td>
<td>5,398</td>
</tr>
<tr>
<td>3</td>
<td>5,499</td>
<td>175</td>
<td>86</td>
<td>77</td>
<td>5,837</td>
</tr>
<tr>
<td>4</td>
<td>3,050</td>
<td>122</td>
<td>62</td>
<td>68</td>
<td>3,302</td>
</tr>
<tr>
<td>5</td>
<td>1,240</td>
<td>92</td>
<td>52</td>
<td>39</td>
<td>1,423</td>
</tr>
<tr>
<td>Attendance (% absent) 0–5%</td>
<td>22,598</td>
<td>435</td>
<td>186</td>
<td>318</td>
<td>23,537</td>
</tr>
<tr>
<td>&gt;5–10%</td>
<td>11,676</td>
<td>307</td>
<td>141</td>
<td>160</td>
<td>12,284</td>
</tr>
<tr>
<td>&gt;10–15%</td>
<td>4,828</td>
<td>184</td>
<td>65</td>
<td>89</td>
<td>5,166</td>
</tr>
<tr>
<td>&gt;15–25%</td>
<td>3,045</td>
<td>178</td>
<td>108</td>
<td>94</td>
<td>3,425</td>
</tr>
<tr>
<td>&gt;25%</td>
<td>1,975</td>
<td>239</td>
<td>122</td>
<td>90</td>
<td>2,426</td>
</tr>
<tr>
<td>Low reading score</td>
<td>4,785</td>
<td>347</td>
<td>174</td>
<td>204</td>
<td>5,510</td>
</tr>
<tr>
<td>Any physical MCA</td>
<td>–</td>
<td>430</td>
<td>242</td>
<td>333</td>
<td>1,005</td>
</tr>
<tr>
<td>Any sexual MCA</td>
<td>–</td>
<td>541</td>
<td>215</td>
<td>155</td>
<td>911</td>
</tr>
<tr>
<td>Any emotional MCA</td>
<td>–</td>
<td>206</td>
<td>141</td>
<td>229</td>
<td>576</td>
</tr>
<tr>
<td>Any neglect MCA</td>
<td>–</td>
<td>373</td>
<td>261</td>
<td>535</td>
<td>1,169</td>
</tr>
</tbody>
</table>

| 1.77] and physical abuse (1.26, 95% CI [1.07, 1.49]). Emotional abuse was associated with threefold increased risk in the univariate analysis, but this effect was attenuated and non-significant in the adjusted model (OR = 1.18, 95% CI [0.95–1.47]). Finally, logistic regression analyses were undertaken using the level of child protection contact (instead of any maltreatment allegation or allegation type) (Table 4). Again, the same risk factors were controlled for. Attendance differs across levels of child protection, and there was some variation in the results when attendance was included, so results are presented for Model B (controlling for all background risk factors except attendance) and Model C (adding attendance to Model B). The results from Model B showed that compared to children with no maltreatment allegations, children with unsubstantiated allegations were at increased risk of low reading achievement (OR = 1.55, 95% CI [1.34, 1.78]), as were children with substantiated allegations who remained at home (OR = 1.68, 95% CI [1.37, 2.06]). However, children who had ever entered out-of-home care did not have significantly increased risk of low reading achievement compared to children with no allegations (OR = 1.16, 95% CI [0.96, 1.41]).

Please cite this article in press as: Maclean, M. J., et al. Pre-existing adversity, level of child protection involvement, and school attendance predict educational outcomes in a longitudinal study. *Child Abuse & Neglect* (2015), http://dx.doi.org/10.1016/j.chiabu.2015.10.026
### Table 2
Logistic regression: odds of low reading scores for children with or without maltreatment allegations.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher than typical age</td>
<td>0.96 (0.95, 0.97)</td>
<td>0.94 (0.94, 0.95)</td>
</tr>
<tr>
<td>Young or typical age</td>
<td>2.21 (1.80, 2.70)</td>
<td>2.67 (2.09, 3.40)</td>
</tr>
<tr>
<td>Boys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aboriginal</td>
<td>1.55 (1.47, 1.64)</td>
<td>1.63 (1.53, 1.73)</td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td>5.14 (4.79, 5.52)</td>
<td>2.00 (1.82, 2.19)</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>6.56 (5.42, 7.93)</td>
<td>5.19 (4.42, 6.39)</td>
</tr>
<tr>
<td>No ID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preterm birth</td>
<td>1.58 (1.44, 1.74)</td>
<td>1.25 (1.12, 1.38)</td>
</tr>
<tr>
<td>Birthweight percentile for gestational age &lt;10th%</td>
<td>1.56 (1.43, 1.69)</td>
<td>1.17 (1.07, 1.28)</td>
</tr>
<tr>
<td>Not low birth weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal smoking</td>
<td>6.87 (6.02, 7.85)</td>
<td>3.3 (2.86, 3.79)</td>
</tr>
<tr>
<td>Parent education missing</td>
<td>7.67 (6.66, 8.83)</td>
<td>3.71 (3.19, 4.31)</td>
</tr>
<tr>
<td>Up to Yr11</td>
<td>3.30 (2.89, 3.78)</td>
<td>2.39 (2.08, 2.75)</td>
</tr>
<tr>
<td>University degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/defacto at birth</td>
<td>4.56 (4.10, 5.08)</td>
<td>1.16 (1.02, 1.33)</td>
</tr>
<tr>
<td>Maternal age under 20</td>
<td>3.23 (2.93, 3.56)</td>
<td>1.30 (1.16, 1.46)</td>
</tr>
<tr>
<td>20–29</td>
<td>1.74 (1.63, 1.85)</td>
<td>1.19 (1.11, 1.28)</td>
</tr>
<tr>
<td>30+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal substance-related contact</td>
<td>2.60 (2.39, 2.82)</td>
<td>1.12 (1.00, 1.24)</td>
</tr>
<tr>
<td>No</td>
<td>4.56 (4.10, 5.08)</td>
<td>1.16 (1.02, 1.33)</td>
</tr>
<tr>
<td>Maternal assault</td>
<td>1.67 (1.56, 1.79)</td>
<td>1.08 (1.00, 1.17)</td>
</tr>
<tr>
<td>Maternal mental health</td>
<td>2.30 (2.08, 2.54)</td>
<td>1.09 (0.97, 1.22)</td>
</tr>
<tr>
<td><em>No</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paternal assault</td>
<td>1.46 (1.33, 1.60)</td>
<td>1.11 (1.00, 1.23)</td>
</tr>
<tr>
<td>Paternal mental health</td>
<td>5.45 (4.85, 6.12)</td>
<td>2.17 (1.91, 2.46)</td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>3.29 (2.91, 3.71)</td>
<td>1.74 (1.53, 1.98)</td>
</tr>
<tr>
<td>2</td>
<td>4.60 (4.12, 5.11)</td>
<td>1.16 (1.02, 1.33)</td>
</tr>
<tr>
<td>4</td>
<td>2.60 (2.29, 2.95)</td>
<td>1.66 (1.45, 1.89)</td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>1.80 (1.58, 2.06)</td>
<td>1.33 (1.16, 1.53)</td>
</tr>
<tr>
<td>ARIA remoteness – least remote</td>
<td>5.45 (4.85, 6.12)</td>
<td>2.17 (1.91, 2.46)</td>
</tr>
<tr>
<td>2</td>
<td>3.29 (2.91, 3.71)</td>
<td>1.74 (1.53, 1.98)</td>
</tr>
<tr>
<td>3</td>
<td>2.60 (2.29, 2.95)</td>
<td>1.66 (1.45, 1.89)</td>
</tr>
<tr>
<td>4</td>
<td>1.80 (1.58, 2.06)</td>
<td>1.33 (1.16, 1.53)</td>
</tr>
<tr>
<td>Most remote</td>
<td>4.23 (3.73, 4.8)</td>
<td>1.55 (1.33, 1.81)</td>
</tr>
<tr>
<td>Attendance (%) absent 0–5%</td>
<td>1.34 (1.25, 1.44)</td>
<td>1.16 (1.07, 1.25)</td>
</tr>
<tr>
<td>&gt;5–10%</td>
<td>1.84 (1.68, 2.02)</td>
<td>1.39 (1.26, 1.53)</td>
</tr>
<tr>
<td>&gt;10–15%</td>
<td>2.98 (2.71, 3.28)</td>
<td>1.70 (1.53, 1.89)</td>
</tr>
<tr>
<td>&gt;15–25%</td>
<td>6.61 (5.94, 7.37)</td>
<td>2.37 (2.08, 2.69)</td>
</tr>
<tr>
<td>Any maltreatment allegation</td>
<td>3.38 (3.08, 3.71)</td>
<td>1.46 (1.31, 1.63)</td>
</tr>
<tr>
<td>No</td>
<td>4.24 (3.71, 1.77)</td>
<td>1.52 (1.30, 1.77)</td>
</tr>
</tbody>
</table>

Notes: Other disabilities (combined birth anomalies and cerebral palsy) were non-significant, as was paternal substance-related contacts.

### Table 3
Logistic regression: Odds of low reading scores by maltreatment type.

<table>
<thead>
<tr>
<th>Allegation types</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any physical</td>
<td>3.19 (2.76, 1.49)</td>
<td>1.26 (1.07, 1.49)</td>
</tr>
<tr>
<td>Any sexual</td>
<td>2.74 (2.35, 1.82)</td>
<td>1.53 (1.29, 1.82)</td>
</tr>
<tr>
<td>Any emotional</td>
<td>2.99 (2.46, 1.47)</td>
<td>1.18 (0.95, 1.47)</td>
</tr>
<tr>
<td>Any neglect</td>
<td>4.24 (3.71, 1.77)</td>
<td>1.52 (1.30, 1.77)</td>
</tr>
</tbody>
</table>

Notes: Each maltreatment type was examined in a separate analysis with all other risk factors from Table 2 except ‘Any maltreatment allegation’. All estimates remained relatively unchanged in the analysis. When all other maltreatment types were controlled for in a combined model, physical abuse was no longer significant.

Please cite this article in press as: Maclean, M. J., et al. Pre-existing adversity, level of child protection involvement, and school attendance predict educational outcomes in a longitudinal study. Child Abuse & Neglect (2015), http://dx.doi.org/10.1016/j.chiabu.2015.10.026
Table 4
Logistic regression: Odds of low reading scores by level of child protection involvement.

<table>
<thead>
<tr>
<th>Contact level</th>
<th>Model A Univariate OR (95% CI)</th>
<th>Model B Multivariate OR (95% CI) without attendance</th>
<th>Model C Multivariate OR (95% CI) with attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>All children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No allegations</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Unsubstantiated</td>
<td>3.17 (2.79, 3.61)</td>
<td>1.55 (1.34, 1.78)</td>
<td>1.49 (1.29, 1.72)</td>
</tr>
<tr>
<td>Substantiated</td>
<td>3.69 (3.07, 4.43)</td>
<td>1.68 (1.37, 2.06)</td>
<td>1.63 (1.33, 2.00)</td>
</tr>
<tr>
<td>Out-of-home care</td>
<td>3.52 (2.97, 4.16)</td>
<td>1.16 (0.96, 1.41)</td>
<td>1.28 (1.05, 1.55)</td>
</tr>
<tr>
<td>Aboriginal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No allegations</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Unsubstantiated</td>
<td>1.86 (1.49, 2.31)</td>
<td>1.62 (1.28, 2.05)</td>
<td>1.57 (1.23, 1.99)</td>
</tr>
<tr>
<td>Substantiated</td>
<td>1.80 (1.34, 2.44)</td>
<td>1.44 (1.04, 1.99)</td>
<td>1.38 (1.00, 1.92)</td>
</tr>
<tr>
<td>Out-of-home care</td>
<td>1.20 (0.93, 1.55)</td>
<td>0.99 (0.74, 1.32)</td>
<td>1.16 (0.86, 1.55)</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No allegations</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Unsubstantiated</td>
<td>2.48 (2.09, 2.94)</td>
<td>1.49 (1.24, 1.79)</td>
<td>1.44 (1.20, 1.73)</td>
</tr>
<tr>
<td>Substantiated</td>
<td>3.08 (2.41, 3.93)</td>
<td>1.81 (1.40, 2.35)</td>
<td>1.78 (1.37, 2.30)</td>
</tr>
<tr>
<td>Out-of-home care</td>
<td>3.41 (2.71, 4.30)</td>
<td>1.43 (1.11, 1.86)</td>
<td>1.47 (1.14, 1.91)</td>
</tr>
</tbody>
</table>

Notes: Level of child protection involvement was examined in a separate analysis with all other risk factors from Table 2 except ‘Any maltreatment allegation’. All estimates remained relatively unchanged in the analysis.

After adding attendance to the model (Model C), however, although the changes were small we found the protective effect of out-of-home care was no longer significant, and reading scores for all three child protection groups were significantly worse than for children with no allegations. This suggests that the effect of out-of-home care on Year 3 reading scores is partially mediated by school attendance. Compared to children with no allegations, the odds ratio for low reading scores for children with unsubstantiated maltreatment was 1.49 (95% CI [1.29, 1.72]), for children with substantiations was 1.63 (95% CI [1.33, 2.00]), and for children who had entered out-of-home care was 1.28 (95% CI [1.05, 1.55]). When presented separately by Aboriginal status, the effect of adding attendance to the model primarily affected the odds ratio for Aboriginal children in out-of-home care, but was not significant.

Sensitivity analysis produced results that generally did not differ substantively from those reported. In some models, either a greater or smaller number of the parental psychosocial risk factors were significant.

Discussion

Low reading achievement was common across children with child protection involvement, affecting over a quarter of these children (27.8%), representing a three times increased risk for low reading compared to children without child protection involvement. After controlling for a wide range of risk factors, our findings showed a small but fairly consistent association between maltreatment and low reading achievement in Year 3, across both substantiated and unsubstantiated maltreatment allegations, and most types of abuse and neglect. This is in line with research showing links between some types of maltreatment and poor outcomes (Fantuzzo et al., 2011; Mersky & Topitzes, 2010), but extends the findings of these studies to show that almost all sub-groups of children with maltreatment allegations (substantiated or unsubstantiated, and across neglect, physical and sexual abuse) are at elevated risk for academic difficulties.

Maltreatment Type and Reading Achievement

Sexual abuse and neglect were both associated with approximately 50% increased odds of low reading achievement. Physical abuse was also significantly associated with poor reading. Our finding that sexual abuse was one of the maltreatment types associated with the highest increase in risk of low reading achievement is consistent with Fergusson and colleagues’ results showing sexual abuse to be associated with a wide range of adverse outcomes (Fergusson, McLeod, & Horwood, 2013), although not with their non-significant findings regarding educational outcomes (Boden et al., 2007). It is unclear why the effects of emotional abuse were fully attenuated by other risk factors whereas all other maltreatment types showed harmful effects. Emotional abuse has been linked to other poor outcomes (Crow, Cross, Powers, & Bradley, 2014; Gross & Keller, 1992; Iwaniec, Larkin, & Higgins, 2006), but remains one of the less-studied areas of maltreatment and requires further exploration.

Level of Child Protection Involvement and Reading Achievement

Although all three child protection groups had over threefold increased risk of low readings scores prior to adjustment, after controlling for pre-existing adversity the risk for the out-of-home care group was not significantly different from children with no allegations. This finding should not be interpreted to mean that children in out-of-home care are performing satisfactorily in school (almost one in three have poor reading achievement), but rather that given the highly increased risks
they face through their family, community and individual characteristics as well as maltreatment experiences, we would expect them to be performing even worse.

Although the difference was small, having entered out-of-home care was associated with lower odds of poor reading achievement compared to children with substantiated or unsubstantiated allegations which suggests that out-of-home care, or other interventions or monitoring that accompany entry to care, may have a protective effect on education. This finding is new, but not inconsistent with the literature. Using data from the National Survey of Child and Adolescent Wellbeing II, Font and Maguire-Jack (2013) found increased school engagement among some of their out-of-home care groups, and suggested that the null findings for performance may be due to use of self-report measures. Runyan and Gould (1985) found increased school attendance and no difference in school grades despite higher levels of background risk, and a Swedish study found fewer children with low or no grades among the out-of-home care group (Berlin, Vinnerljung, & Hjern, 2011). Conversely, two studies using the National Survey of Child and Adolescent Wellbeing data found no significant differences in language and cognitive development between children placed in out-of-home care and those receiving in-home welfare interventions (Berger, Bruch, Johnson, James, & Rubin, 2009; Stahmer et al., 2009). Our study did not aim to specifically examine the causal ‘effects’ of out-of-home care as an intervention, but the results are suggestive of a protective role of out-of-home care (and at minimum no harmful effect). Future research will be undertaken using longitudinal education data to come closer to estimating possible causal relationships.

Attendance

Regular school attendance was an important protective factor. Our research suggests that attendance accounts for some of the protective effect of out-of-home care on Year 3 reading results. While an association has previously found between out-of-home care and attendance (Runyan & Gould, 1985), and between attendance and achievement in the general population (Hancock et al., 2014; Roby, 2004) the role of attendance in the relationship between out-of-home care and achievement has not previously been examined. Strategies to improve attendance among all child protection groups, particularly those that remain at home may play a valuable role in improving children’s early achievement and position them better for school success in adolescence.

Adversity

Like Boden and colleagues (2007), we found some attenuation of risk for low educational achievement after taking into account other risk factors in maltreated children’s lives. A high proportion of children with child protection involvement had additional risk factors, and these were especially common among children who entered out-of-home care. Over one third of children who entered out-of-home care had mothers who had been to hospital following an assault, and over half had mothers with hospital contacts for mental health and two thirds of mothers’ had hospital contact for substance-related issues. The high level of risk factors supports the need to account for these in research examining outcomes for maltreated children (Fantuzzo et al., 2011; Stone, 2007).

While it is not surprising to see intellectual disability emerge as the strongest predictor of low reading scores, it highlights the importance of taking into account disabilities in research among child protection populations. Disabilities are more common among maltreated children, and children affected by both are likely to have additional support needs.

Many of the strongest risk factors for poor educational achievement reflect issues of social disadvantage: low parental education, living in a socially disadvantaged area, and Aboriginal status. Rouse and colleagues found maltreatment had the highest OR (1.6) followed by low maternal education, poverty, homelessness and birth risks (Rouse & Fantuzzo, 2009). This differs somewhat from our findings as maltreatment was not our strongest risk factor. Public health interventions addressing adversity and disadvantage as well as child maltreatment are needed.

Closing the educational gap between Aboriginal and non-Aboriginal students is a complex task requiring sensitivity to a history of entrenched inequality (Ford, 2012). Previous research has illustrated that many expected resilience factors for Aboriginal youth were not significant (Hopkins, Taylor, D’Antoine, & Zubrick, 2012). Within the educational domain, we found school attendance was equally effective at promoting achievement outcomes for Aboriginal and non-Aboriginal students. Education officers within the Department for Child Protection and Family Support are tasked with supporting achievement and attendance among children in out-of-home care, which may contribute to the higher attendance rates for these children. Effective strategies are needed to improve attendance among other Aboriginal children, especially those with maltreatment allegations who remain at home.

Limitations and Future Research

The study had a number of limitations, although we have attempted to address them where possible. Record linkage provides extensive population data but does have limitations in that records are only created when there is contact with government agencies. Thus maltreatment was only captured for children who had contact with the child protection system and may be under-ascertained. As mental health and substance-related issues were counted only for public and private hospital inpatients and public outpatients, there may be some bias towards undercounting these issues among higher socio-economic groups, and the data is likely to capture more severe cases of mental illness rather than cases that are dealt with.
in the community by general practitioners and private practice psychologists. We also did not have information on whether educational, psychological or family support services were provided so cannot control for or assess the impact of these.

Despite these limitations the data uses standardised national assessments of reading ability and using linked longitudinal data to overcome many of the limitations of previous research including small sample size, cross-sectional and point in time data. Record linkage provides the ability to capture sensitive information such as maltreatment allegations and parental hospital contacts and includes individuals who may not participate in surveys.

We only studied children in Year 3. One possible explanation for our findings regarding the association between maltreatment and achievement being closer to results from Rouse and Fantuzzo (2009) than the non-significant findings from Boden and colleagues (2007) is that the latter looked at older students (high school completions). However Mersky and Topitzes (2010) also examined high school and university outcomes and did find maltreatment remained significantly associated with negative educational outcomes after controlling for a range of sociodemographic risk factors within a highly disadvantaged population. Further research should examine whether the same the relationships exist between level of child protection involvement, attendance and achievement in older children and adolescents.

Our study combined all children who had entered out-of-home care into a single group. However, there is evidence that children’s outcomes may vary depending on their out-of-home care experiences, such as placement type (Rubin et al., 2008), duration of out-of-home care, and number of placement changes (Baskin & Sommers, 2011). Future research should examine whether out-of-home care has consistent relationships with attendance and achievement, or varies depending on care experiences. Understanding other mechanisms through which entry to out-of-home care influences children’s academic achievement would also be valuable. Furthermore, research should be conducted using longitudinal data and matching techniques to more fully address questions regarding the causal impact of out-of-home care placement decisions for maltreated children. The linked dataset provides the opportunity for more in-depth exploration of the relationships between different aspects of children’s child protection history (including type and timing of events across childhood and more detailed examination of out-of-home care experiences). Such detail was beyond the scope of this study, however further research is planned.

Finally, linked-record population studies provide a means for monitoring changes in educational outcomes for maltreated children, and evaluating the effect of interventions. The Department for Child Protection and Family Support has fairly recently (2009) introduced Individualised Education Plans for all children in care of compulsory school age, in recognition of the need to address poor educational outcomes. There was insufficient data available after 2009 to evaluate their impact, however future research might be able to shed more light on the effectiveness of the Individualised Education Plans.

Implications for Policy and Practice

This study highlights the prevalence of low reading achievement among children in contact with the child protection system, who typically come from backgrounds of significant adversity and trauma. There is a need to continue to develop effective approaches to increase attendance, which promotes achievement amongst even these vulnerable groups of children.

There is also research support for educational interventions such as tutoring, provision of extra learning materials, individualised educational and psychological support and educational liaison (Forsman & Vinnerljung, 2012). As maltreatment can affect children’s achievement via socio-emotional delays as well as cognitive delays (Trocme & Caunce, 1995), a one-size-fits-all approach may not be ideal.

This research does not specifically assess the effectiveness of current policies and practices in Western Australia, however the findings are consistent with the need for roles such as the Department for Child Protection and Family Support Education Officers who specifically support the educational needs of children in care, and initiatives such as Individualised Education Plans to encourage a focus on the educational needs of children in care. Although children in out-of-home care may be doing better than expected given their extensive challenges, there is still a long way to go to achieve results comparable to the general population. Children with substantiated and unsubstantiated maltreatment allegations, and children with significant social disadvantage are also at high risk of poor educational achievement by Year 3 of schooling, and would also benefit from policies and services aimed at improving educational outcomes.

Conclusions

This study provides new insight into prevalence, risk and protective factors for low reading achievement with a focus on children involved in child protection. After controlling for an extensive range of background risk factors, we found maltreatment, including unsubstantiated and substantiated cases, and neglect, physical and sexual abuse were all associated with increased risk for low reading scores. Out-of-home care was associated with a small protective effect on Year 3 reading scores and much higher school attendance. These findings highlight the need for increased attention to the educational needs of child protection populations, and should be used to inform strategies to improve educational outcomes. Further research is needed to examine whether the same relationships between child protection history, school attendance and achievement exist among older children, and across subgroups of children with different out-of-home care experiences.

Please cite this article in press as: Maclean, M. J., et al. Pre-existing adversity, level of child protection involvement, and school attendance predict educational outcomes in a longitudinal study. Child Abuse & Neglect (2015), http://dx.doi.org/10.1016/j.chiabu.2015.10.026
Acknowledgement

We would also like to thank the Western Australian Data Linkage Branch for linking the data.

References


