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Brainwave Trust Aotearoa

**Behind the Headlines:
Early Childhood Education and
Care**

A Literature Review

Keryn O'Neill

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Scientific Advisory Group:

Dr Catherine Gilchrist, BSc(Hons), PhD
Dr Stephen Harris, MBChB, DCH
Lauren Porter, BA, MSW
Dr Simon Rowley, MBChB, FRACP
Dr Helen Vykopal, BSc, DClinPsych
Sue Wright, BSc, Exec MBA
Sue Younger, MCW(Hons), MA(Hons), DipProfEth, DipTchg

Additional Reviewers:

Graeme MacCormick, MA, LLB
Jean Rockel, MEd(Hons), Dip Ed, DipTchg(ECE), QSM
Ann Rowley, DipFA, BA, DipTchg(ECE), BEd(ECE), AdvDip(ECE)
Anthea Springford, BA, MBA (Dist.)

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Introduction

Use of Early Childhood Education and Care (ECEC) is increasing, both in New Zealand (NZ) and internationally. This is particularly so for the very young. But, to what effect?

As Belsky (2007) stated, "It no longer makes sense, if it ever did, to think in terms of the effects of child care per se . . . child care is a multifaceted phenomenon" (p. 8). The purpose of this review is to explore a number of these facets, and the complex relationships between them, in order to increase awareness of the way in which ECEC might affect children and their development.

We consider what is known about ECEC from a variety of disciplines within the available scientific knowledge, and the factors that might hinder or help the optimal development of children. This is imperative for informed decision making, both at the personal and policy levels.

Brainwave's Vision

A number of reviews of research around ECEC have been conducted in NZ in recent years, each from a different perspective. Given Brainwave's vision of ensuring all children in Aotearoa are valued and nurtured in order to reach their full potential, this literature review seeks to understand more fully the impacts of ECEC on children themselves.

The Story Behind the Headlines

It has been commented that where ECEC is concerned policy makers "have read the headline but skipped the story" (Leigh, 2007, cited by Buckingham, 2007, p. 9).

This review of the literature aims to tell the story.

The review begins by describing three prominent early intervention studies that have frequently been cited in the research literature (Chapter 1).

Next, research on the outcomes of ECEC in several different domains is described, including cognitive, behavioural and physical health outcomes. Literature regarding cortisol research and the impacts of ECEC on children's attachment status is also discussed (Chapter 2).

In keeping with the research on risk and protective factors, features of the children themselves and their interactions with ECEC experiences are described, particularly children who are considered vulnerable, typically through poverty. Other features of the children themselves that are considered include gender, and genes and temperament (Chapter 3).

Three aspects of the childcare experience itself are reviewed. These are the 'dose' or amount of care, the level of quality, and the stability of childcare a child receives. The implications of each of these factors for child outcomes are explored (Chapter 4).

The review concludes with a closer look at what is happening in NZ with regards to ECEC, including a number of facts and figures regarding participation and trends in usage. The outcomes of the Christchurch Health & Development Study, and the Competent Children project are described, and the influential ECE Taskforce Report is critiqued (Chapter 5).

Research Notes and Terminology

As this literature review may be read by people with wide-ranging backgrounds, these explanatory notes are intended to assist with an accurate interpretation of the review's findings, where needed.

- In line with current New Zealand usage, the term Early Childhood Education and Care (ECEC) is used to encompass any type of non-parental care used. This can range from individual care in a home by someone other than a parent (e.g. home-based caregiver, nanny, au pair) to centre-based care
- A variety of terms is used in the research for the various types of ECEC. Endeavours have been made to keep the language reflective of what specific research found and the variables that were studied. As a result, a variety of different terms are used throughout. Sometimes their use differs between countries. For example, in the United States (US) literature Kindergarten refers to the first year of formal schooling whereas in NZ it refers to traditionally part-day ECEC for 3- and 4-year olds, prior to commencing school. These terms and the differences between them are defined in the glossary.
- It is important to note that any findings described reflect group data, in that they compare outcomes between groups of children who have had differing experiences. Outcomes for individual children within each group may vary considerably
- The statistically significant findings reported indicate that differences between the groups are larger than would be expected to be found by chance. This does not necessarily indicate effects that are 'significant' in the everyday usage of the word i.e. that there are observable differences between two groups that would be obvious to anyone. This applies both to reports of potential benefits and risks associated with ECEC
- The available research in this area is almost entirely correlational in nature, permitting associations to be made between particular variables and children's outcomes. Associations do not imply a direct causal relationship and ought not to be interpreted as evidence of causality. It is possible that other unmeasured variables have also affected the outcomes studied
- It is important to consider the country in which the ECEC is occurring when drawing conclusions about its effects, due to differing regulations and practices between nations. This is especially relevant to NZ as the majority of research in this area has occurred elsewhere, limiting its ability to be generalised here
- Similarly, in different countries there may be differences in the demographics of those studied (e.g. ethnicity, socio-economic status), limiting the applicability of the results to a New Zealand context

- The research discussed includes a wide range of variables which can impact the outcomes. Examples include: the age at which a child starts ECEC, the amount of time spent in ECEC, the number of different arrangements a child attends, and the quality of the ECEC itself. These are explored later in the review, but their potential impact needs to be borne in mind throughout

NZ Background

“Family, friends and neighbours of parents have always cared informally for young children” (Pollock, 2012, p. 1). In the latter half of the nineteenth century crèches, as childcare centres were often known then, began to be established in NZ to care for children whose mothers were working. From the 1930s some city centres had drop-in crèches where children could be left while their mothers shopped (Pollock, 2012).

Kindergartens were set up to provide education for 3-5-year-old children on a part-day basis before beginning school, with some Government funding from 1904 (Pollock, 2012). Playcentre was established during World War II, as women played a leadership role with a collaborative perspective while men were at war. This organisation is unique to NZ with parents accessing training and fulfilling the educator role. In 1945 around 5% of 4-year-olds attended preschool education. This rose in the decades after the war “from 7% of three and four year olds in 1950, to 18% in 1960, and 35% in 1970” (Pollock, 2012, p. 4). The numbers attending childcare services were approximately half of those attending pre-school education services.

Social changes in the 1970s saw an increase in the number of women in the paid workforce, including an increase among the mothers of preschool children, which rose from 21% in 1976 to 32% in 1986. “Childcare was also seen as a women’s liberation issue” (Pollock, 2012, p. 5). Childcare centres were opened by some workplaces, including many tertiary institutions.

It was in the late 1970s that centres began to be established by large commercial providers, with Kindercare setting up in Auckland in 1978. Commercial provision experienced rapid growth. For example, ABC Learning Centres opened six centres in 2003 and this had increased to 127 centres by 2011 (Pollock, 2012). ABC is now one of the brands operating as part of BestStart, which has more than 250 centres across NZ and is licensed for 15,000 children (BestStart Education and Care Centres). Evolve Education Group, listed on the NZ Stock Exchange in December 2014, owns 94 centres as well as 91 home-based licences, catering for more than 13,000 children (Evolve Education Group, 2015).

Kōhanga reo were established in the 1980s “as a uniquely Māori response to the likelihood that the Māori language would be lost to future generations unless something was done to preserve it” (Dalli et al., 2011, p. 28). By 1990 there were 618 established throughout the country (Kaga, Bennett, & Moss, 2010). Pacific Island early childhood centres also began to be established in the 1970s and 1980s (Pollock, 2012; Taouma, Wendt-Samu, Podmore, Tapusoa, & Moananu, 2003).

In the 1980s policy issues included inequitable funding and resources in different parts of the early childhood education sector, which ultimately resulted in the administration of childcare being transferred from the Department of Social Welfare to the Department of Education in 1989 (Meade & Podmore, 2002, cited by Dalli et al., 2011). Consequently childcare and early childhood education services became integrated for the first time and operated under one regulatory framework (Pollock, 2012).

“NZ was one of the first countries in the world to develop a national early childhood education curriculum” (Kaga et al., 2010, p. 83) with the implementation of Te Whāriki in 1996 (Te One, 2013). Te Whāriki aimed for children “to grow up as competent and confident learners, healthy in mind body and spirit, secure in their sense of belonging and in the knowledge that they make a valued contribution to society” (Ministry of Education, 1996, p. 4).

Over this time increasing numbers of children began attending early childhood education services. In 1989 approximately 90% of 4 year-olds, and 61% of 3 year-olds attended ECE. Within a decade this had risen to nearly all 4-year-olds and more than 80% of 3-year-olds, with childcare centres being the dominant provider (Meade, 2000, cited by Kaga et al., 2010). Rates of participation have continued to increase, encouraged by the 2002 strategic plan, free attendance for 3- and 4-year-olds from 2007, and increasing numbers of women in the paid workforce (Kaga et al., 2010).

“The presence of infants and toddlers in formal early educational contexts is a relatively recent phenomenon” (Dalli et al., 2011, p. 25). Consequently there is much less research available looking at care quality for this age group, compared with that regarding 3- and 4-year-olds (Dalli et al., 2011).

During this period as researchers and other advocates lobbied for policy improvements to regulations and funding arrangements, and policy makers sought to build evidence-based arguments for change, the scarcity of NZ early childhood research necessitated a heavy reliance on research findings from outside the country. (Dalli et al., 2011, p. 28)

Three particularly influential examples of overseas research that have been relied upon are the focus of Chapter One.

Executive Summary

Introduction

Brainwave Trust Aotearoa was established in 1998 to share research regarding the impact of early experiences on children's development and subsequent outcomes. The Trust wishes to see all New Zealand children nurtured so they can reach their potential. To do this, Brainwave reviews and collates international research, from multiple academic disciplines, which is then shared with those whose decisions impact the lives of children.

A frequently asked question has been: "How does attending childcare affect children's development?" Brainwave's desire to answer this question accurately led to undertaking a literature review regarding the effects of Early Childhood Education and Care (ECEC) on children. A substantial review of the literature was followed by consultation with experts and approval by the Brainwave Scientific Advisory Group.

Early Intervention Studies

The frequently repeated reports of lasting benefits regarding education, employment, reduced crime, and associated economic benefits, are not attributable to typically available ECEC, or even high quality ECEC. They are attributable to multi-faceted early interventions for at-risk children that included parenting intervention and health services, in addition to very high quality ECEC, for children largely aged 3-4 years, usually for 12–15 hours per week.

As these targeted early interventions bear little resemblance to ECEC available in NZ, similar outcomes cannot be expected here. What these results really indicate is this: When at-risk children access a much higher quality of childcare than what is typically available in their community, and their families have comprehensive additional support, then they are likely to have improved outcomes.

Outcomes of Early Childhood Education

In terms of cognitive or academic outcomes the review found that any beneficial effects of ECEC are largely seen as a result of high-quality ECEC received during the preschool years, i.e. at 3-4 years of age, rather than at younger ages.

Much of the available research compares a specific early childhood education programme to a variety of typically available childcare, therefore does not illustrate the effects of ECEC per se, nor ECEC compared with parental care, but rather the effects of higher quality care over lesser quality care.

The review found that in some contexts childcare attendance has been associated with adverse effects on children's behaviour that may persist until adolescence. However, this depends upon a number of factors. This risk is heightened when ECEC attendance occurs at young ages, before 3 years and particularly before 1 year. These findings are

of concern given the large proportion of children who may be affected, and the social and financial implications of this.

Research looking at children's cortisol (a stress hormone) production indicates that cortisol patterns differ on days that children attend childcare, compared to days they are cared for by parents. These effects are more likely when attending full-day as opposed to part-day childcare.

A number of adverse physical health outcomes have been associated with childcare attendance. These include - increased rates of respiratory, digestive and general illnesses; increased rate of anti-biotic treatments; and, a greater likelihood of overweight/obesity in later childhood. The younger the child, the greater the adverse health effects are likely to be. There appears to be a dose-response effect, with those attending more hours of childcare at increased likelihood of more frequent illnesses than those attending for fewer hours.

The studies reviewed found an increased likelihood of insecure attachment associated with childcare attendance. This risk appeared greatest for infants attending childcare in their first year of life, for those attending full-time rather than part-time childcare, and when occurring alongside other risks, such as poor quality childcare.

There are many factors that can influence a child's development, one of which is ECEC. Research indicates that generally:

Children can benefit from ECEC when:

- They are around 3 - 4 years of age
- They attend part-time
- The care is high quality and stable

There can be risks associated with ECEC:

- When children are younger than 3 years, particularly younger than 1 year
- With increasing amount of time spent in ECEC
- When ECEC is poor quality and/or unstable

Vulnerable Children

Despite claims to the contrary, this review did not find strong support for the efficacy of ECEC in improving outcomes for vulnerable children.

- There are some indications that vulnerable children are more likely to benefit from ECEC that is of high quality, than their more advantaged peers
- However, the quality of childcare available to vulnerable children is often poorer than that available to more advantaged children
- Any benefits typically relate to 3-4-year-olds, rather than younger children, and there is little evidence to indicate the positive effects are long-lasting
- Children attending poor quality childcare, and coming from environments of increased risk, are particularly likely to be adversely impacted

To be truly effective, efforts to improve outcomes for vulnerable children should consider a range of proven intervention options, including directly supporting parents in their home.

Dose-Response Effect

As with most factors impacting child development, the amount of exposure, sometimes referred to as 'dose' is an important variable. With regard to childcare, there is huge variability in the amount of care children attend, ranging from 0 to 10,000 hours over the years from birth to school. Before the age of about 3 years, research indicates there is no threshold but a linear dose-response relationship, with increasing amount of childcare associated with increased rates of behavioural difficulties.

Quality of Early Childhood Education and Care

Higher quality childcare may minimise the risks associated with ECEC but does not necessarily remove them. The literature review indicates that young children in excellent childcare are likely to have better outcomes than those in poor childcare. However, this does not mean ECEC is superior to parental care. Much of the research literature involves comparisons being made between higher quality and lower quality childcare. Few studies compare the effects of ECEC with parental care, making it very difficult to draw conclusions about the effects of ECEC per se.

If children are to attend ECEC, clearly this should be of very high quality. This does not mean that high quality childcare is beneficial for all children, just that it is far preferable to poor quality childcare.

Stability of Childcare

For children attending childcare, those with stable care are likely to do better than those experiencing changes in their care. However, amongst children attending childcare, multiple arrangements and instability of care are common. Children attending multiple concurrent arrangements, or those whose childcare arrangements change, are more likely to have adverse outcomes. These include poorer physical health and wellbeing, and social or behavioural difficulties. Instability as a result of staff changes is more common in for-profit services, which make up the bulk of childcare provision in NZ.

Conclusions

What happens in the life of a young child can either help or hinder their healthy brain development and subsequent outcomes in many areas. Prior research reviewed by Brainwave indicates that consistently responsive and loving care by parents, which is particularly important during a child's first few years of life, increases the likelihood of healthy brain development.

- While there can be benefits for children attending high quality early childhood education from around 3 years of age, there are risks associated with children under the age of 3 years attending. These risks increase the younger the child is, and particularly for babies under 1 year of age
- If children are receiving non-parental care there are several important variables that can influence its impact. These include - the child's age, the amount of time in childcare, and the quality and stability of that care
- For children attending ECEC, this is but one influence on their lives and development. Outcomes will be influenced by multiple factors, both within the child themselves, and their experiences
- Most children are likely to benefit if non-parental care is delayed until approximately 3 years of age

Chapter 1: Early Intervention Studies

Much of the writing about the benefits of ECEC draws upon a small number of what are in fact early intervention studies, which have ECEC as one component. An early intervention is a programme developed and implemented in order to address specific risk factors facing a subset of the population who are at increased risk of poor outcomes. As the following sections will illustrate, these studies had specific goals and additional components very different from typically available ECEC, in NZ or elsewhere.

The literature tends to focus on three particularly influential examples of these, which are described here: (1) the Perry Preschool project, (2) Chicago Child-Parent Centres, and (3) the Carolina Abecedarian Project (Joo, 2010). Each of these will be described separately, followed by general conclusions about their relevance.

1.1 High Scope/Perry Preschool Project

One of the most publicised early intervention studies is The High Scope/Perry Preschool project (Anderson, 2008; Campbell, Pungello, Ramey, Miller-Johnson, & Burchinal, 2001) which, as others have previously noted, has been frequently misinterpreted to advocate for extending centre-based early childhood education (ECE) (Fergusson, Boden, & Hayne, 2011; Fergusson, Horwood, Grant, & Ridder, 2005; Zigler & Styfco, 1994). This misinterpretation has been attributed to all pre-school programmes being “lumped into the same category” regardless of whether they were childcare services for employed parents or preventive interventions (Zigler & Styfco, 1994, p. 270).

The Perry Preschool Study

This “flagship intervention” (Heckman & Masterov, 2004, p. 28) began in Ypsilanti, Michigan in 1962 in the area of the Perry Elementary School (Heckman, Pinto, & Savelyev, 2013) and included a total of 123 African American children from low income families, who were randomly assigned to intervention (n=58) or control groups (n=65) (Zigler & Styfco, 1994).

The programme’s goal was to improve the academic achievement of children deemed at risk (Zigler & Styfco, 1994). Approximately 47% of children did not have their fathers living with them at the age of 3 years (Heckman et al., 2013). IQ test scores of the children ranged from 85-70, in other words they ranged from low average to borderline levels of intelligence. The children were studied in five ‘waves’ with the first group beginning when they were four, and subsequent groups beginning at 3 years of age (Schweinhart, Berrueta-Clement, Barnett, Epstein, & Weikart, 1985).

The intervention consisted of:

- Three- and four-year-old children attending 2.5 hours of high-quality centre-based instruction on weekday mornings, (total of 12.5 hours per week) for 8 months of the year (Clarke & Campbell, 1998; Zigler & Styfco, 1994)
- A weekly teacher home visit of 1.5 hours duration. The focus of the home visit was on the child and the parent-child relationship in particular, supporting the

mother to implement the child's educational curriculum in the home (Schweinhart & Weikart, 1993, cited by Zigler & Styfco, 1994)

- Monthly parent group meetings

Teachers at the centre had child development training, all had Masters' degrees (Schweinhart et al., 2005, cited by Muennig, Schweinhart, Montie, & Neidell, 2009) and they were paid 10% above the standard pay scale of the time (Zigler & Styfco, 1994). Teachers received high levels of supervision and ongoing training (Schweinhart et al., 1985). There were five or six children in each class (Anderson, 2008).

Results

One of the strengths of this research was its longitudinal follow-up of participants, yearly until 11 years, with further follow-up in the teen years and again in adulthood (Zigler & Styfco, 1994), and there certainly were many positive outcomes. The retention rate was high, with more than 91% of child participants included in the final results at 40 years of age (Heckman, Pinto, Shaikh, & Yavitz, 2011). It should be noted that the longitudinal results are based upon outcomes for 58 children who remained in the intervention group in comparison to those in the control group (Schweinhart et al., 1985; Zigler & Styfco, 1994).

Compared with the control children, those receiving the intervention were significantly less likely to subsequently:

- have teacher reports of personal or school misconduct (Schweinhart et al, 1993, cited by Clarke & Campbell, 1998)
- have been arrested or be reliant on welfare payments (Schweinhart et al., 1993, cited by Campbell et al., 2001; Clarke & Campbell, 1998; Temple & Reynolds, 2007; Weikart, 1998)
- have a teenage pregnancy (Schweinhart et al., 1985)

and more likely to:

- have stable families, higher earnings, complete more formal education, and have better health (Muennig et al., 2009; Weikart, 1998)
- own their own home, and be employed

Financial analyses indicated that this investment made in early childhood had a major financial return to society (Weikart, 1998). It is the Perry Preschool study which "is responsible for the oft-repeated claim of a seven-fold return on investment in early childhood care programmes" (Buckingham, 2007, p. 5). Such claims often neglect to mention the differences between the components of this *early intervention*, of which high quality ECEC was a part, and typically available *early childhood education*.

Of note is the finding that there was no increased benefit for children who attended the programme for two years compared to those attending for one year, in either the short- or long-term (Schweinhart & Weikart, 1988, cited by Reynolds, 1995).

Methodological Considerations

The "small experiment" that was Perry Preschool completed its last class over 45 years ago (Zigler & Styfco, 1994, p. 269). Whilst the long-term follow-up is very informative, this ought not to be confused with an intervention that is still in existence today.

In an area of research where randomisation is difficult this appears to lend weight to the Perry findings. However, several issues with regard to the randomisation of participants have been raised. Initial random assignment on the basis of IQ assessed by the Stanford-Binet was undertaken (Zigler & Weikart, 1993). Following this some changing between groups occurred to provide a gender balance, equality on the Cultural Deprivation scale and similar percentages of employed mothers (Weikart et al., 1978, & Weikart et al., 1970, cited by Spitz, 1993). As the intervention continued any younger siblings were allocated to the same condition as their older sibling, and some children moved between conditions because of the inconvenience for employed mothers of a half-day programme. Such changes to the randomisation process resulted in more employed mothers in the control group (31%) than in the experimental group (8%) (Zigler & Weikart, 1993). It is possible that due to these randomisation issues, there were other unmeasured differences between the two groups that may have influenced their outcomes.

Perry Preschool Conclusions

A specific group of at-risk African American children, aged 3–4 years, who received weekly family education and support, and high quality ECEC, including small groups and highly trained teachers, for 12.5 hours per week, for eight months of the year, were more likely to have multiple positive outcomes throughout childhood and into adulthood.

The above paragraph needs to be understood in its entirety and no single component can be used in isolation whilst claiming to be informed by the research. This bears little resemblance to ECEC provided in NZ currently.

It is important to note that this was a very small study based on a group of children at high risk for poor outcomes and implemented several decades ago. Therefore the results cannot be generalised to the population at large. Critically, nor can similar outcomes be assumed from implementing only some components of the intervention, namely the ECEC component, whilst failing to implement the family support component.

1.2 Chicago Child-Parent Centres

Another early intervention study often cited is the Chicago Child-Parent Centre programme (CPC), which began in 1967 (Mersky, Topitzes, & Reynolds, 2011). Using a quasi-experimental design, researchers studied the effects of an intervention on more than 1500 (intervention n=989; control n=550) children from families with a low income, of whom 93% were African American (Reynolds & Ou, 2011; Temple & Reynolds, 2007). There were 24 centres located in poor areas of Chicago (Reynolds & Ou, 2011; Temple & Reynolds, 2007). It is important to note that due to the cultural makeup of the group, findings are not necessarily applicable across different cultural groups.

Parents could voluntarily enrol their child for 1 or 2 years, or not at all (Reynolds, 1995). It is likely that this introduced some selection bias to the results.

The intervention included;

- An early education programme for children from 3 to 9 years of age (Reynolds & Ou, 2011; Reynolds, Temple, Ou, Arteaga, & White, 2011)
- The preschool programme was provided to 3- and 4-year-olds for 3 hours per day, 5 days a week (i.e. 15 hours per week), throughout the school year (Reynolds & Ou, 2011)
 - Teachers were all qualified with Bachelor's degrees and certified in early childhood education
 - Classes were relatively small, with 17 children in preschool and 25 children in subsequent years (Reynolds et al., 2011).
 - There was a focus on language, literacy and numeracy development (Mersky et al., 2011)
- Family support, including;
 - Parent education, home visiting, participation in centre events and trips, furthering parent's own educational achievement, and volunteering in the classroom
 - An expectation that parents participate in a variety of activities for at least half a day each week (Mersky et al., 2011; Reynolds, 1995; Reynolds & Ou, 2011)
 - At least one visit from a school-community liaison who continued to support families as needed (Reynolds, 2000, cited by Mersky et al., 2011)
- Health services, including:
 - nutrition, screening and diagnostic services
 - referrals by nurses
 - and meal services (Reynolds & Ou, 2011)

The family support and health services provided in this intervention are not usually features of ECEC in NZ and therefore similar results cannot be assumed in their absence.

Results

Follow-up at an average age of 24.5 years indicated that those who had attended CPC as children were more likely to have higher academic achievement, higher socioeconomic status (SES), lower rates of substance abuse, and less involvement with the justice system than children who attended other early education (Reynolds & Ou, 2011; Reynolds et al., 2011). Juvenile justice involvement was reduced by 33% at 18 years (Temple & Reynolds, 2007). There were lower rates of adult depressive symptoms reported in the preceding month (Reynolds & Ou, 2011). Outcomes were compared with 550 children from other early childhood programmes (Reynolds & Ou, 2011).

These children were also significantly less likely to experience maltreatment, including neglect, than control children who attended other programmes. This has been attributed to the increased parental involvement (Mersky et al., 2011). It is also possible that parents who are likely to neglect their children are less likely to sign up for and continue involvement with these intensive programmes.

Those who attended the programme for two years had higher cognitive readiness scores, including vocabulary, language, maths and listening skills, than those attending for one

year, although this advantage did not continue through the school years (Reynolds, 1995). Boys and children from families experiencing higher risk gained the greatest benefits (Reynolds et al., 2011). Despite the improvements associated with CPC participation, achievement test scores remained well below the national average (Reynolds, 1995).

It should be noted that whilst results reported here reached statistical significance they do not necessarily reflect large effects. For instance, whereas 79.5% of the CPC children completed high school by the age of 21 years, so too did 71.4% of the comparison group. In terms of rates of felony arrest these were 9.9%(CPC) and 14.5%(comparison group)(Reynolds & Ou, 2011).

Mechanisms

An analysis of mediating mechanisms was conducted, with particular reference to the reduction of maltreatment, including neglect. It found that “family support processes made the most substantial contribution to our mediation models, underscoring that prevention programs are typically more effective when they promote positive relationships” (Mersky et al., 2011, p. 1461). In other words, it was not the ECEC component which had the greater impact.

In terms of the positive outcomes on wellbeing in general, “the provision of comprehensive services is more likely to broaden paths of influence necessary for sustained effects” (Reynolds & Ou, 2011, p. 577).

Chicago Child-Parent Centre Conclusions

A specific group of at-risk African American children, who received part-time early education from three years, family support and health services, and ongoing support and parental involvement until 9 years of age, were more likely to have positive outcomes in adulthood across multiple areas than children who attended typically available early childhood education.

The positive outcomes from CPC participation should be interpreted in light of the self-selection that occurred. It is likely that differences between families who chose to participate in the intervention also contribute to improved child outcomes, compared with children whose parents chose not to participate. Whilst attempts were made to address selection bias, this predominantly looked at demographic features, (e.g. SES, parent education) and not features of parenting, with the exception of parental expectations of educational achievement for their child.

As the researchers point out, their findings indicate “the added value of a comprehensive programme relative to typical early childhood services” (Reynolds & Ou, 2011, p. 563). Consequently, these results do not inform us regarding the merits or otherwise of ECEC compared with parental care, and cannot be interpreted as evidence of the benefits of typically available ECEC.

1.3 Carolina Abecedarian Project

Unlike most other preschool centre-based interventions, the Abecedarian project (ABC) provided full-day year round intervention for a small number of children from 6–12 weeks of age until five years of age. Of 111 infants 57 were randomly assigned to the intervention and 54 to the control group. Socioeconomic factors across both groups were comparable (Campbell et al., 2001; Campbell et al., 2008; Martin, Ramey, & Ramey, 1990).

Participating children scored within the average range on the Mental Development Index of the Bayley Scales of Infant Development at 3 months (Bayley, 1969, cited by Campbell et al., 2001), indicating normal physical and cognitive development for their age. They were healthy children from socioeconomically disadvantaged families facing multiple risks (Clarke & Campbell, 1998; Ramey et al., 2000). Mothers of children in this study had a mean IQ of 85, which is in the low average range, and attained an average educational level of approximately 10th Grade (Ramey et al., 2000). This is equivalent to Year 11 in NZ. Children were almost entirely from African American families (98%), with over three-quarters coming from single parent or multigenerational households (Martin et al., 1990; Ramey et al., 2000). They were born between 1972 and 1977 (Clarke & Campbell, 1998). The ABC project's specific purpose was to improve intellectual ability in children identified as being at risk of developing lower intelligence, through the provision of early childhood education, family support and paediatric healthcare from early infancy at least until children have begun school (Martin et al., 1990; Ramey et al., 2000; Ramey & Ramey, 1994).

Features of the centres included teacher:child ratios of 1:3 for infants and 1:6 for 5-year-olds, extensive professional development for teachers, and low staff turnover. Staff had diverse backgrounds with some having university qualifications while others were experienced caregivers from a similar background to the children (Campbell et al., 2001). "Health care, good nutrition and family support services were an integral part of the program" (Ramey et al., 2000, p. 4), but it did not include services in the home (Clarke & Campbell, 1998).

Results

Attending ABC was associated with lower rates of special education provision and lower likelihood of repeating a year of schooling, with benefits in academic and intellectual development still evident at 15 years of age (Clarke & Campbell, 1998; Ramey et al., 2000; Temple & Reynolds, 2007). At 21 years, those who had been part of the intervention group were less likely to have been teen parents, more likely to attend college, had more skilled jobs, and scored more highly on academic and cognitive tests (Campbell et al., 2008). Another benefit was a reduced likelihood to report symptoms of depression in young adulthood (McLaughlin, Campbell, Pungello, & Skinner, 2007). Recent results, obtained when participants were in their mid-30s, indicate that those in the treatment group were less likely to have risk factors for cardiovascular and metabolic diseases (Campbell et al., 2014).

Not all differences were in the positive direction. In the first few years at school, children from the treatment group had higher teacher ratings of aggressive behaviour than the

control children, although this difference lessened over three years at school (Haskins, 1985). The aggression levels of children in the experimental group were higher than those of other children attending almost as much childcare in the control group.

No statistically significant differences were found regarding any measures of juvenile or adult crime rates (Clarke & Campbell, 1998; Temple & Reynolds, 2007). However, it is worth noting that whilst it did not reach levels of significance, the trend was towards higher rates of crime amongst those who had attended the preschool intervention on measures including percentage receiving any criminal charge, violent charges, and drug or property charges (Clarke & Campbell, 1998).

Methodological Issues

Whilst the Abecedarian Project did have a number of positive outcomes, there are several features of this intervention that require clarification, as they are seldom mentioned in other reviews.

The first issue is that of the sample size. Initially, 57 children were randomly assigned to the centre-based intervention (Campbell et al., 2008; Ramey et al., 2000) of whom 48 remained in the study 8 years later (Ramey et al., 2000). As others have occasionally pointed out, it is important that interpretation of these results take into consideration the small sample size (McLaughlin et al., 2007). In addition to this, at Kindergarten entry the experimental and control groups were further randomised with half of each original group also receiving three years of educational intervention during their early schooling years. Consequently, the number of children who received only the preschool intervention, was very small, numbering 24 participants (Clarke & Campbell, 1998).

The second issue concerns the nature of care received by the control group. Despite many reviews citing Abecedarian results as one rationale for expanding ECEC to more children, this is a very large leap on the basis of the evidence. The control group attended a variety of other care arrangements over their early years, some from infancy, and others beginning in their preschool years, depending upon the individual decisions and circumstances of their families (Campbell et al., 2008). Of the control children all but 4 experienced some daycare with several attending for 30 months or more (Haskins, 1985). "Thus the comparison presented here is between children who received consistent, high-quality early educational intervention and children who experienced a variety of early care environments, including parental care and/or other childcare facilities typically used by low-income families in the community" (Campbell et al., 2001, p. 233).

Finally, as the researchers themselves point out "the bundled nature of the treatment does not provide the necessary independent variation in the components of the intervention that would allow us to examine the sources of treatment effects" (Campbell et al., 2014, p. 1484).

It cannot be assumed that any results from this intervention are able to be generalised to those of a different culture.

Abecedarian Conclusions

A very small number of African American children received high quality intensive intervention, including early childhood education along with family support and other health services in the 1970s. This was associated with some positive outcomes, largely in terms of cognitive and academic achievement, which were still evident in early adulthood.

Not all outcomes were positive, notably children's behaviour, and this combined with the methodological issues raised means these findings cannot be interpreted as a global endorsement of the benefits of ECEC.

This was a multi-faceted intervention which bears little resemblance to the ECEC provided in NZ.

Early Intervention Conclusions

These early childhood interventions reported long term benefits for children in terms of:

- health
- cognitive development, and
- school achievement (Reynolds et al., 2007, cited by Randall, 2010)

However, despite the reported positive and often lasting outcomes there are a number of reasons why much more care is needed in applying these findings, and particularly before extrapolating them to all available ECEC.

Factors to be considered include:

- These studies were all early interventions specifically designed to address vulnerabilities
- All were comprised of multiple components, including parent support, health services, of which ECEC was but one
- The population was predominantly African American, limiting the ability to generalise findings to other populations
- Children were all from backgrounds of heightened risk including poverty, and single parent families
- The ECEC component was of higher quality than typically available care, including teacher pay, teacher qualifications, teacher:child ratios, smaller groups
- For the majority of children (in PP and CPC), the ECEC component was part-time (2.5 - 3 hours per day), for the school year
- The majority of children attended when they were 3- 4-years-old (PP and CPC)
- The nature of the control groups, which often (CPC and ABC) involved attendance at typically available ECEC
- The experimental samples have been very small (especially PP and ABC) yet the results have been generalised widely (Anderson, 2008)
- Effect sizes for the early interventions are substantially larger than what is found in typically available childcare (Hungerford & Cox, 2006)

Understanding these early intervention studies and how they differ from more typically available childcare is vital to a thorough understanding of the ECEC literature generally.

These studies have been repeatedly used to indicate that childcare alone is beneficial for children, and the source of data is not often readily apparent in reviews. For example, the highly regarded Cochrane review incorporated results from these comprehensive interventions in their review of daycare, prompting the following comment from their reviewer - "The ambiguous use of the term 'daycare' . . . results in the conclusion that it is 'daycare' to which the results of the review are attributable, rather than the combined programmes to which they are actually attributable"(Zoritch, Roberts, & Oakley, 2000, p. 27).

A more accurate interpretation of these studies would read as follows. Some early interventions for at-risk African American children that involve multiple components such as family support, health intervention and high-quality ECE, usually beginning at 3 years of age, typically for 2.5 – 3 hours per day, have been associated with improved outcomes in areas such as education and health.

In the words of Nobel Laureate and economist, James Heckman:

An accumulating body of evidence suggests that early childhood interventions are much more effective than remedies that attempt to compensate for early neglect later in life. Enriched pre-kindergarten programs available to disadvantaged children on a voluntary basis, coupled with home visitation programs, have a strong track record of promoting achievement for disadvantaged children, improving their labor market outcomes and reducing involvement with crime. (Heckman & Masterov, 2004, p. 1)

The various components of these early interventions bear little resemblance to ECEC available in NZ. The following comment of Farquhar (2008) sums it up eloquently: "To include what is known about the outcomes for economically disadvantaged children in exceptional experimental programmes often for research purposes as meaningful for other children in other contexts is a daft thing to do" (p. 7).

Chapter 2: Outcomes of ECEC

2.1 Cognitive & Academic Achievement Outcomes

A rationale often used to support extending access to ECEC is the purported benefit to children's cognitive development and academic achievement. This section reviews some of the evidence in relation to these outcomes.

Benefits

Burger (2010) conducted a systematic review to establish the effects of ECEC on cognitive outcomes. This review was particularly concerned with larger-scale projects ($n > 300$) in a real world setting, as opposed to the model early intervention programmes described earlier (Chapter 1). The review indicated that "the associations between preschool attendance and cognitive outcomes or educational attainment were mostly positive in 22 out of 32 studies" (Burger, 2010, p. 157). Some studies found no effects, and several had mixed effects. They concluded that the majority of ECEC programmes studied had considerable positive short-term and smaller long-term effects on cognitive development, with some indications that less advantaged children might benefit slightly more, although not enough to catch up to their more advantaged peers. The vast majority of the studies reviewed were of children aged between 3 and 5 years, limiting the relevance of these results to this age group. For some of the studies, factors affecting children's attendance are not known, therefore differing outcomes cannot necessarily be attributed to the influence of preschool alone (Burger, 2010).

More recently, a meta-analysis of 49 studies conducted by the Washington State Institute for Public Policy consistently found short and long term benefits for 3 & 4 year olds from low income families (Kay & Pennucci, 2014).

Camilli and colleagues (2010) conducted a meta-analysis of 123 US studies on centre-based care for at least ten hours per week. They concluded that there were significant effects for children's cognitive outcomes from attending preschool prior to entering (US) Kindergarten. However, their analysis included model early intervention programmes, including Perry Preschool, the Abecedarian Program, and the Chicago CPC, so it is likely these effect sizes have inflated the beneficial results beyond what is seen in more typically available ECEC (Camilli et al., 2010).

A study of more than 10,000 children from the US-based Early Childhood Longitudinal Study, Kindergarten Cohort (ECLS-K) found pre-Kindergarten (pre-K) attendance was strongly associated with improved reading and maths skills, with larger benefits for disadvantaged children. Few lasting effects were seen for more advantaged children by first grade (Magnuson, Ruhm, & Waldfogel, 2007). The outcomes for children attending pre-K are compared with children who attended other centre-based care, Head Start, and other non-parental care. Therefore these results indicate the effects of one type of early education over others. They do not indicate benefits of pre-K over parental care, as children in parental care alone were not studied.

A Canadian cohort of approximately 1800 infants was studied until 7 years of age. For children whose mothers had higher levels of education (in this study, a high school

diploma or more) childcare participation was not associated with improved cognitive outcomes. However, for those with less educated mothers, children attending childcare benefited in terms of school readiness, receptive vocabulary, and reading scores (Geoffroy et al., 2010). The study methodology, which summed the number of hours in different forms of care at several time points (from 5 months to 4 years), does not enable conclusions to be drawn about the age at which this attendance was beneficial, or otherwise.

Caveats

Whilst at a superficial level attending ECEC appears to be of benefit to cognitive development in children, there are a number of reasons to be cautious in interpreting the evidence. In the first instance, many of the neuropsychological tests for children at this age test language only. This is only one domain of ability that falls under the umbrella of 'cognition'. Cognition also refers to attention, memory, executive functioning (planning, decision making, social skills, and impulse control) and processing speed. So whilst there appears to be a benefit in one domain we do not know if there are any benefits, or detriments in other areas, nor the overall effect of attending ECEC on intellectual ability.

It also important to be clear about the nature of the positive effects found in these studies. In many of the studies it is stated that there is a statistically greater performance on tests by children who are attending ECEC. However, statistical significance does not necessarily mean that the difference in the children's performance on the tests would result in a difference in performance that would be observable and noticeable to a parent or teacher.

In interpreting the evidence one must also consider how it was collected. A variety of methods has been employed to assess children and careful consideration should be given to the methodology. For instance, some studies have used assessment tools which have been through a rigorous process to ensure their reliability and validity. In other instances the evidence has relied on teacher assessment which is vulnerable to a wide variety of influences other than the child's cognitive ability.

It is also important to note that clinical and educational psychologists who undertake assessment of intellectual ability rarely make conclusions about a child's ability until they are much older (at least 6 or 7 years) as it is well recognised that children's development at such a young age is in a state of flux. Assessment at this age rarely predicts long term ability (H. Vykopal, personal communication, November 23, 2014).

Risk

Not all research finds evidence of cognitive benefits from ECEC. A National Institute of Child Health and Human Development (NICHD) study (n=1300) found academic achievement at 5 years “was negatively related to child care centre hours in infancy” (NICHD ECRN, 2004, cited by Canadian Paediatric Society, 2008, p. 865).

Major changes in US welfare laws in the 1990s changed work incentives for single mothers and led to greatly increased maternal employment and childcare use. The effects of this were studied on 3-6 year old children of single mothers. It was found that “the effect of childcare on children’s achievement is negative, significant and rather sizeable” (Bernal & Keane, 2011, p. 504). They report that one year of fulltime childcare reduced children’s cognitive scores by approximately 2.1%. It should be noted that formal centre-based care did not have this adverse effect on cognitive outcomes, with no significant effect found on achievement outcomes. ECEC had a greater negative impact on cognitive outcomes for girls compared with boys, and for children whose mothers were more educated (Bernal & Keane, 2011). A difference of this size is unlikely to be clinically significant.

Complexities

It has been suggested that children who experience disadvantage may reap the greatest academic benefits from ECEC because of the reduced likelihood that their home environments will support their early learning (Bradley et al., 2001, cited by Magnuson et al., 2007).

In one study, children in both half-day and full-day ECEC experienced benefits. However in some areas, including spelling and letter-word identification, positive effects were greater for those in half-day care than those attending for the full-day. Selection factors, including race, may influence these findings, with more White US children enrolling in half-day pre-K and more African Americans attending full-day pre-K (Gormley, Gayer, Phillips, & Dawson, 2005).

Different countries report different effects on academic achievement for children attending pre-primary education (Organisation for Economic Co-operation and Development, 2011). Results from the Programme for International Student Assessment (PISA) indicate that 15-year-olds who had attended pre-primary education for more than one year generally performed better in reading than those who had not. However, this was not the case in some countries (e.g. Estonia, Finland, Korea and the US) when students from similar backgrounds were compared, there was “little or no relationship to later performance”(Organisation for Economic Co-operation and Development, 2011, p. 1). These findings looked at the differences associated with pre-primary education after accounting for SES, but do not include other selection factors. It is important to note this reflects the effects of care in the year or so prior to school entry and not the effects of ECEC in infancy or toddlerhood.

Age and Hours of Attendance

Loeb and colleagues (2007) found that children in centre-based childcare showed the greatest cognitive benefits (in reading and maths) as they entered Kindergarten if that care began between the ages of two and three years. There was no benefit to children who began earlier than this. In fact their average achievement was lower. Children from high-income families showed gains when they attended for 15-30 hours per week, with no further cognitive gains with additional hours attended, but “substantially greater behavioural problems associated with additional hours” (Loeb et al., 2007, p. 65).

Entering at age 3-years provides longer exposure to benefits of centre care, than does entering at the age of 4-years. These benefits to aspects of cognitive ability, specifically pre-reading, mathematical skills, and school readiness, were seen when children attended for between 15-23 hours per week (Bridges, Fuller, Rumberger, & Tran, 2004). Another NICHD study (2000) looked at over 500 children from birth to 3 years. When comparing children in fulltime maternal care (defined here as 10 or fewer hours per week of non-maternal care) to those in childcare, their achievement scores were largely similar. There were two exceptions to this. First, children in medium and high quality care outperformed those in maternal care in their 2 year language scores; secondly, those in maternal care performed better than children in low quality care on measures of verbal comprehension at 3 years. The amount of time children spent in childcare had no consistent relationship with cognitive or language outcomes (National Institute of Child Health and Human Development Early Child Care Research Network, 2000). For children in care, quality was a consistent, albeit modest, predictor of language and cognitive development. The aspects considered as quality here included supportive and verbally stimulating caregiver-child interactions.

In further research from the NICHD the most significantly positive associations between centre-based care and cognitive outcomes occurred for children who were 3 or 4-years-old. By contrast, centre-based care at earlier ages did not have consistently significant associations with cognitive or achievement outcomes (NICHD Early Child Care Research Network & Duncan, 2003).

Significance and Duration of Effects

Research on the effects of childcare on cognitive functioning needs to consider the effects of family selection, because as many have pointed out, the type and quality of childcare a child experiences is related to family and demographic features that themselves predict child outcomes. For instance, children who attend centre-based childcare are more likely to come from families with greater income and higher levels of maternal education as well as having mothers who are more responsive, provide a stimulating home environment and have a larger vocabulary, than those attending other forms of care (Bridges et al., 2004; NICHD Early Child Care Research Network & Duncan, 2003).

To place the potential effects of ECEC in context, parenting quality is considered to be a “far stronger and more consistent predictor of tested achievement” than ECEC experience (Belsky, Vandell, et al., 2007, p. 696).

A number of studies have found that cognitively stimulating centre-based childcare from the age of 3-years can improve academic achievement at school entry, although these effects tend to fade over the first year or two of school, with longer term gains diminished relative to short term gains (Burger, 2010; Kay & Pennucci, 2014; Magnuson et al., 2007). As much as 70-80% of these initial gains are lost by partway through first grade (Magnuson et al., 2007). A NZ literature review, commissioned by the Ministry of Education, also reported that the effects on cognitive development declined after leaving ECEC and noted that “these effects are eventually lost altogether” (Smith et al., 2000, p. 39).

Disadvantaged children were found to benefit slightly more than the full sample in terms of their academic outcomes. Magnuson and colleagues illustrate the academic effects by saying that whereas the average disadvantaged child would have a reading score at the 33rd percentile, attending pre-K would be likely to improve their performance to reach the 44th percentile (Magnuson et al., 2007).

In a British cohort of approximately 13,000, attending childcare (either centre-based or informal) at 9 months was associated with improved cognitive outcomes at 3 years, although only for children whose mothers had low levels of education. The benefits were no longer evident at 5 or 7 years. In comparing the effects of centre-based care with informal care, at age 3 and 5 years centre-based care was associated with improved cognitive outcomes, but this was no longer the case by 7 years (Cote, Doyle, Petitclerc, & Timmins, 2013). The authors noted strong selection effects, with “children exposed to higher levels of family and maternal risk characteristics . . . much more likely to receive parental care or informal child-care services” (Cote et al., 2013, p. 1205).

Conclusions

Research findings regarding cognitive outcomes conflict, depending in part upon the quality of studies and the definitions they have employed. Some key findings are summarised below, followed by methodological issues that must be considered in the application of these results.

Key findings include:

- The extent to which children are successful in school depends greatly on “the overall quality of their experiences in early childhood”(Burger, 2010, p. 160), with parenting having the greater influence
- Any beneficial effects of ECEC are largely seen as a result of high-quality ECEC received during the preschool years (i.e. at 3 - 4 years of age) rather than at younger ages
- In fact, some risk to cognitive outcomes is evident especially for children attending from young ages and for long hours
- There are some indications that children whose home environments are less advantageous may benefit more than children from more advantaged homes
- The duration of positive effects is frequently short-lived, often not lasting long after commencing school

Methodological considerations:

- It is possible that children who have attended ECEC perform better on achievement tests because they have been in an environment which teaches test-related skills (such as sitting at a table, taking instruction from an unfamiliar adult) that will enable better test performance, rather than indicate higher cognitive functioning. This may be the reason the reported benefits are often not maintained as other children acquire these skills once they attend school
- Some studies, including meta-analyses, include results from the Early Intervention studies (discussed in Chapter 1) as well as more typically available ECEC which may inflate any beneficial effects found
- Limited aspects of cognition are usually tested, so these results do not indicate effects of ECEC on overall intellectual ability
- Often the comparison is made between a specific programme and typically available care, so does not illustrate the effects of ECEC per se (nor ECEC compared with parental care), but rather the effects of higher quality care over lesser quality care
- Children who attend ECEC are more likely to come from families with greater income, parental education and other advantages, which are themselves predictive of more positive achievement outcomes. It can be difficult to disentangle the impact of these factors from any impact arising from ECEC itself

2.2 Behavioural Outcomes

One of the areas where studies have found negative effects from children attending childcare has been that of increased behavioural difficulties. The factors that have been found to contribute to these difficulties include the age of the child and the quantity of childcare experienced.

Risks

Care beginning in the first year of life and occurring for more than 20 to 30 hours each week was associated with increased aggression and non-compliance when children were 3-8-years-old (Belsky, 1986, cited by NICHD Early Child Care Research Network, 2003). Further follow-ups suggested that the combination of "early, extensive and continuous care" was associated with poorer child socioemotional adjustment (Belsky, 1994; Belsky, 2001, cited by NICHD Early Child Care Research Network, 2003, p. 977).

Belsky's findings have been replicated by a number of others, and despite differences in ECEC provisions between nations, similar results have been found in several countries. Some examples of these are described below.

A US study, using data from the National Longitudinal Survey of Youth, found children whose mothers entered paid employment during their first year of life were significantly more likely to display externalising behaviour problems at 4 years of age, and again at 7 and 8 years of age (Han, Waldfogel, & Brooks-Gunn, 2001). This adverse impact on

behaviour is stronger when mothers return to work fulltime within the baby's first 12 weeks (Berger, Hill, & Waldfogel, 2005).

Youngblade's (2003) study (n=171) found that children whose mothers were employed during their first year had less frustration tolerance, more acting out behaviour and were more often reported by their peers as being 'mean', or to engage in hitting, than those children whose mothers were not employed in their first year. In this study, maternal employment was defined as consistently occurring for at least 10 hours per week. These effects were seen at an average age of approximately 8.6 years and held after controlling for a number of factors including gender, social class, current employment status, and ethnicity. Some, but not all of this was accounted for by the number of different caregiving arrangements children experienced in their first year, with a greater number of caregiving arrangements being associated with more negative behavioural outcomes (Youngblade, 2003). These findings, from the US, echo those of other studies linking early maternal employment to later non-compliance, acting out, and aggression in the child as assessed by both teachers and peers (e.g. Belsky, 1990, NICHD 1998, 2001, cited by Youngblade, 2003).

Another US study (NICHD Early Child Care Research Network, 2003) found that children who had spent more time in non-maternal care were less socially competent, had more externalizing behaviour difficulties, and higher levels of conflict with their caregivers at 4½ years of age. The effects of ECEC were still evident when children were followed up at approximately 12 years of age (Belsky, Vandell, et al., 2007). These adverse effects were evident in children attending care that was of low, moderate and even high quality (Pluess & Belsky, 2009). At 15 years of age, more time spent in childcare over the first 4½ years predicted increased adolescent impulsivity and risk taking (Vandell et al., 2010). Examples of risk-taking behaviours studied included alcohol, tobacco and other drug use; stealing; property damage; threatened or actual use of weapons; and, behaviours that threatened their own safety. The effect sizes at 15 years were of similar size to those seen at 4½ years (Vandell et al., 2010). In other words, the effect had not diminished over time.

An English study (n=>900), found increasing time in centre-based care was related to an increase in total problems, including emotional symptoms, peer problems, conduct disorder and in particular an increase in hyperactivity, with those children who had received childminding being more likely to have difficulty with their peers at school entry (Stein et al., 2013).

Some studies have differentiated between group-based and individual childcare, such as that provided by a nanny. In a Swiss study, the amount of group-based ECEC children were exposed to was related to subsequent Attention Deficit Hyperactivity Disorder (ADHD), aggression, non-aggressive externalising behaviour difficulties, anxiety and depression at the age of 7 years. In particular, they found the cumulative amount of care over the early years to be predictive of behaviour difficulties, rather than specifically care beginning at a young age (Averdijk, Besemer, Eisner, Bijleveld, & Ribeaud, 2011).

An Australian study using a large sample of 2-3 year olds found that more than 20 hours per week of non-parental care, especially centre-based, was associated with poorer

behavioural outcomes, as assessed on the Short Temperament Scale for Infants. The effects were greater for children from families of relatively high SES. Higher adult to child ratios reduced this effect somewhat, although the ratio information was based on parental observations, so it is difficult to draw accurate conclusions (Yamauchi & Leigh, 2011).

A Canadian cohort of more than 1300 children, aged between 1 and 12 months, were followed over 4 years. A global measure of family risk was used including SES, family functioning, maternal depression, maternal age, and whether the parents were together or separated. Children from families with low risk displayed less aggressive behaviour when they received maternal care during their first year (Côté, Borge, Geoffroy, Rutter, & Tremblay, 2008). For children deemed at high risk of behaviour problems, non-maternal care had no significant effect on their levels of aggressive behaviour. Girls from low risk families experienced more emotional difficulties, namely symptoms of anxiety and depression, if they received non-maternal care (Côté et al., 2008).

Magnuson, Ruhm, & Waldfogel (2007) also found increased behavioural difficulties for children who had attended US pre-K programmes, in other words behavioural effects can still occur when children are closer to school age. The increase in behaviour difficulties may be an indicator that a child's developmental needs are not being met.

On the other hand, some studies have found no links between childcare and behavioural difficulties. A very large study of more than 73,000 Norwegian children found little support for childcare being related to behaviour difficulties when children were three years old. It is worth noting that due to Norway's parental leave provisions, most children are cared for by their parents until at least one year of age, as was the case for 86.3% of this study's population (Lekhal, 2012).

Benefits

Other research has found benefits. Examples include improved social/emotional outcomes and behaviour for children attending the Chicago CPC (Clements et al., 2004, cited by Loeb et al., 2007). As outlined previously (Chapter 1), this programme is an example of a high quality early intervention which children attended for 15 hours per week, from the age of 3 years. Therefore this cannot be considered equivalent to the ECEC commonly available in NZ.

Another study reporting socio-emotional benefits looked at Tulsa, Oklahoma's pre-K and Head Start programmes. Children attending the pre-K programme, at 4-5 years of age, were less timid and more able to pay attention, suggesting they would be better prepared for learning at school than those who didn't attend pre-K (Gormley, Phillips, Newmark, Welti, & Adelstein, 2011). The authors concluded "our findings indicate that high quality school based pre-K programmes can support the development of some socioemotional skills that enable children to enter Kindergarten ready to learn" (Gormley et al., 2011, p. 2103).

At first glance, these results appear to contradict the earlier findings of adverse socio-emotional or behavioural outcomes associated with daycare attendance. However, there is more to consider. This is one example of a recurring methodological issue that is not

always considered, namely, the characteristics of the control group. In this instance the comparison group were primarily children attending other forms of pre-school education. Thus their results indicate the benefit of one type or quality of programme over another (Gormley et al., 2011). They tell us nothing about the risks or benefits of ECEC as compared with maternal or parental care. In contrast a number of earlier studies had children in maternal care as a comparison.

The age at which children have attended ECEC is important to consider. Where benefits to socioemotional development are found, the children studied are typically 3-4 years old, not infants and toddlers.

Significance of Findings

Care must be taken in interpreting the effects of ECEC on child behaviour as findings may vary depending upon factors such as the methodology used, the population studied, and which other variables have been controlled for.

Some studies have found the effect of early and extensive childcare to be quite significant, having a comparable or greater impact on a child's later adjustment and behaviour to that of established risk factors such as maternal education level and poverty (Belsky & Eggebeen, 1991); gender and social class (Youngblade, 2003); income, parental separation and having a single parent (Averdijk et al., 2011). The effect of quantity of care on child behaviour problems was larger than the effect of parenting and almost as large as the effect associated with poverty (NICHD Early Child Care Research Network, 2002).

In contrast, other research found childcare attendance to have less impact than gender, poor parenting, (Averdijk et al., 2011); maternal stress, mental health, and quality of maternal caregiving (Stein et al., 2013).

A further issue with the potential adverse effects on behavioural outcomes is the length of time these effects are thought to last. Magnuson and colleagues (2007), for instance, found that whereas 70-80% of the cognitive benefits of pre-K had faded by partway through first grade, the findings with regard to behaviour problems persisted, leading them to suggest that the "the early socialization of aggressive behaviour and lack of self-control may be lasting" (Magnuson et al., 2007, p. 48). Contrary to some other research this occurred at similar levels for disadvantaged children as it did for the whole sample (Magnuson et al., 2007).

Whilst negative effects have sometimes been small, there is concern that for some children when this occurs in the presence of other risk factors, such as poverty, their outcomes may be adversely affected (Han et al., 2001).

Given that childcare, often fulltime and beginning early in life, is a normative experience in countries such as the US, the numbers of children affected are very large, causing several authors to highlight the possible societal implications of modest effects occurring for large numbers of children (Lipscomb et al., 2014; Pluess & Belsky, 2009; Vandell et al., 2010; Weisz, Sandler, Durlak, & Anton, 2005). Similarly, childcare is increasingly becoming the norm in NZ (see Chapter 5). In this regard there are similarities with

many important public health risks which are of modest magnitude “but are multiplied in importance because of their wide prevalence and links to problematic outcomes” (Jeffrey, 1989, cited by NICHD Early Child Care Research Network, 2002, p. 158).

It is important to bear in mind that despite the frequent findings of increased behavioural difficulties associated with childcare attendance “there is no evidence that childcare predicts diagnosable psychopathology”(Pluess & Belsky, 2009, p. 397).

In NZ, externalising behaviour problems constitute a large proportion of those referred to early childhood mental health services (Ministry of Health, 2011). Furthermore, there is increasing evidence, including from the Christchurch Health and Development study, that such early behaviour difficulties persist and are associated with difficulties later in life (Fergusson et al., 2009, cited by Lipscomb et al., 2014; Stein et al., 2013). These difficulties may include delinquency, difficult teacher-child relationships, low acceptance by peers, and anti-social disorders in middle childhood and adolescence (Gormley et al., 2011).

Complexities

Much of the literature indicates that centre-based care has detrimental effects on children’s behaviour if commenced before the age of two years, and especially if beginning before they are one (Loeb et al., 2007). The evidence is less clear about whether or not there are detrimental behavioural effects for children attending ECEC in the year or two before they begin school (Magnuson et al., 2007).

It has been found that the adverse effects of extensive childcare experience are not necessarily restricted to those children who have directly experienced the care, but also to their classmates as such care becomes the norm (Dmitrieva, Steinberg, & Belsky, 2007). “Being in kindergarten (NZ Year 0/1 equivalent) classes comprised of many children with extensive childcare histories contributes to externalizing behavior over and above children’s own personal childcare histories” (Belsky, 2008, p. 230). This raises issues about research into the effects of childcare on behaviour, with previous methods potentially underestimating them in situations in which effects on numbers of children accumulate and in turn influence outcomes for other children via a more indirect route (Belsky, 2008).

There is a great need to consider how the effects on children may alter over time. As with many other influences on development adverse effects are not necessarily observed immediately, resulting in the so-called ‘sleeper effect’. This ‘sleeper effect’ may be a factor when looking at the effects of childcare (NICHD ECRN, 1998, cited by Youngblade, 2003). For instance, Barnes et al (2009), studied over 1200 English children and found no association between the amount of childcare exposure and disruptive behaviour at 3 years (Barnes et al., 2009). When Stein and colleagues published further results of the same sample at age 4.25 years, they found “more time in daycare centres was predictive of more total problems, and specifically more hyperactivity”(Stein et al., 2013, p. 685). In part this was due to not measuring for hyperactivity at 3 years, but it is also probable that some of the effects, whilst not evident early in development, nevertheless have an effect at a later time.

Conclusions

The literature reviewed regarding the effects of ECEC on children's behavioural outcomes has led to the following conclusions:

- "When considered collectively, the investigations just reviewed indicate that the timing or amount of early child care, or both, have repeatedly, though not always, been related to problem behaviour in the early school years" (NICHD Early Child Care Research Network, 2003, p. 979)
- The adverse effects have been found to be lasting, persisting until adolescence in some cases
- There is much literature indicating the risk associated with early ECEC attendance, i.e. before 2 years and particularly before 1 year. Results are more mixed when children attend at 3-4 years
- As with many other factors influencing children's development, this does not mean ECEC necessarily has a direct and devastating effect on all children, however, it is seen as a risk factor for poorer outcomes (Belsky & Eggebeen, 1991)
- These results are correlational and may be influenced by other uncontrolled variables
- Of concern are the potential outcomes for a large proportion of children who may be affected, and the social implications of this
- None of the research indicated that the increased behavioural difficulties reached clinical levels of concern
- The effects of ECEC on behaviour may be felt by those who didn't attend directly, but whose school class comprises many other children with extensive ECEC histories and their associated increase in behaviour difficulties
- No evidence of benefits to behavioural outcomes was found from typically occurring ECEC
- It appears that children at low risk of developing behaviour difficulties based on family factors, are more likely to be adversely affected through ECEC participation
- These effects have been found for children attending childcare at all levels of quality, in other words, it is not simply an effect of poorer quality care

2.3 Cortisol

One of the methodologies used to increase understanding of the effects of ECEC is that of studying cortisol levels. Some background information regarding cortisol, what it is, and the way in which it impacts the body and brain, may be useful before delving into its implications for research on the effects of ECEC.

What is cortisol?

Cortisol is a glucocorticoid hormone produced by the adrenal gland both at rest and in the face of stress (Badanes, Dmitrieva, & Watamura, 2012; Ouellet-Morin et al., 2010). In the absence of significant stress (i.e. under normal conditions) cortisol follows a typical diurnal pattern (Custodio et al., 2007, cited by Ouellet-Morin et al., 2010). Levels of cortisol are usually highest shortly after waking, enabling an individual to get going for the day, decrease sharply over one to two hours, then decline more gradually over the rest of the day, reaching their lowest point late in the evening, enabling sleep (Bruce, Gunnar, Pears, & Fisher, 2013; National Scientific Council on the Developing Child, 2012; Tout, de Haan, Campbell, & Gunnar, 1998; Watamura, Donzella, Alwin, & Gunnar, 2003). This pattern is evident within an infant's first few months (Bruce et al., 2013; Ouellet-Morin et al., 2010), with the decline from morning to afternoon cortisol levels occurring more reliably in children after around 3 years of age (Bernard, Peloso, Laurenceau, Zhang, & Dozier, 2014).

Stress & Cortisol

Both real and perceived threats to an individual's physical or psychological safety result in the 'stress response' (Levine, 2005, McEwen, 2000, cited by Bruce et al., 2013). This response involves a number of hormones and neuro-chemicals, including cortisol.

When cortisol is released quickly and then promptly turned off it activates the immune response and mobilises energy stores, helping the body and brain to cope with adversity (National Scientific Council on the Developing Child, 2005/2014). Whilst the cortisol response is necessary for survival, prolonged cortisol elevation can adversely impact on the architecture and function of certain regions in the brain, particularly those involved in memory and learning. The developing brain is thought to be particularly vulnerable to the effects of sustained cortisol release. Thus prolonged cortisol elevation, due to extreme and/or sustained stress is typically regarded as having a negative impact on child development (Gunnar & Donzella, 2002, cited by Groeneveld, Vermeer, van Ijzendoorn, & Linting, 2010; National Scientific Council on the Developing Child, 2005/2014). Due to the plasticity of the infant brain, extreme and/or repeated stress is likely to be particularly harmful when it occurs during infancy.

Cortisol can alter gene expression which may result in alterations to how an individual experiences and responds to stressors in the future. When chronically activated, high cortisol levels can lead to an overall down-regulation of the Hypothalamic-Pituitary-Adrenal (HPA system) in an attempt to keep cortisol levels within normal limits. Consequently, chronic stress may increase cortisol levels in the first instance, which, over time may lead to a dulled cortisol response in the face of stress, or both may occur (Bruce et al., 2013). Both chronically heightened and dulled cortisol responses are considered maladaptive over the long term.

For instance, among preschoolers, *higher* basal levels of cortisol were associated with increased externalising behaviour, whereas at primary school age, externalising behaviour was associated with *lower* basal levels (Alink et al., 2008).

Cortisol is increasingly used by researchers as a measure of physiological stress due to its ability to be measured in saliva, making it a relatively non-invasive procedure. It also enables physiological measures of a child's response to stress which may be more reliable than behavioural observations, given the individual differences in how children's stress may manifest in their behaviour (Vermeer & Ijzendoorn, 2006).

Other situations in which children have been found to have altered cortisol responses include experiences of abuse and neglect (e.g. see Twardosz & Lutzker, 2010) with adults who experienced childhood maltreatment having lower basal cortisol levels (Tarullo & Gunnar, 2006, cited by Roisman et al., 2009). Being raised in an orphanage, maternal deprivation, and maladaptive parent-child relationships are also thought to affect the development of the HPA system (Gunnar & Donzella, 2002, cited by Vermeer & Ijzendoorn, 2006). Children raised in deprived environments, such as orphanages in Russia and Romania, have been found to have "blunted early morning cortisol levels and no systematic decrease in levels over the course of the day" (Carlson & Earls, 1997, and Kroupina et al., 1997, cited by Tarullo & Gunnar, 2006, p. 633), although this does not appear to be permanent and may change following adoption.

The HPA axis itself develops during infancy and early childhood and disruptions during this period can lead to permanent far-reaching detrimental effects.

Animal Studies

Animal studies have found that frequent or chronic activations of this neuroendocrine system occurring early in development increase fearfulness and impair behaviour and physiological regulation (Gunnar & Quevedo, 2007, cited by Gunnar, Kryzer, Phillips, & Van Ryzin, 2010). Studies of rodents found elevated levels of glucocorticoids can be detrimental to the brain. The hippocampus, important for learning and memory, is particularly vulnerable, as it has many glucocorticoid receptors (Gunnar, 1998). Overall, stress is "an important component of early experience that can have profound effects on the developing central nervous system"(Gunnar, 1998, p. 210).

ECEC & Cortisol

In 1998 Tout and colleagues first found a rising cortisol pattern over the day for 81% of children in full day centre-based care (Tout et al., 1998). Amongst children attending a high quality centre, 73% had rising cortisol, and this increased to 96% of children attending poorer quality care (Tout et al., 1998, cited by Badanes et al., 2012). The children studied were aged between 2 years 8 months – 5 years 10 months, with a mean age of 4 years 3 months (Tout et al., 1998). This result was unexpected because their work the preceding year, with children attending a half-day nursery school, had shown the typical declining cortisol pattern across the day (Gunnar, Tout, de Haan, Pierce, & Stanbury, 1997).

Many studies in this area have followed, with similar results. More recently, Gunnar and colleagues (2010) studied the salivary cortisol of 151 children aged 3–4.5 years who were attending fulltime home-based daycare. The majority of children (63%) showed an increase in cortisol when in care, compared with the days they were at home. In order to determine whether their statistically significant findings were also biologically

significant they used criteria previously employed in adult studies to identify HPA stress responses, which indicated that for 40% of the children, by the afternoon their levels were such that it was considered a stress response, compared with 10% in the morning. This suggests that the stress response occurs in relation to the accumulation of the child's experience over the day, and is not just a reaction to arriving at care in the morning (Gunnar et al., 2010). The authors suggest that this may explain why children who attend half-day preschool programmes do not show a similar elevation in cortisol levels (Gunnar et al., 1997, cited by Gunnar et al., 2010). Their findings also indicate it is not just the presence of a large peer group that is contributing to the cortisol response, as increases for those with one or two other children present were similar to those who were cared for with 10 or more other children (Gunnar et al., 2010). There were gender differences in behaviour associated with the rise in cortisol. For girls this involved anxious, vigilant behaviour, and for boys, angry, aggressive behaviour (Gunnar et al., 2010).

Studies conducted in many countries, including the United States, France, Germany, Australia, Sweden and Korea, point to "many cross-cultural similarities in the cortisol profiles of children in child care settings" (Watamura, Coe, Laudenslager, & Robertson, 2010, p. 1156).

There are a number of elements of non-parental care, particularly centre-based care, that could be stressful for young children. These include separation from parents, initial adjustment to an unfamiliar setting, different routines and caregivers, larger numbers of children present and higher noise levels than those experienced at home (Levine, 2005, cited by Beijers, Riksen-Walraven, Putnam, de Jong, & de Weerth, 2013).

Meta Analyses

Vermeer & Ijzendoorn (2006) reviewed nine studies in their meta-analysis and concluded that children at full-day daycare have significantly higher cortisol levels, and a different cortisol excretion pattern, compared to when they are at home. This effect was most pronounced for children under the age of 3 years, and was observed even when children attended centres of reasonable or high quality (Vermeer & Ijzendoorn, 2006). Only one of the studies reviewed in this analysis included data on children younger than 1-year-old (i.e. Watamura et al., 2003).

Another meta-analysis by Geoffroy and colleagues reviewed 11 published studies. They also found increasing cortisol levels across the day in daycare, whereas on days the children were at home, they showed the typical diurnal pattern (Geoffroy, Côté, Parent, & Séguin, 2006). This effect was greater when children attended low-quality daycare and for those with a more difficult temperament, for whom the authors concluded daycare may increase risks to their mental health, through "chronic atypical cortisol elevation" (Geoffroy et al., 2006, p. 613).

The authors state that "there was essentially little or no effect for children in high quality daycare" (Geoffroy et al., 2006, p. 607). It is important to note that the study this particular conclusion is based on, (Dettling, Parker, Lane, Sebanc, & Gunnar, 2000), looked at 3-5 year olds, with a median age of 4.25 years.

Both meta-analyses “concluded that the rise in cortisol from morning to afternoon at child care has been convincingly documented and that this rise is not seen in the same children when they are at home on non-child care days” (Gunnar et al., 2010, p. 852). They both also indicate that the age of the child is an important factor with younger children, of 2-3 years, typically being affected to a greater extent than older children (Gunnar et al., 2010). Those in full-day, as opposed to part-day care also appear to have more pronounced effects (Geoffroy et al., 2006, and Vermeer & van IJzendoorn, 2006, cited by Phillips, Fox, & Gunnar, 2011).

Complexities

In a more sophisticated study, the interactions between children’s attachments with their mother, quality of childcare, and cortisol patterns were studied for 2-5-year-old children. The researchers found that children who had high levels of attachment security towards their mother, and attended high quality childcare showed the typical decreasing cortisol pattern across a childcare day. Children who were insecurely attached showed a flat pattern of cortisol across the day, in other words, it did not decrease as normal, but nor did it increase. Children with high attachment security who attended poorer quality care had an increase in their cortisol over the day. Notably, the poorer childcare environments in this study were still of average quality, with most being rated good or excellent (Badanes et al., 2012).

Like many other factors influencing child development, there are frequently interactions between a number of variables which can increase or decrease risk. One study found those who had spent more time in childcare during their first three years, and had mothers with lower levels of sensitivity, had lower awakening cortisol levels at 15 years of age. This appears to be one of the few studies looking at the long term implications of the altered cortisol patterns frequently seen in children attending daycare in their early years (Roisman et al., 2009).

Cortisol & Attachment

Some studies indicate that securely attached infants experience ‘maternal buffering’ of their HPA system, suggesting they are at heightened risk of elevated cortisol levels when their mother is not available. At 9-months of age, babies separated from their mother with an unfamiliar adult showed no cortisol increase if their caregiver was sensitive, playful and friendly, indicating that infants may be temporarily able to use a responsive substitute caregiver to buffer their stress response. It is important to note that these separations were for 30 minutes, which is vastly different to the lengths of time many infants are in childcare (Badanes et al., 2012; Gunnar, 1998).

Ahnert and colleagues (2004) studied 15-month old infants (n=70) at home before entering childcare, during visits with their mothers present, the first 9 days in childcare without their mothers, and again five months later. They found children had higher cortisol levels at the childcare centre than at home, even with their mothers present. During the first two weeks of attending childcare, without their mothers present, cortisol levels were 75-100% higher than they were at home. Five months later, despite many children appearing to have adapted to the childcare arrangements, cortisol levels were

still significantly higher (Ahnert et al., 2004). These results indicate that “securely attached infants and toddlers do not necessarily regulate stress more effectively than insecurely attached young children in their mother’s absence” (Badanes et al., 2012, p. 163S).

Physical Health

The long term consequences of alterations in cortisol are not yet clear, but may include lowered immune system functioning and reduced antibody production, potentially affecting children’s physical health (Watamura et al., 2010, cited by Badanes et al., 2012; Greenspan, 2003). Watamura and colleagues (2010) studied 65 children, aged 3-5 years, attending full-time high quality care who were from high SES and low risk families. They found rising salivary cortisol in childcare was associated with lower antibody levels and higher rates of parent reported illness, particularly upper respiratory illness. This is unsurprising given the links between the immune and stress response systems (Watamura et al., 2010).

Studies of humans and animals suggest at least four areas of development which frequent cortisol elevations might affect. These include physical health; attention and memory; social behaviour; and, increased stress reactivity (Watamura et al., 2010). Recurrently elevated cortisol levels have been associated with poorer immune system functioning, health issues such as stroke and diabetes, as well as reduced memory and ability to pay attention (McEwen 2000, 2006, cited by Bruce et al., 2013).

Mental Health

Ongoing changes to physiological stress responses may result in greater difficulties coping with change and contribute to a higher risk for later psychopathology (Geoffroy et al., 2006; Ouellet-Morin et al., 2010), including a heightened risk for anxiety, depression, vulnerability to Post Traumatic Stress Disorder following a traumatic event, and disruptive behaviour disorders (Bruce et al., 2013; Greenspan, 2003). Although this has been less studied in relation to ECEC, both elevated and reduced HPA system activity are considered potentially maladaptive with each possibly contributing to differing disorders (Bruce et al., 2013).

Knowledge Limitations

Whilst we know that daycare attendance is associated with higher cortisol levels compared to children being cared for by their parents, it is not yet clear which aspects of the ECEC environment trigger this response (Vermeer & Ijzendoorn, 2006).

In terms of mechanisms for these findings, a number of possibilities have been posited in the literature. One of these involves the idea that it is being in a peer group all day that is creating stress for infants, toddlers and preschoolers (Greenspan, 2003). However, this is not supported by Gunnar’s findings reported earlier (Gunnar et al., 2010).

It seems likely that “the most plausible explanation lies in a complex interaction between the quantity of daycare attendance (both length of day and hours a week), the quality of

the daycare setting and characteristics of the child itself” (Vermeer & Ijzendoorn, 2006, p. 399).

Many of these studies, as with the majority of research around ECEC in general, have looked at the effects on children over the age of 3 years. We therefore know relatively little about the effects for children younger than this.

As some researchers point out, we do not know precisely what the long-term implications of these repeated cortisol elevations are for children’s development throughout life (Vermeer & Ijzendoorn, 2006), or if there is any effect at all. However, as previously mentioned there is evidence both from animal studies and other areas of human development, to suggest that such repeated elevations may be cause for concern.

Conclusions

It is true that mild stress over a defined time can be beneficial (Ouellet-Morin et al., 2010), and is necessary for survival (Groeneveld et al., 2010). However, “childcare - for some children and under some conditions - can be a highly stressful experience with documented negative impacts on young children’s stress reactivity, development and health” (Phillips, 2010, p. 7).

- The cortisol research adds to our knowledge by measuring children’s immediate psychophysiological response (Buckingham, 2007). In most cases research finds “that children’s cortisol production on child-care days differs from children’s cortisol production on non-child-care days” (Bernard et al., 2014, p. 1)
- These effects are more likely when attending full-day childcare and not when children attended only in the morning
- Younger children, around 2-3 years of age, are more likely to display altered cortisol patterns in ECEC than older children
- It is not clear what triggers the increased cortisol, but it is likely to be a combination of factors
- Among infants, even when they outwardly appear to have adapted to their childcare arrangement, cortisol levels have still been found to be higher 5 months later (Ahnert et al., 2004)
- For children aged 2-5 years with a secure attachment and attending high quality childcare, their cortisol patterns showed the typical decreasing pattern over the day (Badanes et al., 2012)
- Research in other areas indicates that stressors occurring over a prolonged period of time are typically found to have adverse effects on children’s development (Gunnar & Donzella, 2002, cited by Groeneveld et al., 2010). However, the long term implications of the particular cortisol alterations associated with ECEC attendance are unclear
- For some children, this altered cortisol pattern may be occurring for five days per week, most of the year, over five or so years
- More research is needed to increase understanding regarding the nature and extent of altered cortisol patterns associated with ECEC attendance and their long-term implications

2.4 Physical Health Outcomes

Much discussion about public funding of childcare has centred on children's cognitive and non-cognitive skills (Duncan et al., 2007, and Cunha & Heckman, 2009, cited by Gennetian, Hill, Lopoo, & London, 2010) "but children's health has arguably equal if not greater importance for future productivity"(Gennetian et al., 2010, p. 3).

Adverse Effects

A number of studies indicate that there may be adverse effects on various aspects of children's health associated with ECEC attendance. This includes breast-feeding rates, frequency of illness, and rates of obesity.

The effects of breastfeeding and daycare attendance on child health were studied up to the age of 5 years in more than 1800 Canadian children. At each age studied it was found that attending daycare increased the number of antibiotic treatments a child received, whereas factors such as mother's education and poverty did not play a role. Children beginning daycare by 18 months of age are 7.5 times more likely to have received 6 or more antibiotic treatments by the age of 5 years, than children who never attended daycare. When children were breastfed for four months or more, this risk reduced, but they were still four times as likely to have received 6 or more antibiotics than those who did not attend daycare (Dubois & Girard, 2005). The authors suggest that it is the contact with other children, and thus increased exposure to infectious diseases, that adversely affects children's health.

A review of 9 studies found that children who attended non-parental care, whether in centre-based care or with a relative, were more likely to be overweight or obese later in childhood, than those who were cared for by their parents. In some studies, this effect was seen at a young age. For instance, Gubbels and colleagues (2010, cited by Geoffroy et al., 2012) found a greater risk of obesity at 2 years for children in centre-based care (Geoffroy et al., 2012). The authors conclude that particularly at risk children could benefit from being breast-fed and cared for "in a familial setting, especially before 2.5 years of age" (Geoffroy et al., 2012, p. 2042).

Following the introduction of universally available highly subsidised child care in Quebec, children experienced negative effects in terms of physical health. Very large and significant negative effects were seen in terms of the odds of being in excellent health, and of never having had nose, throat or ear infections (Baker, Gruber, & Milligan, 2008).

A study in the Netherlands found that infants spending more hours in non-parental care had more respiratory, digestive and general illnesses in their first year of life. Infants experiencing more than one simultaneous arrangement had fewer respiratory and general illnesses, but increased skin illnesses compared to children attending one non-parental care arrangement. These results were only found for infants who attended centre-based care (Beijers, Jansen, Riksen-Walraven, & de Weerth, 2011). The important role of psychological factors in skin illnesses was highlighted (Pourpak et al., 2007, cited by Beijers et al., 2011).

A systematic review was conducted to investigate the effects of centre-based preschool interventions on the health of 4-year-olds. The review included 37 studies, primarily conducted in the US, and found in general no significant differences over a variety of health outcomes, particularly those that provided only preschool with no other intervention components. It is of interest that in this review 70% of the preschool programs included other services, with many including specific health services, often alongside varying combinations of social services, home visiting and parenting programmes, all of which could contribute to enhancing children's physical health outcomes. From a methodological perspective, they point out that "the majority of studies were non-randomised which increases the possibility that the study results include effects of selection bias and residual confounding by unmeasured family background characteristics" (D'Onise, Lynch, Sawyer, & McDermott, 2010, p. 1437).

Dose

A number of studies find a relationship between childcare hours and increased illnesses (Beijers et al., 2011). As the number of hours children spend in care increases, so too does the likelihood of poorer health. Geoffroy and colleagues (2012) found that for each additional 5 hours of non-parental care, the odds of being overweight or obese by the age of 10 years, increased by 9%. Another study found that for each 9 hours of centre-based care per week, the number of days of respiratory illness increased by 12% (Dales, Cakmak, Brand, & Judek, 2004).

In contrast, this effect was not found in the NICHD study, although this may be due to less variation in the number of hours attended. In this case most children were attending for more than 20 hours per week (Bradley, 2001, cited by Beijers et al., 2011).

Age

There is some evidence that the adverse effects on health are more likely when children are younger than two years. Illnesses that are more prevalent among children attending daycare include ear infections, diarrhoea, and respiratory illnesses (Beijers et al., 2011; Dales et al., 2004).

Another study found that the earlier mothers returned to work, particularly if it was before their child was 12 weeks old, the poorer their child's health outcomes on various measures including regular medical check-ups, breastfeeding and receiving immunisations (Berger et al., 2005).

Complexities

Not all children are affected equally. Those without siblings were more susceptible to an increase in illness as a result of daycare attendance compared to those with siblings (Dales et al., 2004). This may be because those with siblings are already exposed to an increased number of childhood illnesses via their sibling.

Daycare attendance increased illness frequency for children in both high and low income groups, however the increase was greater for those from families with greater income,

suggesting that daycare attendance removed the protective effect of income on physical health and wellbeing. For children not in daycare, increasing family income was associated with decreased illness rates, however this was not found for those attending daycare (Dales et al., 2004).

Mechanisms

Increased contagion, through contact with large numbers of children is the most frequently offered explanation for higher rates of illness amongst children in childcare (Beijers et al., 2011).

There are some indications that the quality of childcare has an impact on the immune system of children in care (Vermeer, Ijzendoorn, Groeneveld, & Granger, 2012). However, this is preliminary research and more studies are required before strong conclusions can be drawn.

Conclusions

Physical health outcomes that have been associated with ECEC attendance include:

- Increased rates of various illnesses including respiratory, digestive and general illnesses
- Increased rate of anti-biotic treatments
- Greater likelihood of being overweight or obese in later childhood

Other key points from the literature include:

- There appears to be a dose-response effect, with those attending more hours of care at increased likelihood of more frequent illnesses
- The younger the child, the greater the adverse health effects are likely to be
- Daycare attendance interacts with other factors such as breast-feeding and whether the child has siblings
- Increased contact with other children is frequently considered to be a mechanism for this increase
- The long-term effects of these physical health implications are not fully known (Beijers et al., 2011). However, it is believed that "the evidence provided here is sufficient to raise a 'red flag' " regarding policies which encourage both parents to be in paid employment from very early in an infant's life (Berger et al., 2005, p. F45)

The studies reviewed here lend weight to D'Onise and colleagues' conclusion that "the great potential for early childhood interventions across a range of health outcomes, as anticipated by policy makers worldwide currently rests on a rather flimsy evidence base" (D'Onise et al., 2010, p. 1423).

2.5 Attachment

One of the areas that ECEC has been found to affect is that of attachment between parent and child. A child's attachment relationships are considered important for a range of developmental outcomes, including language development, emotional development and cognitive performance (Pianta, Nimetz, & Bennett, 1997).

"Infants with secure attachment relationships are confident in the sensitive and responsive availability of their caregivers, and consequently these infants are confident in their own interactions with the world" (Weinfield, Sroufe, Egeland, & Carlson, 2008, p. 79). On the other hand, infants who have not had consistently responsive caregiving are likely to develop insecure attachments, and lack the "confidence in themselves and mastery of their environments" of securely attached children (Weinfield et al., 2008, p. 80)

Risks

A number of studies have found an adverse effect on the development of a secure attachment in children receiving non-maternal care in the early years, although the specific findings, including the amount of care associated with this effect, varies.

Belsky (1990, cited by Howes & Spieker, 2008) found that extensive childcare in the first year of a child's life was a risk factor for insecure attachment. Others have found this effect at relatively small amounts of childcare. For example, children who had been in exclusive maternal care during infancy had higher rates of attachment security than other infants, who were more likely to be insecurely and avoidantly attached when in childcare for more than 5 hours per week (Lamb, Sternberg, & Prodromidis, 1992).

As far back as the 1980s research has indicated that attending more than 20 hours per week of childcare was associated with increased rates of insecure attachment (Howes & Spieker, 2008).

Several studies indicate beginning daycare before 12 months of age is associated with increased insecure-avoidant attachment (Bargalov et al. 1987; Belsky & Rovine, 1988; Vaughan et al., 1980, cited by Egeland & Hiester, 1995). Infants who experienced more than 20 hours per week of non-maternal care in their first year of life, were more likely to be insecurely attached to their mother, than infants with fewer than 20 hours per week in care. Boys in fulltime care were also more likely to be insecurely attached to their fathers (Belsky & Rovine, 1988). In this study the majority of care was provided by a babysitter or home-based childcare, with only 9 of 73 children attending a childcare centre. Fathers were included as non-maternal care providers.

In a review of studies assessing attachment to mothers (n=>1200), it was found that those whose mothers worked fulltime were more likely to avoid their mother after being separated, have less compliance with their mother, and increased aggression towards peers at one year of age. Rates of insecurity were 36% for children of fulltime working mothers, compared with 29% for children of mothers working part-time or not employed outside the home, which was a statistically significant difference (Clarke-Stewart, 1989).

Schwartz (1983) compared attachment behaviour of 18-month-old infants who were in maternal care, part-time daycare, and fulltime daycare. More of the children who had been in fulltime daycare showed avoidance of their mother during the Strange Situation assessment (Schwartz, 1983). Similarly, using data from the NICHD study (n=1281), the more time infants spent in non-maternal care, the less likely they were to "seek comfort from their mother during the reunion episodes in the Strange Situation" (Umemura & Jacobvitz, 2014, p. 360).

Many of these studies compare cross-sectional groups of children. In other words, they compared two or more groups of children at a given point in time. The NICHD ECCRN on the other hand looked at the stability over time of children classified as securely or insecurely attached at 15 months and again at 36 months. Those children who changed from secure to insecure were more likely to have begun attending childcare for at least 10 hours per week between 15 and 35 months (NICHD ECCRN, 2001, cited by Howes & Spieker, 2008).

Type of care

A study in Israel by Sagi and colleagues (2002) found that infants in centre-based childcare in their first year were more likely to be insecurely attached to their mothers than not only those in maternal care, but also infants cared for by a relative, individual paid caregiver, or in home-based daycare. The proportion of children in centre-based care who were rated as insecurely attached was 46%, compared with 26% insecurely attached across all the other groups. Of those insecurely attached, the majority were in the ambivalent category. The researchers note the high child:adult ratios in centre-based care, with the best reported as being 6:1 (Sagi et al., 2002).

Benefits

There is some evidence that for children from backgrounds of poverty and high risk, and with insecure attachments to their parents, that early childcare may have a positive effect - including being less withdrawn and more self-confident at 42 months of age (Egeland & Hiester, 1995). Egeland & Hiester (1995) found no main effects of daycare on child outcomes, but a significant interaction between daycare and attachment. "In general, the home-reared securely attached children were functioning in a more competent fashion than the securely attached children in daycare" (Egeland & Hiester, 1995, p. 479).

Attachment to mothers at 12 months was related to outcomes at 42 months, but only for children in maternal care. Daycare children were more likely to have externalizing and aggressive behaviour in Kindergarten, but not later on in school (Egeland & Hiester, 1995). In other words, "early and extensive child care beginning in the first year seemed to have a negative effect on children who were secure as infants, but a positive effect on those who were insecure" (Egeland & Hiester, 1995, cited by Howes & Spieker, 2008, p. 327).

Complexities

The effects of ECEC itself are compounded with other factors that may be associated with the decision to have a child in ECEC in the first place. One example is the parents' own attachment status. In one study of middle-class mothers, those who were rated as insecure on the Adult Attachment Interview were more likely to have their infants in childcare in their first year of life (Korwen-Karie, 2001, cited by Sagi et al., 2002). Parents of securely attached children are more likely to choose childcare that has lower child to adult ratios (Howes, Rodning, Galluzzo, & Myers, 1988), providing another example of the interactions between family and childcare characteristics. Given the influence of a parent's own attachment styles it is likely that factors contributing to the care decision, as well as the care itself, interact in complex ways to influence child attachment outcomes.

Data from the NICHD study indicate that "the highest rates of insecurity occurred under dual-risk conditions" (Howes & Spieker, 2008, p. 325). Infants were more likely to be insecure when they experienced low maternal sensitivity and responsiveness, poor quality childcare, larger amounts of childcare, or multiple childcare arrangements (Howes & Spieker, 2008). "When infants spent 10 hours or more per week in non-maternal care, those who experienced insensitive maternal care were more likely to be insecurely attached to their mother than were those who had sensitive maternal care. On the other hand, when infants spent less than 10 hours in non-maternal care, maternal sensitivity did not differentiate secure versus insecure infants" (Umemura & Jacobvitz, 2014, p. 354).

Similar findings with regards to maternal sensitivity and less favourable care are reported from the Haifa Study of Early Child Care, conducted in Israel (Sagi et al., 2002). Belsky also found that mothers who demonstrated low sensitivity interacting with their infants (at 6 & 15 months), and had on average more than 10 hrs per week childcare (from 3-15 months), had infants who more likely to be insecurely attached (Belsky, 2007).

Gender

A number of studies suggest that boys may be more vulnerable than girls to negative consequences of early non-maternal care (Cochran & Robinson, 1983, cited by Belsky & Rovine, 1988), with this vulnerability increasing in the presence of "centre care, unstable care, and high infant-caregiver ratios" (Howes & Spieker, 2008, p. 326). Boys who had the poorest care in terms of child/adult ratio and care stability, were least likely to have secure attachment compared with boys receiving better care conditions (Sagi et al., 2002).

Dose

The amount of time children spend in childcare can affect the stability of attachment security. A study by Howes & Hamilton found that children (both infants and three-year-olds) attending part-time childcare had more stable patterns of attachment than those who were in fulltime childcare. Both insecure and secure attachments were stable over

time (Howes & Hamilton, 1992, cited by Howes & Spieker, 2008). It is likely that this is because part time childcare enables the child to spend more time with their mother.

Data from 13 studies was combined to assess the extent of association between non-maternal care and infant-mother attachment security for infants between 11 and 24 months of age. The sample was a primarily advantaged group in the US, where mothers of children in regular non-maternal care averaged 32.6 hours paid work per week. Approximately half the children studied received little or no regular non-maternal care (<5h/week). They found children were 1.38 times more likely to be insecurely attached if they were in regular non-maternal care (Lamb et al., 1992).

More recently, the amount of time infants spent in non-maternal care was found to predict the subcategories of infant attachment, including whether they were resistantly or avoidantly attached at 15 months (Umemura & Jacobvitz, 2014). This relationship between hours of care and proximity-seeking behaviour "differed depending on the developmental period in which the hours of non-maternal care were measured" (Umemura & Jacobvitz, 2014, p. 362).

Attachment to Care Providers

Children attending childcare may develop attachment relationships with their care providers and these are independent of those with their parents (Howes & Spieker, 2008). A meta-analysis of 40 studies, in which children averaged 29.6 months old (SD 8.6 months) found "the security of children's relationships with their parents (both mothers and fathers) and care providers were modestly but significantly intercorrelated" (Ahnert, Pinquart, & Lamb, 2006, p. 672). Girls were more likely than boys to form secure attachments to their care providers, and secure attachments were more likely in home-based than centre-based childcare. In small groups dyadic responsiveness predicted security, similar to children's primary attachments, but in centre-based childcare, the caregiver's interaction with the group was associated with security (Ahnert et al., 2006).

Relatively little is known about the role of childcare providers for children's long-term development. "Child care providers are not long term participants in the social networks of most children" (Howes & Spieker, 2008, p. 328).

Conclusions

Attachment theory suggests non-maternal childcare increases the risk of poorer developmental outcomes through separating child and mother (Bowlby, 1969, cited by Averdijk et al., 2011). The studies reviewed here support this view in their finding of increased likelihood of insecure attachment associated with childcare attendance.

Further findings include:

- Attachment security is more at risk for infants in childcare in their first year of life. However the effect size is typically small
- This risk appears to be heightened when occurring alongside other risks, such as lower maternal sensitivity, or attending poor quality childcare

- As with any other risk factor, it is important to note that adverse outcomes do not occur for all. For instance, “more than 50% of infants experiencing extensive non-maternal care per week established secure relationships with their mothers” (Belsky & Rovine, 1988, p. 164)
- Some of the protective effect of secure attachment with the child’s mother was lost when childcare began at an early age (Egeland & Hiester, 1995)
- There are some indications that boys may be more likely than girls to be adversely affected
- Fulltime childcare increases the risk over and above part-time childcare
- For children with insecure attachments to their parents, among other risks, there may be some benefits in attending ECEC

Further research is needed to determine at what age attachment security is not likely to be at risk from attending early childhood education, and for what amounts of time.

Chapter 3: Child Factors

3.1 Gender

It has been suggested that we “need to approach child care as an environment that is experienced differently by children depending on their characteristics and family circumstances” (Winer & Phillips, 2012, p. 22). One of the characteristics of the child that interacts with their ECEC experiences is that of gender.

Whilst not all studies look at outcomes separately for boys and girls, those that do often find a gender difference in the outcomes. By and large research included in this review suggests that boys are more likely to be adversely affected by aspects of their early caregiving experiences, with boys often considered to be more vulnerable and sensitive to their environment (Datta Gupta & Simonsen, 2010; De Shipper, Tavecchio, Van IJzendoorn, & Van Zeijl, 2004).

Boys have been found to be more vulnerable to experiencing centre-based care particularly when this is unstable and infant-caregiver ratios are high (Howes & Spieker, 2008). The issue of instability is explored more fully in Chapter 4, but relates to both changes from one ECEC to another, and changes of caregivers within an ECEC arrangement. Boys are also more adversely affected by the quality and quantity of childcare they experience (Claessens, 2012). When the quality of childcare is lower, boys are more likely than girls to be adversely affected (Howes & Olenick, 1986, cited by Crockenberg, 2003).

Youngblade’s (2003) study (described in Chapter 2), found children whose mothers were employed during the first year of their life were more likely to display aggression, at school age, than those whose mothers were not employed during this period. This effect was stronger for boys than for girls. Boys whose mothers were employed during their first year were more likely to be peer-nominated for hitting than boys whose mothers had not been employed during this period. The authors also found that boys who had experienced instability in their childcare arrangements were at heightened risk of poorer behavioural outcomes. These results are consistent with those of other earlier studies (e.g. Barglow et al., 1987, and, Belsky & Rovine, 1988, cited by Youngblade, 2003).

In addition to greater risk of harm from childcare, there are a number of indications that any benefits from ECEC are smaller for boys than for girls (Winer & Phillips, 2012). For instance, Head Start raised high school graduation and lowered arrest rates for girls, but not boys (Oden, Schweinhart, Weikart, Marcus & Zie, 2000, cited by Winer & Phillips, 2012). Girls growing up in poverty who attended Head Start had improved scores on the Woodcock Johnson–R, and a decreased likelihood of being suspended, expelled or needing to repeat a grade. On the other hand, no significant differences were found in relation to these outcomes for boys from similar backgrounds (Joo, 2010).

Even when looking at outcomes from model early intervention programs, results are less positive for boys. The educational benefits of the Abecedarian programme were

greater for women than for men (Campbell et al., 2002, cited by Anderson, 2008). An analysis of the Perry Preschool data found that whilst there were consistent positive effects on outcomes for female teens, this was not the case for male teens, for example, in relation to teen criminal behaviour (Anderson, 2008). Heckman's analysis of the Perry results found the effects in terms of enhanced achievement test scores were much stronger for girls than boys (Heckman et al., 2013).

On the other hand, no significant differences were found between girls and boys in a US study looking at maternal employment in the first year of life (Han et al., 2001).

Suggested Mechanisms

Few suggestions have been made regarding the reasons for these differential effects based on gender. However, the finding of the NICHD study that at 15 months of age boys received fewer positive interactions from their caregivers (both home and centre-based), than did girls, (NICHD ECRN, 1997, cited by Winer & Phillips, 2012) may provide a partial explanation.

Others suggest gender differences in regulation ability play a role, with girls more able to regulate negative arousal by the middle of their first year than boys "which may allow them to behave more competently when they are stressed" (Crockenberg, 2003, p. 1037).

Conclusions

- A number of studies indicate that gender plays a role in interaction with childcare experiences, to influence children's later outcomes.
- The majority of studies that find gender differences report boys are more likely to be adversely affected
- Boys are also less likely to receive benefits from ECEC, or early interventions that include ECEC, than are girls
- It is possible that at least some of these differences are due to differences between the genders in their response to stress, with boys more likely to display externalizing behaviour than girls, and girls more likely to develop internalising difficulties, for example

3.2 Vulnerable Children

One definition of vulnerability is "children who are at significant risk of harm to their wellbeing now and in the future as a consequence of the environment in which they are being raised" (Ministry of Social Development, 2012, p. 6).

Children from backgrounds of poverty are much more likely to experience delays in a number of areas, including cognition, language and social-emotional development. This affects a number of aspects of their lives, including their likelihood of achieving academically at school (Ansari & Winsler, 2013; Bridges et al., 2004; Burger, 2010; Domitrovich et al., 2013). Some estimate that the achievement gap between the poorest and the most affluent children equates to around two thirds of a school year (Bridges et al., 2004).

Benefits and Risks

Much has been made of the advantages for vulnerable children in attending ECEC as a means of improving outcomes across the life span. For example it is claimed that “high quality early childhood education can help families and whanau living in disadvantaged circumstances cope with the stresses and challenges of daily life to help ameliorate the effect of poverty and risk for children” (Barnett, 1995, and, Smith et al., 2000, cited by Expert Advisory Group on Solutions to Child Poverty, 2012, p. 4).

In most studies of typically available ECEC, the quality of the care is only modestly related to developmental outcomes. However its impact appears greater for children from low income families (NICHD Early Child Care Research Network & Duncan, 2003). It is thought that this may go some way towards compensating for the relatively deprived environments those children may encounter at home (Dearing, McCartney, & Taylor, 2009).

There is some evidence to suggest that when a child’s home situation is “markedly disadvantageous” that childcare at 2-3 years of age, may protect against the development of aggressive behaviour, possibly through a dilution of exposure to family risk and possibly through the provision of alternative positive learning experiences that are less available to such children at home (Borge, Rutter, Côté, & Tremblay, 2004, p. 373).

Benefits for vulnerable children are far from universally found. A Scottish pilot project that provided preschool for vulnerable children from the age of 2-years as well as support for their parents found that whilst the children made developmental gains, this was not significantly different from the gains made by matched control children (Woolfson & King, 2008).

In other countries, such as Delaware in the US, there is research indicating an increase in child neglect amongst children of single parents following welfare reforms promoting parental employment (Fein & Lee, 2003), which often serves as a proxy for childcare.

Impact of Quality

As outlined earlier, there have been lasting positive outcomes from specific early intervention studies conducted with disadvantaged children, such as the Perry Preschool project, Chicago Child-Parent Centres and the Abecedarian programme (Datta Gupta & Simonsen, 2010). However, these results have not been successfully replicated in other programmes (Barnett, 2010, cited by Domitrovich et al., 2013). Effect sizes for Perry and Abecedarian are substantially larger than those typically found in non-experimental studies of community-based ECEC (Hungerford & Cox, 2006; NICHD Early Child Care Research Network & Duncan, 2003).

A study of more than 700 children aged 4–8 years, found that those with a better quality preschool experience had improved developmental outcomes over a 5 year period. Benefits included language and maths ability, cognitive and attention skills, reduced behavioural difficulties and enhanced sociability. This positive effect was stronger for children from backgrounds of greater risk (Peisner-Feinberg et al., 2001). It is

important to note, that as with a number of other studies, the comparison was made between the effects of childcare of differing quality. No comparison was made between those who attended childcare and those who did not. As Dearing and colleagues (2009) pointed out, if we are interested in learning what best supports development of children from low-income families “external validity is limited substantially if children in maternal care are not considered” (Dearing et al., 2009, p. 1331).

Domitrovich and colleagues (2013) found that for low-income, predominantly Black or Hispanic children, attending an enhanced preschool programme for 2 years (i.e. aged 3 and 4 years) was associated with having higher receptive vocabulary, literacy and numeracy scores at school entry compared to children attending for 1 year (Domitrovich et al., 2013). Children attended for 5 mornings per week, from 8am – 1pm and families received three home visits and two parent-teacher conferences. Teachers had higher than average professional qualifications and participated in high levels of professional development (Domitrovich et al., 2013).

Some studies have found the effects of ECEC to be greater for those children experiencing vulnerability or disadvantage of one form or another. For example, following the Kindergarten Act of 1975 in Norway, which led to a significant expansion of subsidised high quality ECEC, those children who gained most were those with mothers who had lower formal education levels (Havnes & Mogstad, 2011). It should be noted that this resulted in a shift from informal to formal care arrangements, and does not represent support for formal ECEC over the benefits of parental care.

Watamura and colleagues (2011) found that whilst vulnerable children were “open to the compensatory influence of high-quality childcare” they were also vulnerable to the ‘double jeopardy’ of poor home environment and poor quality ECEC (Watamura et al., 2011, p. 61).

Research Complexities

As much of the research in this field is not experimental (i.e. there is seldom a randomised, controlled trial) it is crucial to be mindful of selection issues as attendance at ECEC, as well as the type and quality of ECEC attended, are related to family demographics that themselves predict children’s outcomes (NICHD Early Child Care Research Network & Duncan, 2003). For example, children from more advantaged families with higher maternal income and education are likely to have a more stimulating and responsive home environment, and to attend centre-based childcare or higher quality home-based childcare (NICHD Early Child Care Research Network & Duncan, 2003). Bridges and colleagues (2004) found that whereas 49% of low income children attended Head Start or other centre-based care, more than 80% of upper-middle class children attended centre-based care.

Borge and colleagues (2004) also found strong effects of social selection in that mothers who cared for their children at home during their first three years differed systematically from those whose children attended childcare. They report that those caring for their own children were likely to be less well-educated, belonging to a lower occupational

group, having more children and with less adaptive family functioning (Borge et al., 2004). This is consistent with NZ trends (see Chapter 5).

Family selection factors such as these can bias any estimates of the effects of ECEC (Hungerford & Cox, 2006). In other words, both the factors making it more likely that parents chose higher quality care, and the impact of the higher quality care itself, are associated with enhanced academic achievement for children from low income families (Dearing et al., 2009).

For instance, parents with better parenting skills were also more likely to enrol their children in preschool at 3 years compared with parents who enrolled their children a year later (Puma 2006, 2010, cited by Domitrovich et al., 2013).

Duration of Effects

Results are influenced by many factors, including the country where the ECEC is provided and the research conducted. In their study across Denmark and the United States, Esping-Andersen and colleagues (2012) found Danish children who were enrolled in high quality childcare at 3 years old, were more likely to have higher cognitive scores at 11 years. This effect was stronger for children with lower scores, and those from low income families. However, in the US whilst scores were higher at school entry, the positive effects tended to disappear by 11 years, and particularly for the more at-risk children (Esping-Andersen et al., 2012). The reference group for the US study was children who received only parental care. However, the analysis of the Danish data compared children in high quality childcare with "children in low quality care or care by parents only" (Esping-Andersen et al., 2012, p. 581).

Childcare attendance at 9 months of age has been associated with improved cognitive outcomes at 3 years for children of poorly educated mothers, however, these effects were no longer evident at 5 or 7 years of age (Cote et al., 2013). As mentioned earlier, this may be due to children being in an environment where test behaviour is practised, with improved results reflecting this, rather than any enduring change.

The benefits of increased family income are often cited as a rationale for children from low-income families attending ECEC. While such a financial benefit may be advantageous to children of single mothers, these same children are also more vulnerable to the adverse effects of reduced time with their mothers, particularly if the childcare is of low quality (Gennetian et al., 2010).

Access to Quality ECEC

Despite the findings indicating that children facing disadvantage may be more likely to benefit from high quality ECEC, it appears that they are also the least likely to access it. The childcare they do receive has been found to be very variable in terms of quality and often inadequate to meet their developmental needs (Fuller et al., 2004, and Li-Grining, 2006, cited by Votruba-Drzal, Coley, Maldonado-Carreno, Li-Grining, & Chase-Lansdale, 2010). They are least likely to attend centre-based ECEC and more likely to attend low quality care (Esping-Andersen et al., 2012).

This is also the case in NZ, with services assessed as being of poor quality by the Education Review Office (ERO) being over-represented in more disadvantaged neighbourhoods (ECE Sector Advisory Group, 2012, cited by Ritchie, Harvey, Kayes, & Smith, 2014). This is of concern, particularly in light of the recently introduced requirement that children of welfare beneficiaries attend ECEC or parents face benefit sanctions (Ritchie et al., 2014).

Conclusion

The studies reviewed here do not provide strong support for the efficacy of ECEC in improving outcomes for vulnerable children. They suggest that:

- There are some indications that vulnerable children are more likely to benefit from ECEC that is of high quality, than their more advantaged peers
- There is little evidence to indicate any positive effects are long-lasting
- Any benefits in the literature typically relate to the preschool period, that is 3–4 year olds, rather than for younger children, particularly below the age of 2 years (Carroll-Lind & Angus, 2011)
- The quality of care available to vulnerable children, including in NZ, is likely to be poorer than that available to more advantaged children
- Some studies have found no significant differences, and others have found detrimental effects, for example, an increase in child neglect
- Where there are benefits, these decrease, but do not close, the achievement gap between vulnerable children and their more advantaged peers

There are several methodological issues that should be borne in mind when considering the implications of ECEC for vulnerable children:

- Comparisons are often made between higher quality care and lower quality care. Unsurprisingly, higher quality childcare is more likely to be of benefit
- Few studies compare the effects of ECEC with maternal or parental care, making it very difficult to draw conclusions about the effects of ECEC per se
- Some of the data showing benefits for vulnerable children relies on the early intervention studies described in Chapter 1, which should not be equated with the effects of ECEC in isolation, nor the effects of typically available ECEC
- The difficulty in disentangling selection effects from the effects of the care itself

As others have pointed out, any public investment in ECEC for children in poverty “should take place in tandem with aggressive intervention to improve the quality of the home environments to which most poor children are exposed” (Joo, 2010, p. 813).

3.3 Temperament & Genes

It has been suggested that, like many experiences children may encounter, “childcare does not affect all children in the same way” (Pluess & Belsky, 2009, p. 396). Kagan and colleagues suggested that temperamentally inhibited children “may find early child care particularly stressful” (1978, cited by Belsky & Eggebeen, 1991, p. 1085). Relatively recently, researchers have begun to investigate the possibility that a child’s biological/genetic makeup moderates their sensitivity to ECEC (Lipscomb et al., 2014).

Temperament

Temperament can be defined as “stable patterns of emotional reactivity that appear to influence childhood and adult behaviour and psychopathology”(Sheridan & Nelson, 2009, p. 54).

Beijers and colleagues (2013) studied 193 Dutch children until 30 months of age. Infants who displayed highly negative affect at three-months-old had increased internalising and externalising behaviour problems at 30 months, if they attended centre-based childcare in the first year of life. For children with low or average levels of negativity, centre-based care was not associated with increased behavioural difficulties (Beijers et al., 2013). Interestingly, the infants rated high in negative affect who were cared for by their parents had the lowest incidence of behavioural difficulties (Beijers et al., 2013). This supports the differential susceptibility hypothesis of Pluess & Belsky (2009), which posits that it is not simply that these infants are more at risk of adverse effects from problematic environments, but that they also benefit more from supportive environments (Pluess & Belsky, 2009).

A study of 186 children aged between 6-30 months found “children perceived by their mothers as being more difficult show more internalising and total problem behaviours as well as less satisfaction and happiness within the daycare setting”(De Shipper et al., 2004, p. 267). Unlike some other studies, they found no association between temperament and externalising behaviour.

Crockenberg & Leerkes (2005) found that children who were more reactive to novelty as infants and experienced more than 30 hours childcare per week at 2½ years of age had significantly more internalising behaviour difficulties than similarly reactive infants who received less or no non-parental care. “The finding that early temperament interacted also with long hours of non-parental care at 6 months introduces the possibility that long hours of childcare that begin early and continue contribute to the development of internalizing behaviour in young children” (Crockenberg & Leerkes, 2005, p. 32). They also found that infants who were more easily frustrated and spent long hours in centre-based care had more externalizing behaviour than infants of a similar temperament who attended other forms of non-parental care (Crockenberg & Leerkes, 2005).

In a number of studies temperament has been found to interact with childcare experience to predict cortisol levels over the course of the day. In particular, children who have a more reactive temperament, with greater social fearfulness and less self-control, show greater increases in cortisol over the day than do children with a more easy-going temperament (Geoffroy et al., 2006; Phillips et al., 2011). This suggests that children with a more reactive temperament who experience fulltime care from an early age may be most at risk (Vermeer & Ijzendoorn, 2006).

In terms of possible mechanisms a number of theories have been proposed. One of these suggests that an infant’s negativity “reflects a highly sensitive nervous system on which experience registers powerfully – negatively when not regulated by the caregiver but positively when coregulation occurs” (Belsky, 2005, cited by Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2007, p. 303).

It has also been suggested that “for children with more negative, inhibited temperaments, the experience of child care may provide more frequent opportunities for the activation of social fearfulness, which characterises children with this temperamental disposition. For children who tend toward aggressive behaviour, child care may pose experiences of social threat that arise from negative peer interactions” (Phillips et al., 2011, p. 47).

Genes

It is only very recently that researchers have investigated the gene-environment interaction with respect to ECEC. However, many of the longitudinal studies currently underway include a genetic component and gather data regarding early childhood educational experiences and thus more will be understood in the future.

A recent study looked at genetic influences and children’s early experiences, including ECEC, on the development of externalising behaviour. Lipscomb and colleagues (2014) studied the effect of parenting style and centre-based ECEC on externalising behaviours in 233 adopted children. Children with a genetic pre-disposition for temperamental dysregulation (i.e. their birth parents had poor temperamental regulation) were more likely to exhibit externalising behaviours as a result of center-based ECEC attendance than other children. These children were also more sensitive to the effects of over-reactive (adoptive) parenting on externalising behaviour (Lipscomb et al., 2014).

The above study considers the effects of the whole genome, compared to other studies which examine the effects of specific genetic variations in relation to outcomes. An association between a particular variant of a receptor for the neurotransmitter dopamine, known as DRD4, and behaviour has been investigated by two groups (Belsky & Pluess, 2013; Berry, McCartney, Petrill, Deater-Deckard, & Blair, 2014). When combined with childcare attendance, children with the DRD4 variant have better attention skills and inhibitory control in pre-K compared to children with other variants of DRD4 (Berry et al., 2014). There is also evidence that children with this DRD4 variant are more susceptible to the detrimental effects of poor quality ECEC, resulting in the development of more externalising behaviours (Belsky & Pluess, 2013). As the authors state, “the results of this study should be regarded more as “proof of concept” rather than a basis for definitive conclusions” (Belsky & Pluess, 2013, p. 1223), and thus more studies are required to fully understand the link between genes and ECEC in behaviour development.

Conclusions

This is a relatively new field of research, with comparatively few studies to draw on. However, the emerging knowledge further contributes to our awareness that ECEC may be experienced differently by different children depending upon their own genetic makeup and temperament.

It is worth bearing in mind when considering other studies regarding outcomes from attending ECEC, that “average outcomes may hide the presence of large effects in susceptible participants and simultaneous small or absent effects in less susceptible subjects” (Bakermans-Kranenburg & van Ijzendoorn, 2011, p. 50).

Chapter 4: ECEC Factors

4.1 Dose

“More than 20 years ago, studies in the USA first suggested that the amount of external childcare is associated with increased child problem behaviour” (Averdijk et al., 2011, p. 652). Belsky initially reported on the adverse effects of “early, extensive and continuous care” in 1986 (Belsky, 2007, p. 4). Since then, a number of other studies have been conducted which support these earlier findings.

Range of Exposure

It is worth considering the total ‘dose’ of care and what this looks like over the childhood period. Children who enter fulltime care at 6 weeks of age and continue in fulltime care until they are 5 years old may spend more than 10,000 hours in care. This is more than all their primary and intermediate school hours combined (Bedford & Sutherland, 2008).

This dose, of course, varies widely amongst children. “Some children start routine non-maternal care virtually from the beginning of their life and others not until they are 3 or 4, if at all. Moreover, some are in care on a fulltime basis, whereas others experience care on only a part-time basis. What this means is that by the time they are one, three or even 5 years of age, children vary immensely in the total amount of time that they have spent in non-maternal care arrangements” (Belsky, 2007, p. 11).

It can be difficult to disentangle the effects of the amount of care, or dose, from the age at entry as these are often highly correlated, with most research reflecting their combined effects (Mathers, Eisenstadt, Sylva, Soukakou, & Ereky-Stevens, 2014).

Threshold

There is no evidence for a particular threshold regarding the quantity of care, rather “it appears that a linear dose-response relationship most accurately characterises the association between amount of child care experience and socioemotional adjustment in the NICHD data” (NICHD Early Child Care Research Network, 2003, p. 999). As Belsky explains, “as quantity of care increased, so did problem behaviour” (Belsky, 2007, p. 12).

Both the age at which a child enters childcare and the hours of their attendance combine to determine the ‘dosage’ effect (Loeb et al., 2007).

Behavioural Effects

Loeb and colleagues (2007) found evidence of negative behavioural effects for those with at least 15 hours childcare per week. When the amount of time spent in childcare increased to 30 or more hours, the negative effect on behaviour more than doubled (Loeb et al., 2007).

Full-day childcare was associated with poorer social outcomes than part-day childcare (Gormley et al., 2011). In this study, a full-day was 6.5 hours, with a part-day of 3.25 hours. This is considerably different to the full day experienced by many NZ children

which may be up to 10.5 hours (Carroll-Lind & Angus, 2011). It is worth noting that this is likely to be longer than any single staff member would work, resulting in changes in care from the child's perspective.

A Swedish study found children receiving the greatest amounts of childcare had levels of aggression at 7 years almost three times higher than the aggression rates for children in the least amount of childcare (Averdijk et al., 2011).

It is important to note that even when quality of care was controlled for, more time in childcare was associated with increased behavioural difficulties (NICHD Early Child Care Research Network, 2002).

Increasing hours in preschool from 20-30 per week to 30-40 per week led to significantly poorer child outcomes in areas such as behaviour problems, peer relationship difficulties, hyperactivity and inattention and reduced pro-social behaviour (Datta Gupta & Simonsen, 2010). One of the rationales for this outcome was that greater hours in preschool restrict the amount of time available for the child to be with their parents. This study was conducted in Denmark, which has lower children to staff ratios than other OECD nations, so it is likely that such increases in hours of attendance may have an even greater impact in countries where the ratios are less favourable. Further, this study looked at the impact on 3-year-olds. The impact on younger children, particularly babies, may be more marked.

Mechanisms

There are several possible reasons why a greater number of hours spent in non-maternal care may have adverse effects on a number of outcomes. Attending ECEC for 20 hr/week may lead to very different outcomes from 45 hr/week, as "one allows for substantial time with both parents in addition to time with peers, whereas the other to a higher degree restricts time with parents" (Datta Gupta & Simonsen, 2010, p. 35).

Children cared for by their parents may have more opportunities for individualised interactions with an adult, than those who are being cared for by an adult with responsibility for many children (Berry et al., 2014).

Conclusions

As with most factors impacting child development, the amount of exposure, or dose, is an important variable.

- In their attempt to answer the question of how much care is too much, Loeb and colleagues concluded that "the answer depends upon which child and which domain of child development is being examined" (Loeb et al., 2007, p. 64).
- The impact of extended periods of time in childcare "is consistently viewed as a risk for the under 2 age group" (Carroll-Lind & Angus, 2011, p. 72).
- There is no evidence that increasing the amount of time spent in quality childcare confers greater developmental benefits than spending less time in childcare (Belsky, 2007; Farquhar, 2008).

- Internationally there is huge variability in the amount of ECEC attended from birth to 5-years-old, ranging from 0 to 10,000 hours. This is also true in NZ.
- Adverse effects of greater ECEC exposure are particularly seen in relation to child behaviour
- As discussed previously (Chapter 2), research does not indicate that the behavioural difficulties necessarily reach levels of clinical concern
- Research indicates there is no threshold but a linear dose-response relationship, with increasing amount of child care associated with increased rates of behavioural difficulties
- Policy often neglects this factor. For example, NZ targets to increase ECEC participation do not appear to consider from what age, nor for how many hours a child is attending

4.2 Quality

One aspect of the ECEC itself that may influence children's outcomes is the quality of care those children attending ECEC receive. Much research includes reference to high quality care. However it is difficult to pinpoint the components of such quality. It is worth noting that, given the relatively recent phenomenon of infants and toddlers in ECEC, much of the available research about quality relates to 3- and 4-year old children, with much less known about quality for under-two-year-olds (Dalli et al., 2011).

The quality of a child's environment is important "because neurobiological and child development research shows that unresponsive, inconsistent, unhealthy, unstable relationships, coupled with ongoing exposure to highly stressful environments in the first years of life are known to negatively affect brain development with potential long-term consequences" (Dalli et al., 2011, p. 149).

Structure & Process

Definitions of quality vary but often include factors such as group size, ratios of adults to children, and the physical environment (National Scientific Council on the Developing Child, 2004). These factors are often referred to as the structural aspects of quality.

The Abecedarian early intervention described previously, had a ratio of one adult to three children for those under two-years-old (Campbell et al., 2001). This is the ratio that is required in Norway (Bekkhuis, Rutter, Maughan, & Borge, 2011) and has been recommended in NZ in recent years (Carroll-Lind & Angus, 2011; Dalli et al., 2011). However, current NZ regulations require only 1:5 in ECE centres and 1:4 in home-based care for children of this age (Carroll-Lind & Angus, 2011).

Rolfe (2000) commented that caregiver infant ratios of 1:5 "all but guarantee that even the most skilled and highly trained carers are frustrated in their attempts" to develop the close relationships with children in their care that are needed for optimal development (Rolfe, 2000, p. 12)

This ratio can influence a number of outcomes, including a child's attachment security. One study found that for infants, a ratio of 1:3 or less was associated with an attachment security rate of 72%, compared with a secure-attachment rate of 57% for

those infants with higher infant-adult ratios (Howes & Spieker, 2008, cited by Sagi et al., 2002).

The relationships young children have “affect virtually all aspects of their development – intellectual, social, emotional, physical, behavioural and moral.” When ECEC is considered as a component of the child’s environment of relationships, ‘quality’ is viewed differently (National Scientific Council on the Developing Child, 2004, p. 1).

This aspect of care provider behaviour is often referred to as a process aspect of care quality (Gunnar et al., 2010). Examples of process components of quality can include - sensitivity to children, provision of cognitive stimulation, encouragement of exploration, and warm and sensitive interactions (Vandell et al., 2010, cited by Li, Farkas, Duncan, Burchinal, & Vandell, 2012). For example, in high quality ECEC “adults respond to children with warmth and affection and promptly comfort and reassure children when necessary” (Education Review Office, 2009, p. 8).

Findings

Watamura and colleagues looked at outcomes for children who attended high or low quality ECEC and whose home was of high or low quality. Unsurprisingly, they found that “children who experience double jeopardy deriving from low-quality home and child-care environments are particularly at risk for compromised development” including behaviour problems and lower levels of pro-social behaviour (Watamura et al., 2011, p. 60). Components of high quality in this study included caregiver qualifications, child-adult ratios, environmental factors including space and materials, and caregiver sensitivity (Watamura et al., 2011).

The following dimensions have been identified as underpinning quality ECEC for children under 2-years. “High adult to child ratios, small group sizes, staff qualifications and skills, positive and responsive care relationships, superior environments, parent involvement, attention to health and safety requirements, and effective pedagogy through a socially, culturally and developmentally appropriate curriculum” (Carroll-Lind & Angus, 2011, p. 191).

It is worth noting that, “while expensive child care is not necessarily high-quality care, it is clear that high-quality care is expensive” (Helburn, 1995, cited by Li et al., 2012, p. 10).

Research vs Reality

Research definitions of quality are not necessarily translated into available care of high quality. In the US, for instance some consider the care to be generally of poor quality (National Scientific Council on the Developing Child, 2004). In NZ “the regulatory regime, the education and support services and the monitoring of practices for under 2 year olds is short of what is in their best interests” (Carroll-Lind & Angus, 2011, p. 193).

Further, there is an apparent discrepancy between what ECEC experts and researchers consider high quality, and what parents understand it to be. In one study “parental ratings (were) only modestly correlated with observed quality” (Cryer & Burchinal, 1997,

cited by NICHD Early Child Care Research Network & Duncan, 2003, p. 1456). Most parents consider that their child is attending high-quality care (NICHD Early Child Care Research Network & Duncan, 2003). This is not surprising, as few parents would knowingly have their child attend poor quality care, although some research indicates that cost and location are often the determining factors in parents' choice of ECEC for their child (Barraclough & Smith, 1996, cited by Dalli et al., 2011).

In NZ parents "may not be able to ensure their infants are in high quality care as a result of lack of knowledge and information or lack of availability" (Expert Advisory Group on Solutions to Child Poverty, 2012, p. 4). An Education Review Office (ERO) review found that in centres for infants and toddlers "there was wide variation in the quality of education provided" (Education Review Office, 2009, p. 14), so whilst some services were found to provide high quality, others were not.

Methodological Issues

Early intervention studies, often used as evidence of the benefits of ECEC are examples of particularly high quality care, not usually available elsewhere, with substantial additional components such as home visiting and health services. Their outcomes should not be used to illustrate the effects of quality ECEC.

Effect sizes in typically available care are "substantially smaller" than those found in early intervention studies, and when a reasonable number of covariates are used, quality has a modest effect size on cognitive outcomes (NICHD Early Child Care Research Network & Duncan, 2003, p. 1471).

It is important to consider the country in which the child care is occurring when drawing conclusions about quality and its impacts due to differing regulations and practices. For instance, whereas the US meets 3/10 of the UNICEF quality benchmarks, Norway met 8/10, and NZ 6/10 (UNICEF, 2008). "These variations will have an impact on how childcare relates to children's development and make it difficult to generalize across contexts (Love et al., 2003, and UNICEF, 2008, cited by Lekhal, 2012, p. 198).

It is difficult to disentangle the effects of higher quality ECEC from the more advantaged homes that children attending higher quality care typically come from. As discussed previously, children of more educated parents and higher SES are more likely to attend quality ECEC.

As with any other aspect covered in this review, the issue of quality interacts with other factors, including the amount of time a child is in care. For example, the amount of time a child spent in care "was a stronger predictor of externalizing behaviour at 24 & 54 months in lower quality compared to higher quality care"(Gunnar et al., 2010, p. 851).

As discussed earlier, in some instances, the heightened cortisol levels were observed even when children attended care of high quality (Vermeer & Ijzendoorn, 2006), although another meta-analysis found this effect greater when children attended low quality care (Geoffroy et al., 2006). Gunnar and colleagues found "no significant associations between any of the structural measures of care quality and the rise in cortisol at day care", including teacher experience and training, and the number of

children or adults present (Gunnar et al., 2010, p. 863). However, they did find differences when looking at the process measures of care. Findings included associations between warm supportive care and child behaviour, but not the cortisol rise. On the other hand, "intrusive, over-controlling care was associated with larger rises in cortisol over the day-care day" (Gunnar et al., 2010, p. 863).

Conclusions

- A number of components contribute to high quality care, typically divided into structural and process factors
- Quality of ECEC is most important for those who are vulnerable, but they are less likely to access it
- There is some evidence that quality has an impact; however, it is not the only factor that impacts a child's outcomes and should not be unnecessarily elevated in importance
- Children attending poor quality ECEC, and coming from environments of heightened risk are particularly likely to be adversely impacted
- Higher quality care may reduce the risks associated with ECEC (Love et al., 2003) but does not necessarily remove them. For example, the increased risk of behavioural difficulties associated with time in ECEC occurred for care at all levels of quality
- As others have found, the studies reviewed here indicate that "toddlers and pre-schoolers in good and excellent childcare have better outcomes than those in mediocre or poor childcare in many different areas" (Howes & Brown, 2000, cited by Mathers et al., 2014, p. 14). However, "they do not show that centre-based childcare is superior to parental care for all children" (Buckingham, 2007, p. 6).

4.3 Stability of Care

One aspect of ECEC that appears to have received relatively little research attention is that of the stability of care a child receives (Youngblade, 2003). This is an important aspect given what we know about the significance of relationships in child development, particularly in the first few years of life.

Such stability has been considered in several different ways. These include: teacher/caregiver retention; stability with regard to a child's primary caregiver; longitudinal stability in ECEC setting over time for the child; and regularly having multiple ECEC arrangements over a day or week, known as multiplicity (Ansari & Winsler, 2013; Beijers et al., 2011; Tran & Winsler, 2011). Arrangement multiplicity and long term stability issues are often confounded (Beijers et al., 2011).

Rate

It has been estimated that between 33% and 60% of children experience childcare instability before they begin school (Chase et al., 2005, Lowe et al., 2003, Miller, 2003, and Tran & Weinraub, 2006, cited by Ansari & Winsler, 2013). In Australia, nearly a quarter of children under 5-years-old experience multiple non-parental care arrangements, and this proportion grows with increasing age to reach almost 40% of 4-

and 5-year-olds (Claessens & Chen, 2013). Similarly, Morrissey (2009) cites earlier work indicating that over a quarter of children under 5-years-old experience two or more childcare arrangements in an average day or week in the US (Adams et al., 2007, and, Johnson, 2005, cited by Morrissey, 2009).

Infants in the NICHD study were found to typically experience more than two non-parental care arrangements, in their first year of life alone, a fact that concerned the authors (NICHD Early Child Care Research Network, 2005). By three years of age nearly three-quarters of children in child care were found to have experienced two or more concurrent childcare arrangements, in a subset of the NICHD sample (Morrissey, 2009).

Several studies in the US suggest that children from disadvantaged families are likely to experience the most frequent changes (Ha et al., 2012, cited by Ansari & Winsler, 2013). This contrasts with findings in Australia, where children of relatively advantaged backgrounds, including having a more educated mother and higher family income, were more likely to experience multiple care arrangements (Claessens & Chen, 2013).

Behavioural Outcomes

A number of altered outcomes have been associated with multiple or unstable care arrangements, such as: behavioural difficulties including withdrawal and aggression; reduced social skills; attachment insecurity; and, health implications (e.g. see Ansari & Winsler, 2013; NICHD Early Child Care Research Network, 2005).

In terms of behavioural outcomes, one study of 2- and 3-year-olds found that an increasing number of care arrangements was related to a small but significant increase in child behaviour problems and decreased pro-social behaviour (Morrissey, 2009). This was also the case for Australian children in the *Growing Up in Australia* longitudinal study who had fewer pro-social behaviours and an increased rate of conduct problems when they were being cared for in multiple settings concurrently (Claessens & Chen, 2013).

Youngblade (2003) found that at nine or ten years of age, children whose mothers had been employed during their first year of life were more likely to be seen by their teachers and peers as acting out and displaying less frustration tolerance. This effect was partially mediated by the number of non-parental care arrangements these children experienced as infants (Youngblade, 2003).

Staff turnover constitutes one form of instability from a child's perspective, and this is higher in for-profit services (UNICEF, 2008). This has particular relevance to NZ as ECEC is increasingly provided by commercial, for-profit companies (Carroll-Lind & Angus, 2011).

The majority of research suggests that instability of non-parental care has an adverse effect on children's social adjustment, likely resulting from the stress associated with these changes for children and the impact on the formation of sensitive relationships between caregiver and child (Morrissey, 2009).

Having many caregivers, or a "series of losses related to significant caregivers" may put children at risk for later difficulties (Howes & Phillips, 1987, cited by Youngblade, 2003,

p. 479). Even if regular transitions become routine for parents, moving among different environments may still be a stressful experience for their children (Beijers et al., 2011).

Health

Increased numbers of caregiving arrangements had implications for a number of aspects of children's physical health. These included higher rates of ear infections, gastrointestinal infections and asthma (Chen, 2013). This study used the total number of arrangements children experienced from several different time points across their early years, thus both long-term stability and multiplicity of arrangements are included together.

Similarly, children experiencing multiplicity of care were more likely to experience higher rates of communicable illnesses compared to children in a single form of non-parental care (Morrissey, 2013).

Complexities

The impact of multiple concurrent care arrangements was found to be greater for those children considered to have a more difficult temperament who had a greater likelihood of internalising behaviour difficulties (de Schipper, Tavecchio, Van Ijzendoorn, & Van Zeijl, 2004). In other studies, boys were more likely to be affected, displaying increased problem behaviour, as were younger children who evidenced greater distress (Youngblade, 2003, and Cryer et al., 2005, cited by Morrissey, 2009). However, another study found girls were more vulnerable to multiplicity (Morrissey, 2009).

The number of changes is also important. A study of low income minority children whose parents were not married found that two or more changes in care were related to increased behaviour difficulties, whereas one change was not (Pilarz & Hill, 2014).

Conclusions

For children attending ECEC, those with stable care are likely to do better than those experiencing changes in their non-parental care (Ansari & Winsler, 2013).

- Instability of care can result from staff changes, a child moving from one ECEC setting to another over time, and/or having multiple non-parental arrangements occurring simultaneously
- For children attending childcare, multiple arrangements and instability of care are common, occurring for up to 60% children
- Adverse outcomes can be seen in terms of children's physical health and wellbeing
- Social and behavioural outcomes are adversely affected by instability/multiplicity of care arrangements
- Instability as a result of staff changes is more common in for-profit services (UNICEF, 2008)

Chapter 5: The New Zealand Context

When looking at the potential impacts of ECEC attendance discussed elsewhere in this review, it is necessary to understand how many children in NZ are being affected. This section first provides some context regarding issues such as participation rates, amount of time spent in care, ages of children in care, types of care and their changing usage. Secondly it describes NZ research, namely the Christchurch Health and Development study, Competent Children project, and *Growing Up in New Zealand*. Finally, the 2011 ECE Taskforce Report is critiqued.

5.1 Facts & Figures

Participation Rates

By international standards NZ has high rates of participation in ECEC with the 8th largest proportion of under-3-year-olds in licensed childcare, out of 24 nations (UNICEF, 2008). By the time they start school, approximately 95.7% of NZ children have attended some form of ECEC (Ministry of Education, 2013a). Interestingly, this overall participation rate is not dissimilar to the 95% rate reported almost 20 years prior (Fergusson, Horwood, & Lyskey, 1994).

Currently, the NZ Government has a goal of 98% participation in ECEC before school, to be achieved by 2016 (Ministry of Education, 2013a).

In many regards, these participation rates conceal more than they reveal. For instance, of particular relevance for this review are the age of children and the duration of care, both of which influence the expected outcomes from ECEC participation. While the overall rates have remained relatively stable, the changing trends of usage that underpin them have not. Some of these changes are outlined below.

Growing Up in New Zealand Data

A useful snapshot of current experience for children in NZ is provided by the longitudinal study, *Growing Up in New Zealand (GUINZ)*, which is studying a cohort of more than 6,000 children from Auckland and the Waikato region. GUINZ found that at the age of 9 months, 35% of infants were being regularly cared for each week by someone other than the child's parents (Morton et al., 2014). Of these children, 36% were reported by their mothers to have the majority of their care in a formal daycare centre and 32% were cared for by grandparents (Morton et al., 2014).

In terms of the amount of time spent in child care, the median duration per week was 20 hours, with a mean of 23.0 hours (Morton et al., 2012). The main reason for being in care was to accommodate the mother's work or study commitments, which applied to 87% of the children (Morton et al., 2012).

At 2-years of age, 56% of the GUINZ cohort was being regularly looked after each week by someone other than their parents. Of those in regular non-parental care 59% had their main care arrangement in a formal kindergarten, preschool or daycare centre. The average length of time that the 2-year-olds spent in this care was 24 hours per week (Morton et al., 2014).

The *GUIiNZ* cohort is currently around 4.5 years old and will provide us with current NZ data regarding the impact of ECEC in the coming years.

Types of ECEC

A report by Statistics New Zealand (2012) compared formal childcare use between 1998 and 2009. The types of care included in their definition of formal care include public kindergartens, childcare centres, *kōhanga reo*, bilingual centres, organised home-based ECEC, and play groups. Their report illustrates a number of changes, including a shift from kindergarten as the most common type of ECEC, to childcare centres. In 1998 19.2% attended public kindergarten, and 17.4%, childcare centres; by 2009 15.2% were attending kindergarten and 24.9% childcare centres. The percentage of children attending Playcentre decreased from 7.2% in 1998 to 6.7% in 2009 (Statistics New Zealand, 2012).

The most recent figures available from the Ministry of Education break down the attendance at different types of care as follows. Of those children attending licensed ECEC services, 63.4% attended an education and care service; 15.9% attended Kindergarten; 9.6% attended home based care; 6.4% attended Playcentre; and, 4.5% attended *Kōhanga reo* (Ministry of Education, 2014).

Another change in ECEC usage in recent years is that a larger proportion of children are attending more than one type of childcare. This has increased from 8% in 1998, to 11.6% in 2009 (Statistics New Zealand, 2012).

Hours & Number of Days

The median number of hours attended increased from 10 to 17 hours per week from 1998 to 2009 (Statistics New Zealand, 2012). In 2013 a Ministry of Education report found that the average hours of ECEC attendance had increased to 21.7 hours per week (Ministry of Education, 2013a). The 2014 Census Summary saw a change in data collection systems, however suggest that "it is likely to have continued the same upwards trend" (Ministry of Education, 2014, p. 13).

Both in 1998 and 2009, of those attending formal ECEC, the largest proportion attended for 5 days per week (1998 - 31.7%, and 2009 - 30.4%). However, the overall trend was an increase in the number of days, with the proportion of those attending for 3 or more days increasing from 52.8% (1998) to 74% (2009) (Statistics New Zealand, 2012).

One factor possibly impacting on this is the corresponding increase in the number of ECEC services providing all day rather than sessional care, which rose from 65% in 2004 to 87% in 2013 (Ministry of Education, 2013a).

Age

As is often the case with statistics, the figures vary, but there is overwhelming agreement that enrolment rates have increased substantially, particularly for the youngest children.

The increased attendance was most notable for 1-year-olds with the proportion of this age attending ECEC increasing from 14.7% (1998) to 23.8% (2009). Of those attending ECEC, the proportion attending for only one day per week decreased from 43.4% in 1998 to 27.9% in 2009 (Statistics New Zealand, 2012). The Ministry of Education report that attendance by under-1-year-olds increased by 40% between 2004 and 2013, and 1-year-olds had a similar increase of 39.3% (Ministry of Education, 2013a). The report from the Office of the Children's Commissioner stated that "enrolment rates for under threes have more than doubled since 1990, with the fastest growth being . . . children under two years of age" (Carroll-Lind & Angus, 2011, p. 45).

Anecdotally, there are reports of babies as young as 8 days old beginning ECEC. Babies are attending for both the shortest and longest durations, ranging from 3 hours twice a week, to 10.5 hours five times a week (Carroll-Lind & Angus, 2011). It is variations such as these, which are likely to have greatly differing impacts on the children concerned, that a focus on overall participation rates ignores.

Finances

Attendance at ECEC is not equally distributed across people of differing socioeconomic status. International research indicates that childcare attendance, particularly centre-based care, is associated with higher parental education and income (Belsky & Eggebeen, 1991; O'Brien-Strain, Moye & Sonenstein, 2003, cited by Loeb et al., 2007) and this is also the case in NZ. Where family income is \$20,000 or less, 39.6% of children attended formal ECEC, compared with 68.6% of children from families with an income of more than \$70,000 (Statistics New Zealand, 2010, cited by Carroll-Lind & Angus, 2011).

Costs to families vary considerably, from a gold coin donation at some kōhanga reo to \$450 per week at some private centres (Carroll-Lind & Angus, 2011). *GUI* report that the average cost to parents of two-year-olds in care was \$160 per week, with 23% of families of children in childcare receiving a childcare subsidy (Morton et al., 2014).

This is only part of the picture however, as public expenditure on ECEC in 2013 was \$9600 per year, per Full Time Equivalent child (Ministry of Education, 2013b). The Government was expected to spend \$1.5 billion on ECEC in the 2013/14 financial year, with \$255 million of this for the care of under 2 year olds (Health Committee, 2013). "Internationally, New Zealand ranks in the top group of OECD countries in terms of both its per-child public investment in ECE and its proportion of total public spending allocated to ECE" (Ministry of Education, 2013b).

Policy Impacts

In June 2007 the 20 hours ECE scheme was introduced, which meant 3- and 4-year-olds attending participating teacher-led services could receive up to 20-hours funded ECE per week (Ministry of Education, 2013a). However, despite this incentive to increase participation by 3- and 4-year-olds, the largest increase was actually seen in 1- to 2-year-olds, followed by babies (Bedford & Sutherland, 2008). By 2013, 85% of licensed ECEC providers were participating in this scheme (Ministry of Education, 2013a).

It is worth noting that teacher-led services do not necessarily mean children are being cared for by trained teachers, as some home-based caregiving and au pair agencies also qualify for this funding.

5.2 NZ Research

Within the New Zealand context, education policy recommends participation in early childhood education to encourage development in the early years, with a particular focus on increasing the participation of Māori and Pacific children, and those living in low socio-economic areas (Ministry of Education, 2008, 2010, and Ministry of Social Development, 2008, 2010, cited by Morton et al., 2012).

There is relatively little research on the effects of ECEC as it is provided in NZ. However two examples are described below.

Christchurch Health and Development Study

The Christchurch Health and Development study used longitudinal data to investigate the effects of existing systems of ECE on outcomes for more than 700 children born in Christchurch in 1977, and their impact at 13 years of age (Fergusson et al., 1994).

They found a small but statistically significant association between the duration of ECEC and mean cognitive and academic test scores (measured on WISC-R, Progressive Achievement Tests, and TOSCA). Children who had attended ECEC for three years had mean test scores 5 to 12 points higher than children who had not attended ECEC. They also noted a trend of increasing test scores with increasing duration of ECEC attendance (Fergusson et al., 1994). It should be noted that the majority of children attended public Kindergarten or Playcentre. Both of these operate on a sessional basis, and the latter is parent run. At the time of the study, children were typically entering Kindergarten at the age of three years, and Playcentre at 2½ years (Fergusson et al., 1994). The remaining children attended childcare centres and informal play groups. The majority of children (52.8%) attended ECEC for between 1 and 2 years, in other words the age at which they commenced was between 3 and 4 years.

One of the issues with non-experimental studies on ECEC is the presence of confounding factors that are associated both with attendance at ECEC, and with later outcomes. In the Christchurch study, there were significant correlations between factors such as parental level of education, family SES, ethnicity, family size, maternal responsiveness, and the length of time children attended ECEC. In fact, these family variables were correlated more highly with children's later test scores, than was their ECEC attendance (Fergusson et al., 1994). As the authors conclude, studies may "reflect the effects of uncontrolled confounding factors which are associated with both exposure to early education and later academic achievement" (Fergusson et al., 1994, p. 114). After results had taken account of these confounding factors, the association between length of ECEC and test outcomes reduced "quite substantially" and resulted in a mean difference of 4.6 points between those with more than 2 years ECEC and those who had not attended at all (Fergusson et al., 1994, p. 113).

The authors conclude that ECEC may be associated with improved academic outcomes. However, as their results are likely to be the upper limit of the benefits of NZ ECEC to later academic achievement, they “suggest it would be unwise to aggressively promote the view that early education of the type provided to this cohort makes an important contribution to subsequent academic achievement” (Fergusson et al., 1994, p. 115).

Unfortunately, despite their greater relevance to NZ and the strong methodology of the study, these results are often neglected in other reviews. It has been suggested that it was “probably ignored because the findings were not politically palatable” (Farquhar, 2008, p. 8).

The Competent Children Study

Another example of NZ research regarding ECEC is the *Competent Children, Competent Learners* study. This began with a pilot study in 1992, with data collection beginning in 1993 (Wylie et al., 2004). The main purpose of the study was to “to explore the roles of home and education in the development of the children’s competencies” (Wylie et al., 2004, p. xix), with a key focus being the role of ECEC in children’s lives. The project was funded by the Ministry of Education (Wylie, 1996).

The original sample included 307 children, aged 4½ years, from the Wairarapa, Kapiti Coast and Wellington regions (Wylie, 1996). The sample was drawn from different ECEC types rather than the population at large, resulting in an over-representation of Pakeha children from high income homes, whose mothers had a trade/tertiary qualification. The entire sample attended ECEC services. When the children were 8 years old, an additional 242 children who had been part of another survey were added in order to increase the sample size (Wylie et al., 2004).

Children’s competence was assessed in ten areas including literacy and numeracy, and in social skills. The quality of the ECEC children attended just prior to commencing school was investigated across 21 different aspects, including structural aspects such as staff training and group size, and process elements, for example, staff responsiveness to children and asking open-ended questions (Wylie, 1996).

These children have been followed up at two-yearly intervals and at the age of 12 years researchers concluded that “the study children’s early childhood educational experience was still contributing to their mathematics and reading comprehension scores seven years later” (Wylie et al., 2004, p. xxxiv). Several years later researchers report that ECEC with staff who are highly responsive to children can impact those children’s social skills at 16 years of age (Hodgen, 2007). However, in terms of the magnitude of the impact of ECEC quality, the researchers report that it was “smaller than the effect of maternal qualifications” (Hodgen, 2007, p. 30).

As other studies have found (e.g. Esping-Andersen et al., 2012), there were differences in the proportion of children from different family backgrounds accessing quality ECEC. For instance, the rates of children attending a centre in the top quartile for staff responsiveness were 14% where mothers had no qualifications, compared with 39% of children with university educated mothers (Hodgen, 2007).

Farquhar (2008) comments that these findings have been used to convince parents of the benefits of non-parental care for children and support political policies promoting increased access for 3- and 4-year-olds. However, as only children attending ECEC were sampled, it is not possible to make comparisons between those attending ECEC and those who did not (Farquhar, 2008). Therefore these results indicate that higher quality ECEC is more likely to benefit children than poorer quality ECEC. This echoes the results of international studies. However these results cannot be used to support the notion that ECEC is beneficial to all children relative to parental care.

5.3 ECE Taskforce Report: A critique

The information shared in the preceding sections has implications for our understanding of the ECE TaskForce Report, commissioned by the Minister of Education, and completed in 2011 (Early Childhood Education Taskforce, 2011).

This report has been cited widely including by the Health Select Committee, the Expert Advisory Group on Solutions to Child Poverty, and an Infometrics Report, among others (Expert Advisory Group on Solutions to Child Poverty, 2012; Health Committee, 2013; Infometrics Ltd, 2011).

This report claims to be based on evidence regarding the benefits of ECEC, with its first key message stating that “An impressive body of research evidence confirms that returns from quality early childhood education are high and long lasting. Therefore, this is one of the most important investments a country can make” (Early Childhood Education Taskforce, 2011, p. 3).

Similar generalisations are repeated throughout the report. However a closer look at its contents reveals a number of flaws, many relating to the methodological issues discussed earlier in the current review. Some of these issues are outlined and discussed below.

Methodological Issues

1. The Importance of the Early Years

“What happens in the early years of a child’s life can have enormous consequences for the child’s future well-being. For that reason, high quality early childhood education deserves to be among the highest priorities for any society” (Early Childhood Education Taskforce, 2011, p. 12).

The growing evidence base for the significance of a child’s early experiences is being misapplied here. There is an enormous leap in logic being made between the importance of a child’s early experiences, which is certainly supported by research, and the presumption that these experiences should occur away from parents in a formal ECEC environment.

2. Cost benefits

The Taskforce cite an analysis by Aos et al. (2004a) which reportedly found that “Early childhood education for low-income three and four year olds delivered a greater average

total benefit for each taxpayer dollar spent (\$2.36) than any other 'pre-kindergarten programme' (Early Childhood Education Taskforce, 2011, p. 25).

However, reading the analysis directly paints a different picture. What the Taskforce neglected to mention were the benefits per dollar for other interventions, for example: HIPPIY - \$1.80; Nurse Family Partnership - \$2.88; and, and Parent Child Interaction Training -\$3.64 (Aos et al., 2004a). Several of these interventions clearly provide greater cost-benefits than early childhood education.

Secondly, further reading of the Appendix to the Aos report (Aos, Lieb, Mayfield, Miller, & Pennucci, 2004b) indicates that some of the studies included in their cost-benefit analysis were the previously discussed Perry Preschool, Abecedarian Project and Chicago Child Parent Centres. Hence the cost benefits are based at least in part on very high quality model programmes that may bear little resemblance to typically available ECEC. In addition, both the Perry Preschool and CPC provided their intervention to 3- and 4-year olds.

These statements have been subsequently reported by others to further influence policy in NZ. For example, the following from the Infometrics Report: The "Early Childhood Education Taskforce found that early childhood education programmes with well educated, adequately paid teachers, small classrooms . . . and reasonable staff child ratios (less than 1:10) have repeatedly produced strong short and long term educational gains. American cost benefit analysis of a range of early childhood education programmes gives ratios of \$2.36 to \$16.14 for every \$1 invested" (ECE Taskforce Secretariat, 2011, cited by Infometrics Ltd, 2011, p. 19).

3. Reducing death/injury

"Participation in ECE has also been shown to reduce the risk of death or serious injury for children as a result of child abuse" (Early Childhood Education Taskforce, 2011, p. 26).

At first glance, this appears to provide a compelling case for greater provision of ECEC. One of the references cited is a report commissioned by the Children's Commissioner, *Death and serious injury from assault of children aged under 5 years in Aotearoa New Zealand* (Duncanson, Smith, & Davies, 2009). However, this report actually refers to public investment in childcare as a "proposed intervention" (Duncanson et al., 2009, p. 14) and does not provide evidence that ECEC attendance reduces child abuse or its consequences.

4. Improved health

"US research on the Head Start programme found that participation in Head Start reduced child mortality rates in five to nine year olds, compared with those rates observed in non-participating control groups" (Early Childhood Education Taskforce, 2011, p. 26).

As is pointed out in their footnote, Head Start also included health services. In fact, further research indicates that whilst Head Start is often seen as an early education

program, ECEC is one of six core components of the services it provides, and accounts for around 40% of the programme's budget (Richmond, Stipek & Zigler, 1979, and Currie & Neidell, 2006, cited by Ludwig & Miller, 2007). The other five components include parent involvement, nutrition, social services, mental health services and health services (Ludwig & Miller, 2007). Health services accounted for approximately one eighth of the total budget and included immunisations and screening for conditions such as tuberculosis, diabetes and nutritional deficiencies. Furthermore, other aspects of the comprehensive services provided, such as parenting support and social work services may improve children's health through reducing their exposure to chronic stress, and its associated effects on immune function (Ludwig & Miller, 2007).

Therefore, to claim that it is ECEC which leads to improved health outcomes is misleading, and also ignores the studies cited earlier indicating that the reverse may be true.

Conclusion

Others have argued that NZ ECE policy "is based on ideology and not on evidence of what is best for children" (Farquhar, 2008, p. 1), and that it is increasingly driven by employment and profit motivations which are at odds with children's actual needs in the early years (Bedford & Sutherland, 2008).

Chapter 6: Conclusions

Conceptual framework

It is useful to consider the results discussed in this review within the framework of risk and protective factors. In particular, this means that any risks identified are not necessarily related to poor outcomes for all those affected, equally, any positive or protective effects do not equate to good outcomes for all children.

Early Intervention Studies

Chapter One discussed the much-cited Perry Preschool, Chicago Child-Parent Centres and Abecedarian Project, which were multi-faceted early interventions for at-risk children.

They reported positive and often lasting outcomes including improved health, cognitive development, and school achievement. Their findings have subsequently been used in many countries to advocate for increasing access to ECEC. However, there are a number of reasons why much greater care is needed in applying these findings, and particularly before extrapolating them to all available ECEC.

Of particular note, all interventions comprised multiple components, including parent support and health services, of which ECEC was but one. Furthermore, the ECEC component was of much higher quality than typically available care including that currently available in NZ. The ECEC was usually part-time, with most children commencing when they were 3-4-years-old.

As the various components of these early interventions bear little resemblance to ECEC available in NZ similar results cannot be expected here. What these results really tell us is, if we give children a much higher quality of care than what is typically available in the community, and provide them and their families with comprehensive additional supports, particularly around parenting and health, this is likely to lead to improved outcomes.

Outcomes of ECEC

Several domains of child outcomes associated with ECEC attendance were explored in depth in Chapter Two.

In terms of cognitive or academic outcomes this review finds that any beneficial effects of ECEC are largely seen as a result of high-quality ECEC received during the preschool years (i.e. at 3 - 4 years of age) rather than at younger ages. However, the duration of these positive effects may be short-lived, often not lasting long after commencing school.

A number of methodological issues were raised around the findings in this area. By way of example, often a comparison is made between a specific ECEC programme and typically available care, so does not illustrate the effects of ECEC per se (nor ECEC compared with parental care), but rather the effects of higher quality care over lesser quality care.

The review finds that in some contexts ECEC attendance has been associated with adverse effects on children's behaviour, effects that may be long lasting, at times persisting until adolescence. However, this depends upon a number of factors. This risk appears to be heightened when ECEC attendance occurs at young ages, i.e. before 2 years and particularly before 1-year. Results are more mixed when children attend at 3-4 years of age. These findings are of concern given the large proportion of children who may be affected, and the social implications of this.

Research looking at children's cortisol production indicates that cortisol patterns differ on days that children attend childcare, compared to days they are cared for by parents. These effects are more likely when attending full-day as opposed to part-day childcare. Even when children outwardly appear to have adapted to their childcare arrangement, cortisol levels have still been found to be higher 5 months later.

A number of adverse physical health outcomes have been associated with ECEC attendance. These include increased rates of respiratory, digestive and general illnesses; increased rate of anti-biotic treatments; and, a greater likelihood of overweight/obesity in later childhood. The younger the child, the greater the adverse health effects are likely to be. There appears to be a dose-response effect, with those attending more hours of care at increased likelihood of more frequent illnesses than those attending for fewer hours.

The studies reviewed found an increased likelihood of insecure attachment associated with childcare attendance. This risk appeared greatest for infants in childcare in their first year of life, for those attending full-time rather than part-time childcare, and when occurring alongside other risks, such as lower maternal sensitivity, or attending poor quality care.

Child Factors

Characteristics of the child are likely to interact with their experiences to also influence outcomes. Chapter Three explored some of the research regarding the differing impacts ECEC may have on children in relation to their gender, level of vulnerability, and genes and temperament.

A number of studies find that boys are more likely to be adversely affected by attending ECEC than are girls. Where there are benefits, such as the early interventions which include ECEC as a component, these are more likely to be experienced by girls. It is possible that at least some of these differences are due to differences between the genders in their response to stress, with boys more likely to display externalizing behaviour than girls, for example.

Despite many claims to the contrary, this review did not find strong support for the efficacy of ECEC in improving outcomes for vulnerable children. There are some indications that vulnerable children are more likely to benefit from ECEC that is of high quality, than their more advantaged peers. However, the quality of care available to vulnerable children, including in NZ, is likely to be poorer than that available to more advantaged children. Any benefits typically relate to 3-4-year-olds, rather than younger

children, particularly below the age of 2 years. There is little evidence to indicate positive effects are long-lasting.

Several methodological issues were discussed including the fact that comparisons are often made between higher quality and lower quality care. Few studies compare the effects of ECEC with parental care, making it very difficult to draw conclusions about the effects of ECEC per se. The important efforts to improve outcomes for vulnerable children should consider the range of intervention options, including those that work directly in the home with parents.

The influence of a child's temperament and genes is a relatively new field of research, with comparatively few studies to draw on. However, the emerging knowledge further contributes to our awareness that ECEC may be experienced differently by different children depending upon their own genetic makeup and temperament.

ECEC Factors

Several aspects of ECEC itself and associated outcomes were explored in Chapter Four.

As with most factors impacting child development, the amount of exposure, or dose, is an important variable. The review found that there is huge variability across children, from 0 to 10,000 hours over the years from birth to school. The impact of extended periods of time in childcare is considered a risk factor particularly for those under 2-years of age. Adverse effects of greater ECEC exposure are particularly seen in relation to child behaviour. Research indicates there is no threshold but a linear dose-response relationship, with increasing amount of child care associated with increased rates of behavioural difficulties. Policy often neglects this factor. For example, NZ targets to increase ECEC participation do not state from what age, or for how many hours a child should be attending.

A number of components contribute to high quality care, typically divided into structural and process factors. Quality of ECEC is most important for those who are vulnerable, but they are less likely to access high quality ECEC. Children attending poor quality ECEC, and coming from environments of heightened risk are particularly likely to be adversely impacted. Higher quality care may minimise the risks associated with ECEC but does not necessarily remove them. The studies reviewed here indicate that young children in excellent childcare have better outcomes than those in poor childcare. However, this does not mean centre-based ECEC is superior to parental care.

For children attending ECEC, those with stable care are likely to do better than those experiencing changes in their care. However, amongst children attending childcare, multiple arrangements and instability of care are common. Children attending multiple concurrent arrangements, or those whose arrangements change, are more likely to have adverse outcomes, including poorer physical health and wellbeing, and social and behavioural difficulties. Instability as a result of staff changes is more common in for-profit services, which make up the bulk of ECEC provision in NZ.

The NZ Context

The literature reviewed indicates that NZ policy regarding the needs of young children has not been based on sound interpretations of research. It is time this changed, and the needs of children should now take the precedence they deserve.

References

- Ahnert, L., Gunnar, M. R., Lamb, M. E., & Barthel, M. (2004). Transition to child care: Associations with infant-mother attachment, infant negative emotion, and cortisol elevations. *Child Development, 75*(3), 639-650. doi: 10.1111/j.1467-8624.2004.00698.x
- Ahnert, L., Pinquart, M., & Lamb, M. E. (2006). Security of Children's Relationships With Nonparental Care Providers: A Meta-Analysis. *Child Development, 77*(3), 664-679. doi: 10.1111/j.1467-8624.2006.00896.x
- Alink, L. R. A., van Ijzendoorn, M. H., Bakermans-Kranenburg, M. J., Mesman, J., Juffer, F., & Koot, H. M. (2008). Cortisol and externalizing behavior in children and adolescents: Mixed meta-analytic evidence for the inverse relation of basal cortisol and cortisol reactivity with externalizing behavior. *Developmental Psychobiology, 50*(5), 427-450. doi: 10.1002/dev.20300
- Anderson, M. L. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects. *Journal of the American Statistical Association, 103*(484), 1481-1495. doi: 10.1198/016214508000000841
- Ansari, A., & Winsler, A. (2013). Stability and sequence of center-based and family childcare: Links with low-income children's school readiness. *Children and Youth Services Review, 35*(2), 358-366. doi: <http://dx.doi.org/10.1016/j.childyouth.2012.11.017>
- Aos, S., Lieb, R., Mayfield, J., Miller, M., & Pennucci, A. (2004a). *Benefits and costs of prevention and early intervention programs for youth*. Washington, DC: Washington State Institute for Public Policy. Retrieved from http://www.wsipp.wa.gov/ReportFile/881/Wsipp_Benefits-and-Costs-of-Prevention-and-Early-Intervention-Programs-for-Youth_Summary-Report.pdf
- Aos, S., Lieb, R., Mayfield, J., Miller, M., & Pennucci, A. (2004b). *Benefits and Costs of Prevention and Early Intervention Programs for Youth: Technical Appendix*. Olympia, WA: Washington State Institute for Public Policy. Retrieved from http://www.wsipp.wa.gov/ReportFile/883/Wsipp_Benefits-and-Costs-of-Prevention-and-Early-Intervention-Programs-for-Youth_Appendix-B.pdf
- Averdijk, M., Besemer, S., Eisner, M., Bijleveld, C., & Ribeaud, D. (2011). The relationship between quantity, type, and timing of external childcare and child problem behaviour in Switzerland. *European Journal of Developmental Psychology, 8*(6), 637-660. doi: 10.1080/17405629.2011.571846
- Badanes, L. S., Dmitrieva, J., & Watamura, S. E. (2012). Understanding cortisol reactivity across the day at child care: The potential buffering role of secure attachment to caregivers. *Early Child Research Quarterly, 27*, 156-165.
- Baker, M., Gruber, J., & Milligan, K. (2008). Universal child care, maternal labor supply, and family well-being. *Journal of Political Economy, 116*(4), 709-745.
- Bakermans-Kranenburg, M. J., & van Ijzendoorn, M. H. (2011). Differential susceptibility to rearing environment depending on dopamine-related genes: New evidence and a meta-analysis. *Development and Psychopathology, 23*(01), 39-52. doi: 10.1017/S0954579410000635
- Barnes, J., Leach, P., Malmberg, L. E., Stein, A., Sylva, K., & the, F. T. (2009). Experiences of childcare in England and socio-emotional development at 36 months. *Early Child Development and Care, 180*(9), 1215-1229. doi: 10.1080/03004430902943959
- Bedford, M., & Sutherland, K. (2008). Early childhood education in New Zealand: Do we have a runaway train? *The First years: Nga Tau Tuatahi New Zealand Journal of Infant and Toddler Education 10*(1), 38-42.
- Beijers, R., Jansen, J., Riksen-Walraven, M., & de Weerth, C. (2011). Nonparental care and infant health: Do number of hours and number of concurrent arrangements

- matter? *Early Human Development*, 87(1), 9-15. doi: <http://dx.doi.org/10.1016/j.earlhumdev.2010.09.003>
- Beijers, R., Riksen-Walraven, M., Putnam, S., de Jong, M., & de Weerth, C. (2013). Early non-parental care and toddler behaviour problems: Links with temperamental negative affectivity and inhibitory control. *Early Childhood Research Quarterly*, 28(4), 714-722. doi: <http://dx.doi.org/10.1016/j.ecresq.2013.06.002>
- Bekkhuis, M., Rutter, M., Maughan, B., & Borge, A. I. H. (2011). The effects of group daycare in the context of paid maternal leave and high-quality provision. *European Journal of Developmental Psychology*, 8(6), 681-696. doi: 10.1080/17405629.2011.602232
- Belsky, J. (2007). *Quality, quantity and type of child care: Effects on child development in the USA*. Paper presented at the Early Childhood Education: International Perspectives, Potsdam, Germany.
- Belsky, J. (2008). Classroom composition, childcare history and social development: Are childcare effects disappearing or spreading? *Social Development*, 18(1), 230-238.
- Belsky, J., Bakermans-Kranenburg, M. J., & van Ijzendoorn, M. H. (2007). For better and for worse: Differential susceptibility to environmental influences. *Current Directions in Psychological Science (Wiley-Blackwell)*, 16(6), 300-304. doi: 10.1111/j.1467-8721.2007.00525.x
- Belsky, J., & Eggebeen, D. (1991). Early and extensive maternal employment and young children's socioemotional development: Children of the National Longitudinal Survey of Youth. *Journal of Marriage and Family*, 53(4), 1083-1098. doi: 10.2307/353011
- Belsky, J., & Pluess, M. (2013). Genetic moderation of early child-care effects on social functioning across childhood: A developmental analysis. *Child Development*, 84(4), 1209-1225. doi: 10.1111/cdev.12058
- Belsky, J., & Rovine, M. J. (1988). Nonmaternal care in the first year of life and the security of infant-parent attachment. *Child Development*, 59(1), 157-167. doi: 10.2307/1130397
- Belsky, J., Vandell, D. L., Burchinal, M., Clarke-Stewart, A., McCartney, K., Owen, M. T., & the NICHD Early Child Care Research Network. (2007). Are there long term effects of early child care? *Child Development*, 78(2), 681-701.
- Berger, L. M., Hill, J., & Waldfogel, J. (2005). Maternity leave, early maternal employment and child health and development in the US. *Economic Journal*, 115(501), F29-F47. doi: 10.1111/j.0013-0133.2005.00971.x
- Bernal, R., & Keane, M. P. (2011). Child care choices and children's cognitive achievement: The case of single mothers. *Journal of Labor Economics*, 29(3), 459-512.
- Bernard, K., Peloso, E., Laurenceau, J.-P., Zhang, Z., & Dozier, M. (2014). Examining Change in Cortisol Patterns During the 10-Week Transition to a New Child-Care Setting. *Child Development*, n/a-n/a. doi: 10.1111/cdev.12304
- Berry, D., McCartney, K., Petrill, S., Deater-Deckard, K., & Blair, C. (2014). Gene-environment interaction between DRD4 7-repeat VNTR and early child-care experiences predicts self-regulation abilities in prekindergarten. *Developmental Psychobiology*, 56(3), 373-391. doi: 10.1002/dev.21105
- BestStart Education and Care Centres. Retrieved 26 August 2015, 2015, from <http://www.beststarteducare.co.nz/Home.aspx>
- Borge, A. I. H., Rutter, M., Côté, S., & Tremblay, R. E. (2004). Early childcare and physical aggression: differentiating social selection and social causation. *Journal of Child Psychology and Psychiatry*, 45(2), 367-376. doi: 10.1111/j.1469-7610.2004.00227.x
- Bridges, M., Fuller, B. C., Rumberger, R. W., & Tran, L. (2004). *Preschool for California's Children: promising benefits, unequal access*. Berkeley, CA: Policy Analysis for

- California Education (PACE). Retrieved from <http://files.eric.ed.gov/fulltext/ED491703.pdf>
- Bruce, J., Gunnar, M. R., Pears, K. C., & Fisher, P. A. (2013). Early adverse care, stress neurobiology, and prevention science; lessons learned. *Prevention Science, 14*(3), 247-256.
- Buckingham, J. (2007). Child Care: Who Benefits? *IssueAnalysis, 89*.
- Burger, K. (2010). How does early childhood care and education affect cognitive development? An international review of the effects of early interventions for children from different social backgrounds. *Early Childhood Research Quarterly, 25*(2), 140-165. doi: <http://dx.doi.org/10.1016/j.ecresq.2009.11.001>
- Camilli, G., Vargas, S., Ryan, S., & Barnett, W. S. (2010). Meta-analysis of the effects of early education intervention on cognitive and social development. *Teachers College Record, 112*, 579-620.
- Campbell, F. A., Conti, G., Heckman, J. J., Moon, S. H., Pinto, R., Pungello, E., & Pan, Y. (2014). Early Childhood Investments Substantially Boost Adult Health. *Science, 343*(6178), 1478-1485. doi: 10.1126/science.1248429
- Campbell, F. A., Pungello, E., Ramey, C. T., Miller-Johnson, S., & Burchinal, M. (2001). The development of cognitive and academic abilities: Growth curves from an early childhood educational experiment. *Developmental Psychology, 37*(2), 231-242.
- Campbell, F. A., Wasik, B. H., Pungello, E., Burchinal, M., Barbarin, O., Kainz, K., . . . Ramey, C. T. (2008). Young adult outcomes of the Abecedarian and CARE early childhood educational interventions. *Early Childhood Research Quarterly, 23*, 452-466.
- Canadian Paediatric Society. (2008). Health implications of children in child care centres Part A: Canadian trends in child care, behaviour and developmental outcomes. *Paediatric and Child Health, 13*(10), 863-867.
- Carroll-Lind, J., & Angus, J. (2011). *Through their lens: An inquiry into non-parental education and care of infants and toddlers*. Wellington, NZ: Office of the Children's Commissioner. Retrieved from www.occ.org.nz/publications
- Chen, J.-H. (2013). Multiple childcare arrangements and health outcomes in early childhood. *Maternal and Child Health Journal, 17*(3), 448-455. doi: 10.1007/s10995-012-1016-9
- Claessens, A. (2012). Kindergarten child care experiences and child achievement and socioemotional skills. *Early Childhood Research Quarterly, 27*(3), 365-375. doi: <http://dx.doi.org/10.1016/j.ecresq.2011.12.005>
- Claessens, A., & Chen, J.-H. (2013). Multiple child care arrangements and child well being: Early care experiences in Australia. *Early Childhood Research Quarterly, 28*(1), 49-61. doi: <http://dx.doi.org/10.1016/j.ecresq.2012.06.003>
- Clarke-Stewart, K. A. (1989). Infant day care: Maligned or malignant? *American Psychologist, 44*(2), 266-273. doi: 10.1037/0003-066x.44.2.266
- Clarke, S. H., & Campbell, F. A. (1998). Can intervention early prevent crime later? The abecedarian project compared with other programs. *Early Childhood Research Quarterly, 13*(2), 319-343. doi: 10.1016/s0885-2006(99)80042-8
- Côté, S. M., Borge, A. I., Geoffroy, M.-C., Rutter, M., & Tremblay, R. E. (2008). Nonmaternal care in infancy and emotional/behavioral difficulties at 4 years old: Moderation by family risk characteristics. *Developmental Psychology, 44*(1), 155-168. doi: 10.1037/0012-1649.44.1.155
- Cote, S. M., Doyle, O., Petitclerc, A., & Timmins, L. (2013). Child care in infancy and cognitive performance until middle childhood in the Millenium Cohort Study. *Child Development, 84*(4), 1191-1208.
- Crockenberg, S. C. (2003). Rescuing the baby from the bathwater: How gender and temperament (may) influence how child care affects child development. *Child Development, 74*(4), 1034-1038. doi: 10.1111/1467-8624.00585

- Crockenberg, S. C., & Leerkes, E. M. (2005). Infant temperament moderates associations between childcare type and quantity and externalizing and internalizing behaviors at years. *Infant Behavior and Development, 28*(1), 20-35. doi: <http://dx.doi.org/10.1016/j.infbeh.2004.07.002>
- D'Onise, K., Lynch, J. W., Sawyer, M. G., & McDermott, R. A. (2010). Can preschool improve child health outcomes? A systematic review. *Social Science & Medicine, 70*, 1423-1440.
- Dales, R. E., Cakmak, S., Brand, K., & Judek, S. (2004). Respiratory illness in children attending daycare. *Pediatric Pulmonology, 38*(1), 64-69. doi: 10.1002/ppul.20034
- Dalli, C., White, E. J., Rockel, J., Duhn, I., Buchanan, E., Davidson, S., . . . Wang, B. (2011). *Quality early childhood education for under-two-year-olds: What should it look like? A literature review*. Wellington, NZ: Ministry of Education. Retrieved from www.educationcounts.govt.nz/publications
- Datta Gupta, N., & Simonsen, M. (2010). Non-cognitive child outcomes and universal high quality child care. *Journal of Public Economics, 94*(1-2), 30-43. doi: 10.1016/j.jpubeco.2009.10.001
- de Schipper, J. C., Tavecchio, L. W. C., Van Ijzendoorn, M. H., & Van Zeijl, J. (2004). Goodness of fit in daycare: Relations of temperament, stability, and quality of care with children's adjustment. *Early Childhood Research Quarterly, 19*, 257-272.
- De Shipper, J. C., Tavecchio, I. W. C., Van IJzendoorn, M. H., & Van Zeijl, J. (2004). Goodness-of-fit in center day care: Relations of temperament, stability, and quality of care with the child's adjustment. *Early Child Research Quarterly, 19*, 257-272.
- Dearing, E., McCartney, K., & Taylor, B. A. (2009). Does higher quality early child care promote low-income children's math and reading achievement in middle childhood? *Child Development, 80*(5), 1329-1349. doi: 10.1111/j.1467-8624.2009.01336.x
- Dettling, A. C., Parker, S. W., Lane, S., Sebanc, A., & Gunnar, M. R. (2000). Quality of care and temperament determine changes in cortisol concentrations over the day for young children in childcare. *Psychoneuroendocrinology, 25*(8), 819-836. doi: [http://dx.doi.org/10.1016/S0306-4530\(00\)00028-7](http://dx.doi.org/10.1016/S0306-4530(00)00028-7)
- Dmitrieva, J., Steinberg, L., & Belsky, J. (2007). Child-care history, classroom composition, and children's functioning in kindergarten. *Psychological Science, 18*(12), 1032-1039. doi: 10.1111/j.1467-9280.2007.02021.x
- Domitrovich, C. E., Morgan, N. R., Moore, J. E., Cooper, B. R., Shah, H. K., Jacobson, L., & Greenberg, M. T. (2013). One versus two years: Does length of exposure to an enhanced preschool program impact the academic functioning of disadvantaged children in kindergarten? *Early Childhood Research Quarterly, 28*(4), 704-713. doi: <http://dx.doi.org/10.1016/j.ecresq.2013.04.004>
- Dubois, L., & Girard, M. (2005). Breast-feeding, day-care attendance and the frequency of antibiotic treatments from 1.5 to 5 years: A population-based longitudinal study in Canada. *Social Science & Medicine, 60*, 2035-2044.
- Duncanson, M. J., Smith, D. A. R., & Davies, E. (2009). *Death and serious injury from assault of children aged under 5 years in Aotearoa New Zealand: A review of international literature and recent findings*. Wellington, NZ: Office of the Children's Commissioner. Retrieved from <http://www.occ.org.nz/assets/Uploads/Reports/Child-abuse-and-neglect/Death-and-serious-injury.pdf>
- Early Childhood Education Taskforce. (2011). *An Agenda for Amazing Children: Final Report of the ECE Taskforce*. Wellington, NZ: Ministry of Education. Retrieved from http://www.taskforce.ece.govt.nz/wp-content/uploads/2011/06/Final_Report_ECE_Taskforce.pdf

- Education Review Office. (2009). *Early Childhood Monographs: The quality of education and care in infant and toddler centres*. Wellington, NZ: Education Review Office. Retrieved from <http://www.ero.govt.nz/National-Reports/Early-Childhood-Monograph-Series-The-Quality-of-Education-and-Care-in-Infant-and-Toddler-Centres-January-2009>
- Egeland, B., & Hiester, M. (1995). The long-term consequences of infant day-care and mother-infant attachment. *Child Development*, 66(2), 474-485. doi: 10.1111/1467-8624.ep9505240346
- Esping-Andersen, G., Garfinkel, I., Han, W.-J., & Magnuson, K. (2012). Child care and school performance in Denmark and the United States. *Children and Youth Services Review*, 34, 576-589.
- Evolve Education Group. (2015). *Annual Report 2015*. Retrieved from <http://www.evolveeducation.co.nz/images/EvolveAnnualReport2015ForNZX.pdf>
- Expert Advisory Group on Solutions to Child Poverty. (2012). *Education solutions to mitigate child poverty*. Wellington, NZ: Office of the Children's Commissioner,. Retrieved from <http://www.occ.org.nz/assets/Uploads/EAG/Working-papers/No-16-Education-solutions.pdf>
- Farquhar, S. E. (2008). Assessing the evidence on early childhood education/childcare. *ChildForum Research Working Paper* Retrieved from http://www.childforum.com/images/stories/childcareECE_effects.pdf
- Fein, D. J., & Lee, W. S. (2003). The Impacts of Welfare Reform on Child Maltreatment in Delaware. *Children and Youth Services Review*, 25(1-2), 83-111. doi: [http://dx.doi.org/10.1016/S0190-7409\(02\)00267-0](http://dx.doi.org/10.1016/S0190-7409(02)00267-0)
- Fergusson, D. M., Boden, J. M., & Hayne, H. (2011). Childhood Conduct Problems. In P. Gluckman & H. Hayne (Eds.), *Improving the Transition: Reducing Social and Psychological Morbidity During Adolescence* (pp. 59-78). Auckland, NZ: Office of the Prime Minister's Science Advisory Committee.
- Fergusson, D. M., Horwood, L. J., Grant, H., & Ridder, E. M. (2005). *Early Start Evaluation Report*. Christchurch, NZ: Early Start Project Ltd. Retrieved from <http://www.earlystart.co.nz/pdf/evalreport.pdf>
- Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1994). A longitudinal study of early childhood education and subsequent academic achievement. *Australian Psychologist*, 29(2), 110-115.
- Gennetian, L., Hill, H., Lopoo, L., & London, A. (2010). Mothers' employment and health of low-income children. *Journal of Health Economics*, 29(3), 353-363.
- Geoffroy, M.-C., Côté, S. M., Giguère, C.-É., Dionne, G., Zelazo, P. D., Tremblay, R. E., . . . Séguin, J. R. (2010). Closing the gap in academic readiness and achievement: the role of early childcare *Journal of Child Psychology & Psychiatry*, 51(12), 1359-1367. doi: 10.1111/j.1469-7610.2010.02316.x
- Geoffroy, M.-C., Côté, S. M., Parent, S., & Séguin, J. R. (2006). Daycare attendance, stress, and mental health. *The Canadian Journal of Psychiatry / La Revue canadienne de psychiatrie*, 51(9), 607-615.
- Geoffroy, M.-C., Power, C., Touchette, E., Dubois, L., Boivin, M., Séguin, J. R., . . . Côté, S. M. (2012). Childcare and overweight or obesity over 10 years of follow-up. *The Journal of Pediatrics*(0). doi: 10.1016/j.jpeds.2012.09.026
- Gormley, W. T., Jr., Gayer, T., Phillips, D., & Dawson, B. (2005). The effects of universal Pre-K on cognitive development. *Developmental Psychology*, 41(6), 872-884.
- Gormley, W. T., Jr., Phillips, D. A., Newmark, K., Welts, K., & Adelstein, S. (2011). Social-emotional effects of early childhood education programs in Tulsa. *Child Development*, 82(6), 2095-2109. doi: 10.1111/j.1467-8624.2011.01648.x
- Greenspan, S. I. (2003). Child Care research: A clinical perspective. *Child Development*, 74(4), 1064-1068.
- Groeneveld, M. G., Vermeer, H. J., van Ijzendoorn, M. H., & Linting, M. (2010). Children's wellbeing and cortisol levels in home-based and center-based

- childcare. *Early Childhood Research Quarterly*, 25(4), 502-514. doi: <http://dx.doi.org/10.1016/j.ecresq.2009.12.004>
- Gunnar, M. R. (1998). Quality of early care and buffering of neuroendocrine stress reactions: Potential effects on the developing human brain. *Preventative Medicine*, 27, 208-211.
- Gunnar, M. R., Kryzer, E., Phillips, D. A., & Van Ryzin, M. J. (2010). The rise in cortisol in family daycare: Associations with aspects of care quality, child behavior, and child sex. *Child Development*, 81(3), 851-869.
- Gunnar, M. R., Tout, K., de Haan, M., Pierce, S., & Stanbury, K. (1997). Temperament, social competence, and adrenocortical activity in preschoolers. *Developmental Psychobiology*, 31(1), 65-85. doi: 10.1002/(sici)1098-2302(199707)31:1<65::aid-dev6>3.0.co;2-s
- Han, W.-J., Waldfogel, J., & Brooks-Gunn, J. (2001). The effects of early maternal employment on later cognitive and behavioral outcomes. *Journal of Marriage and Family*, 63(2), 336-354. doi: 10.1111/j.1741-3737.2001.00336.x
- Haskins, R. (1985). Public school aggression among children with varying day-care experience. *Child Development*, 56(3), 689. doi: 10.1111/1467-8624.ep7252237
- Havnes, T., & Mogstad, M. (2011). No Child Left Behind: Subsidized child care and children's long-run outcomes. *American Economic Journal: Economic Policy*, 3(2), 97-129. doi: 10.2307/41238095
- Health Committee. (2013). *Inquiry into improving child health outcomes and preventing child abuse with a focus from preconception until three years of age*. Wellington, NZ: New Zealand House of Representatives. Retrieved from http://www.parliament.nz/resource/en-nz/50DBSCH_SCR6007_1/3fe7522067fdab6c601fb31fe0fd24eb6befae4a
- Heckman, J. J., & Masterov, D. V. (2004). *The productivity argument for investing in young children*. Invest in Kids Working Group, Committee for Economic Development. Retrieved from <http://www.ced.org/pdf/The-Productivity-Argument-for-Investing-in-Young-Children.pdf>
- Heckman, J. J., Pinto, R., & Savelyev, P. (2013). Understanding the mechanisms through which an influential early childhood program boosted adult outcomes. *American Economic Review*, 103(6), 2052-2086. doi: 10.1257/aer.103.6.2052
- Heckman, J. J., Pinto, R., Shaikh, A. M., & Yavitz, A. (2011). Inference with imperfect randomisation: The case of the Perry Preschool Program.
- Hodgen, E. (2007). *Early childhood education and young adult competencies at age 16: Technical report 2 from the age-16 phase of the longitudinal Competent Children, Competent Learners study*. Wellington, NZ: New Zealand Council for Educational Research. Retrieved from <http://www.nzcer.org.nz/research/publications/early-childhood-education-and-young-adult-competencies-age-16-technical-report>
- Howes, C., Rodning, C., Galluzzo, D. C., & Myers, L. (1988). Attachment and child care: Relationships with mother and caregiver. *Early Childhood Research Quarterly*, 3(4), 403-416. doi: [http://dx.doi.org/10.1016/0885-2006\(88\)90037-3](http://dx.doi.org/10.1016/0885-2006(88)90037-3)
- Howes, C., & Spieker, S. (2008). Attachment relationships in the context of multiple caregivers. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of Attachment Theory, Research, and Clinical Applications* (2nd ed., pp. 317-332). New York, NY: The Guilford Press.
- Hungerford, A., & Cox, M. J. (2006). Family factors in child care research. *Evaluation Review*, 30(5), 631-655.
- Infometrics Ltd. (2011). *1000 days to get it right for every child: The effectiveness of public investment in New Zealand Children*. Retrieved from http://www.everychildcounts.org.nz/_w/wp-content/uploads/2011/08/ECCInfometricsInvestmentinchildrenAug11.pdf

- Joo, M. (2010). Long-term effects of Head Start on academic and school outcomes of children in persistent poverty: Girls vs. boys. *Children and Youth Services Review*, 32(6), 807-814. doi: 10.1016/j.childyouth.2010.01.018
- Kaga, Y., Bennett, J., & Moss, P. (2010). *Caring and Learning Together: A cross-national study on the integration of early childhood care and education within education* Paris, FR: UNESCO. Retrieved from <http://unesdoc.unesco.org/images/0018/001878/187818e.pdf>
- Kay, N., & Pennucci, A. (2014). *Early childhood education for low income students: A review of the evidence and benefit-cost analysis*. Olympia: Washington State Institute for Public Policy. Retrieved from http://www.wsipp.wa.gov/ReportFile/1547/Wsipp_Early-Childhood-Education-for-Low-Income-Students-A-Review-of-the-Evidence-and-Benefit-Cost-Analysis_Full-Report.pdf
- Lamb, M. E., Sternberg, K. J., & Prodromidis, M. (1992). Nonmaternal care and the security of infant-mother attachment: A reanalysis of the data. *Infant Behavior and Development*, 15(1), 71-83. doi: [http://dx.doi.org/10.1016/0163-6383\(92\)90007-S](http://dx.doi.org/10.1016/0163-6383(92)90007-S)
- Lekhal, R. (2012). Do type of childcare and age of entry predict behavior problems during early childhood? Results from a large Norwegian longitudinal study. *International Journal of Behavioral Development*, 36(3), 197-204.
- Li, W., Farkas, G., Duncan, G. J., Burchinal, M. R., & Vandell, D. L. (2012). Timing of High-Quality Child Care and Cognitive, Language, and Preacademic Development. *Developmental Psychology*, 49(8), 1440-1451. doi: 10.1037/a0030613
- Lipscomb, S. T., Laurent, H., Neiderhiser, J. M., Shaw, D. S., Natsuaki, M. N., Reiss, D., & Leve, L. D. (2014). Genetic vulnerability interacts with parenting and early care and education to predict increasing externalizing behavior. *International Journal of Behavioral Development*, 38(1), 70-80. doi: 10.1177/0165025413508708
- Loeb, S., Bridges, M., Bassok, D., Fuller, B., & Rumberger, R. W. (2007). How much is too much? The influence of preschool centers on children's social and cognitive development. *Economics of Education Review*, 26(1), 52-66. doi: 10.1016/j.econedurev.2005.11.005
- Love, J. M., Harrison, L., Sagi-Schwartz, A., Van Ijzendoorn, M. H., Ross, C., Ungerer, J. A., . . . Chazan-Cohen, R. (2003). Child Care Quality Matters: How Conclusions May Vary With Context. *Child Development*, 74(4), 1021-1033. doi: 10.1111/1467-8624.00584
- Ludwig, J., & Miller, D. L. (2007). Does Head Start improve children's life chances? Evidence from a regression discontinuity design. *Quarterly Journal of Economics*, 122(1), 159-208.
- Magnuson, K. A., Ruhm, C., & Waldfogel, J. (2007). Does prekindergarten improve school preparation and performance? *Economics of Education Review*, 26(1), 33-51. doi: 10.1016/j.econedurev.2005.09.008
- Martin, S. L., Ramey, C. T., & Ramey, S. (1990). The prevention of intellectual impairment in children of impoverished families: Findings of a randomized trial of educational daycare. *American Journal of Public Health*, 80(7), 844-847.
- Mathers, S., Eisenstadt, N., Sylva, K., Soukakou, E., & Ereky-Stevens, K. (2014). *Sound Foundations: A review of the research evidence on quality of Early Childhood Education and Care for children under three*. University of Oxford. Retrieved from <http://www.suttontrust.com/our-work/research/item/sound-foundations/>
- McLaughlin, A. E., Campbell, F. A., Pungello, E. P., & Skinner, M. (2007). Depressive symptoms in young adults: The influences of the early home environment and early educational child care. *Child Development*, 78(3), 746-756. doi: 10.1111/j.1467-8624.2007.01030.x
- Mersky, J. P., Topitzes, J. D., & Reynolds, A. J. (2011). Maltreatment prevention through early childhood intervention: A confirmatory evaluation of the Chicago Child-

- Parent Center preschool program. *Children and Youth Services Review*, 33(8), 1454-1463. doi: <http://dx.doi.org/10.1016/j.childyouth.2011.04.022>
- Ministry of Education. (1996). *Te whāriki: He whāriki mātauranga mō ngā mokopuna o Aotearoa: Early Childhood Curriculum*. Wellington, NZ: Learning Media. Retrieved from <http://www.education.govt.nz/early-childhood/teaching-and-learning/ece-curriculum/te-whariki/redownloadpdf>
- Ministry of Education. (2013a). Annual ECE Census Summary Report. Retrieved from <http://www.educationcounts.govt.nz/statistics/ece2/annual-ece-summary-reports>
- Ministry of Education. (2013b). *Public expenditure on Early Childhood Education (ECE)*. Wellington, NZ: NZ Government. Retrieved from <http://www.educationcounts.govt.nz/statistics/ece2/ece-indicators/public-expenditure-on-early-childhood-education-ece>
- Ministry of Education. (2014). *Annual Early Childhood Education (ECE) census summary report 2014*. Retrieved from <http://www.educationcounts.govt.nz/statistics/early-childhood-education/annual-ece-summary-reports>
- Ministry of Health. (2011). *Healthy Beginnings: Developing perinatal and infant mental health services in New Zealand*. Wellington, NZ. Retrieved from www.health.govt.nz
- Ministry of Social Development. (2012). *The White Paper for Vulnerable Children*. New Zealand Government. Retrieved from <http://www.msd.govt.nz/documents/about-msd-and-our-work/work-programmes/policy-development/white-paper-vulnerable-children/white-paper-for-vulnerable-children-volume-1.pdf>
- Morrissey, T. W. (2009). Multiple child-care arrangements and young children's behavioural outcomes. *Child Development*, 80(1), 59-76.
- Morrissey, T. W. (2013). Multiple child care arrangements and common communicable illnesses in children aged 3 to 54 months. *Maternal and Child Health Journal*, 17(7), 1175-1184. doi: 10.1007/s10995-012-1125-5
- Morton, S. M. B., Atatoa Carr, P. E., Grant, C. C., Berry, S. D., Bandara, D. K., Mohal, J., . . . Wall, C. R. (2014). *Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Now we are Two: Describing our first 1000 days*. Auckland, NZ. Retrieved from www.growingup.co.nz
- Morton, S. M. B., Atatoa Carr, P. E., Grant, P., Lee, A. C., Bandara, D. K., Mohal, J., . . . Wall, C. R. (2012). *Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Report 2: Now we are born*. Auckland, NZ: Growing Up in New Zealand.
- Muennig, P., Schweinhart, L., Montie, J., & Neidell, M. (2009). Effects of a prekindergarten educational intervention on adult health: 37 year follow-up results of a randomized controlled trial. *American Journal of Public Health*, 99(8), 1431-1437.
- National Institute of Child Health and Human Development Early Child Care Research Network. (2000). The relation of child care to cognitive and language development. *Child Development*, 71(4), 960-980.
- National Scientific Council on the Developing Child. (2004). *Young Children Develop in an Environment of Relationships: Working Paper #1*. Retrieved from <http://www.developingchild.net>
- National Scientific Council on the Developing Child. (2005/2014). *Excessive Stress Disrupts the Architecture of the Developing Brain: Working Paper #3*.
- National Scientific Council on the Developing Child. (2012). *The Science of Neglect: The persistent absence of responsive care disrupts the developing brain; Working Paper 12*. Center on the Developing Child, Harvard University. Retrieved from http://developingchild.harvard.edu/resources/reports_and_working_papers/working_papers/wp12/

- NICHD Early Child Care Research Network. (2002). Early child care and children's development prior to school entry: Results from the NICHD study of early child care. *American Educational Research Journal*, 39(1), 133-164.
- NICHD Early Child Care Research Network. (2003). Does amount of time spent in child care predict socioemotional adjustment during the transition to kindergarten? *Child Development*, 74(4), 976-1005. doi: 10.1111/1467-8624.00582
- NICHD Early Child Care Research Network. (2005). Child Care in the first year of life. In NICHD Early Child Care Research Network (Ed.), *Child Care and Child Development* (pp. 39-49). New York, NY: The Guilford Press.
- NICHD Early Child Care Research Network, & Duncan, G. J. (2003). Modeling the impacts of child care quality on children's preschool cognitive development. *Child Development*, 74(5), 1454-1475. doi: 10.1111/1467-8624.00617
- Organisation for Economic Co-operation and Development. (2011). *Does Participation in pre-primary education translate into better learning outcomes at school?* Retrieved from <http://www.oecd-ilibrary.org/docserver/download/5k9h362tpvxp.pdf?expires=1396919180&id=id&accname=quest&checksum=4EB837BB673079E4143923EC397BD8A2>
- Ouellet-Morin, I., Tremblay, R. E., Boivin, M., Meaney, M., Kramer, M., & Côté, S. M. (2010). Diurnal cortisol secretion at home and in child care: a prospective study of 2-year-old toddlers. *Journal of Child Psychology & Psychiatry*, 51(3), 295-303. doi: 10.1111/j.1469-7610.2009.02167.x
- Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., & Yazejian, N. (2001). The relation of preschool child-care quality to children's cognitive and social developmental trajectories through second grade. *Child Development*, 72(5), 1534-1553.
- Phillips, D. A. (2010). *10 Years post Neurons to Neighbourhoods: What's at stake and what matters in child care?* Paper presented at the Celebration of the 20th Anniversary of CCDGB, Washington, DC. http://www.irle.berkeley.edu/cscce/wp-content/uploads/2010/12/DeborahPhillips_Keynote_CCDBG20thCelebration_10-19-10.pdf
- Phillips, D. A., Fox, N. A., & Gunnar, M. R. (2011). Same place, different experiences: Bringing individual differences to research in child care. *Child Development Perspectives*, 5(1), 44-49. doi: 10.1111/j.1750-8606.2010.00155.x
- Pianta, R. C., Nimetz, S. L., & Bennett, E. (1997). Mother-child relationships, teacher-child relationships, and school outcomes in preschool and kindergarten. *Early Childhood Research Quarterly*, 12(3), 263-280. doi: [http://dx.doi.org/10.1016/S0885-2006\(97\)90003-X](http://dx.doi.org/10.1016/S0885-2006(97)90003-X)
- Pilarz, A. R., & Hill, H. D. (2014). Unstable and multiple child care arrangements and young children's behavior. *Early Childhood Research Quarterly*, 29(4), 471-483. doi: <http://dx.doi.org/10.1016/j.ecresq.2014.05.007>
- Pluess, M., & Belsky, J. (2009). Differential susceptibility to rearing experience: the case of childcare *Journal of Child Psychology & Psychiatry*, 50, 396-404.
- Pollock, K. (2012). Early Childhood Education and Care. <http://www.teara.govt.nz/en/early-childhood-education-and-care>
- Ramey, C. T., Campbell, F. A., Burchinal, M., Skinner, M. L., Gardner, D. M., & Ramey, S. (2000). Persistent effects of early childhood education on high-risk children and their mothers. *Applied Developmental Science*, 4(1), 2-14.
- Ramey, C. T., & Ramey, S. L. (1994). Which children benefit the most from early intervention? *Pediatrics*, 94(6), 1064.
- Randall, P. P. (2010). *Preschool education in Virginia and the resulting academic effects for third- and fifth-grade at-risk students*. Doctor of Education Dissertation, Liberty University, Virginia. (AAT 3426964)

- Reynolds, A. J. (1995). One year of preschool intervention or two: Does it matter? *Early Childhood Research Quarterly, 10*(1), 1-31. doi: [http://dx.doi.org/10.1016/0885-2006\(95\)90024-1](http://dx.doi.org/10.1016/0885-2006(95)90024-1)
- Reynolds, A. J., & Ou, S.-R. (2011). Paths of effects from preschool to adult well-being: A confirmatory analysis of the Child-Parent Center Program. *Child Development, 82*(2), 555-582. doi: 10.1111/j.1467-8624.2010.01562.x
- Reynolds, A. J., Temple, J. A., Ou, S.-R., Arteaga, I. A., & White, B. A. B. (2011). School-based early childhood education and age-28 well-being: Effects by timing, dosage, and subgroups. *Science, 333*, 360-364.
- Ritchie, J., Harvey, N., Kayes, M., & Smith, C. (2014). *Our Children, our choice: Priorities for policy*. Auckland, NZ: Child Poverty Action Group. Retrieved from www.cpag.org.nz
- Roisman, G. I., Susman, E., Barnett-Walker, K., Booth-LaForce, C., Tresch Owen, M., Belsky, J., . . . Steinberg, L. (2009). Early family and child-care antecedents of awakening cortisol levels in adolescence. *Child Development, 80*(3), 907-920.
- Rolfe, S. A. (2000). Understanding relationships between professional carers and infants in child care. *The First Years: New Zealand Journal of Infant and Toddler Education, 2*(1), 9-12.
- Sagi, A., Koren-Karie, N., Gini, M., Ziv, Y., & Joels, T. (2002). Shedding further light on the effects of various types and quality of early child care on infant-mother attachment relationship: The Haifa study of early child care. *Child Development, 73*(4), 1166-1186.
- Sattler, J. M. (2008). *Assessment of Children: Cognitive Foundations* (5th ed.). San Diego, CA: Jerome M. Sattler, Publisher, Inc.
- Sattler, J. M., & Hoge, R. D. (2006). *Assessment of Children: Behavioral, Social, and Clinical Foundations* (5th ed.). San Diego, CA: Jerome M. Sattler, Publisher, Inc.
- Schwartz, P. (1983). Length of day-care attendance and attachment behavior in eighteen-month-old infants. *Child Development, 54*(4), 1073-1078. doi: 10.2307/1129911
- Schweinhart, L. J., Berrueta-Clement, J. R., Barnett, W. S., Epstein, A. S., & Weikart, D. P. (1985). Effects of the Perry Preschool program on youths through age 19: A summary. *Topics in Early Childhood Special Education, 5*(2), 26-35.
- Sheridan, M., & Nelson, C. A. (2009). Neurobiology of fetal and infant development. In C. H. Zeanah (Ed.), *Handbook of Infant Mental Health* (3rd ed., pp. 40-58). New York, NY: The Guilford Press.
- Smith, A. B., Grima, G., Gaffney, M., Powell, K., Masses, L., & Barnett, S. (2000). *Early Childhood Education: Literature Review Report to the Ministry of Education*. Dunedin, NZ: Children's Issues Centre, University of Otago. Retrieved from <http://taskforce.ece.govt.nz/wp-content/uploads/2010/11/ECE-Literature-Review.pdf>
- Spitz, H. H. (1993). Were children randomly assigned in the Perry Preschool Project? *American Psychologist, 48*(8), 915.
- Statistics New Zealand. (2012). *Childcare use and work arrangements in 1998 and 2009*. Wellington, NZ. Retrieved from http://www.stats.govt.nz/browse_for_stats/people_and_communities/Children/childcare-use-work-arrangements.aspx
- Stein, A., Malmberg, L. E., Leach, P., Barnes, J., Sylva, K., & the, F. T. (2013). The influence of different forms of early childcare on children's emotional and behavioural development at school entry. *Child: Care, Health and Development, 39*(5), 676-687. doi: 10.1111/j.1365-2214.2012.01421.x
- Taouma, J., Wendt-Samu, T., Podmore, V. N., Tapusoa, E., & Moananu, M. (2003). *Innovation and collaborative research development in an Early Childhood Centre*. Paper presented at the NZARE-AARE Conference, Auckland, NZ. <http://www.aogafaasamoaschool.nz/Innovation.pdf>

- Tarullo, A. R., & Gunnar, M. R. (2006). Child maltreatment and the developing HPA axis. *Hormones and Behavior*, 50(4), 632-639. doi: <http://dx.doi.org/10.1016/j.yhbeh.2006.06.010>
- Te One, S. (2013). Te Whariki: Historical accounts and contemporary influences 1990-2012. In J. Nuttall (Ed.), *Weaving Te Whariki - Aotearoa New Zealand's Early Childhood Curriculum Document in Theory and Practice* (2nd ed., pp. 7-34). Wellington, NZ: NZCER Press.
- Temple, J. A., & Reynolds, A. J. (2007). Benefits and costs of investments in preschool education: Evidence from the Child-Parent Centers and related programs. *Economics of Education Review*, 26(1), 126-144. doi: 10.1016/j.econedurev.2005.11.004
- Tout, K., de Haan, M., Campbell, E. K., & Gunnar, M. R. (1998). Social behavior correlates of cortisol activity in child care: Gender differences and time-of-day effects. *Child Development*, 69(5), 1247-1262. doi: 10.1111/j.1467-8624.1998.tb06209.x
- Tran, H., & Winsler, A. (2011). Teacher and center stability and school readiness among low-income, ethnically diverse children in subsidized, center-based child care. *Children and Youth Services Review*, 33(11), 2241-2252. doi: <http://dx.doi.org/10.1016/j.childyouth.2011.07.008>
- Twardosz, S., & Lutzker, J. R. (2010). Child maltreatment and the developing brain: A review of neuroscience perspectives. *Aggression and Violent Behavior*, 15, 59-68.
- Umemura, T., & Jacobvitz, D. B. (2014). Nonmaternal care hours and temperament predict infants' proximity-seeking behavior and attachment subgroups. *Infant Behavior and Development*, 37(3), 352-365. doi: <http://dx.doi.org/10.1016/j.infbeh.2014.05.007>
- UNICEF. (2008). *The Child Care Transition, Innocenti Report Card 8: A league table of early childhood education and care in economically advanced countries*. Florence, Italy: UNICEF Innocenti Research Centre. Retrieved from http://www.unicef-irc.org/publications/pdf/rc8_eng.pdf
- Vandell, D. L., Belsky, J., Burchinal, M., Steinberg, L., Vendergrift, N., & NICHD Early Child Care Research Network. (2010). Do effects of early child care extend to age 15 years? Results from the NICHD study of early child care and youth development. *Child Development*, 81(3), 737-756.
- Vermeer, H. J., & Ijzendoorn, M. H. v. (2006). Children's elevated cortisol levels at daycare: A review and meta-analysis. *Early Childhood Research Quarterly*, 21, 390-401.
- Vermeer, H. J., Ijzendoorn, M. H. v., Groeneveld, M. G., & Granger, D. (2012). Downregulation of the immune system in low-quality childcare: The case of Secretary Immunoglobulin A (SIgA) in toddlers. *Physiology & Behavior*, 105, 161-167.
- Votruba-Drzal, E., Coley, R. L., Maldonado-Carreno, C., Li-Grining, C. P., & Chase-Lansdale, P. L. (2010). Child care and the development of behavior problems among economically disadvantaged children in middle childhood. *Child Development*, 81(5), 1460-1474.
- Watamura, S. E., Coe, C. L., Laudenslager, M. L., & Robertson, S. S. (2010). Child care setting affects salivary cortisol and antibody secretion in young children. *Psychoneuroendocrinology*, 35(8), 1156-1166. doi: <http://dx.doi.org/10.1016/j.psyneuen.2010.02.001>
- Watamura, S. E., Donzella, B., Alwin, J., & Gunnar, M. R. (2003). Morning-to-afternoon increases in cortisol concentrations for infants and toddlers at child care: Age differences and behavioral correlates. *Child Development*, 74(4), 1006-1020. doi: 10.1111/1467-8624.00583
- Watamura, S. E., Phillips, D. A., Morrissey, T. W., McCartney, K., & Bub, K. (2011). Double jeopardy: Poorer social-emotional outcomes for children in the NICHD

- SECCYD experiencing home and child-care environments that confer risk. *Child Development*, 82(1), 48-65.
- Weikart, D. P. (1998). Changing early childhood development through educational intervention. *Preventative Medicine*, 27, 233-237.
- Weinfield, N. S., Sroufe, A., Egeland, B., & Carlson, E. (2008). Individual differences in infant-caregiver attachment: Conceptual and empirical aspects of security. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of Attachment: Theory, Research and Clinical Applications* (2nd ed., pp. 78 - 101). New York, NY: Guilford Press.
- Weisz, J. R., Sandler, I. N., Durlak, J. A., & Anton, B. S. (2005). Promoting and protecting youth mental health through evidence-based prevention and treatment. *American Psychologist*, 60(6), 628-648.
- Winer, A. C., & Phillips, D. A. (2012). Boys, Girls, and "Two Cultures" of Child Care. *Merrill-Palmer Quarterly*, 58(1), 22-49.
- Woolfson, L., & King, J. (2008). *Evaluation of the Extended Pre-school Provision for Vulnerable Two Year Olds Pilot Programme Final Report*. Edinburgh: Scottish Government Social Research. Retrieved from <http://www.scotland.gov.uk/Resource/Doc/255044/0075576.pdf>
- Wylie, C. (1996). Five Years old and Competent: A summary of the main findings of the first stage of the Competent Children Project Retrieved from <http://www.nzcer.org.nz/system/files/13217-competent-children-at-5.pdf>
- Wylie, C., Thompson, J., Hodgen, E., Ferral, H., Lythe, C., & Fijn, T. (2004). *Competent Children at 12*. Wellington, NZ: New Zealand Council for Educational Research.
- Yamauchi, C., & Leigh, A. (2011). Which children benefit from non-parental care? *Economics of Education Review*, 30(6), 1468-1490. doi: <http://dx.doi.org/10.1016/j.econedurev.2011.07.012>
- Youngblade, L. M. (2003). Peer and teacher ratings of third- and fourth-grade children's social behavior as a function of early maternal employment. *Journal of Child Psychology and Psychiatry*, 44(4), 477-488. doi: 10.1111/1469-7610.00138
- Zigler, E., & Styfco, S. J. (1994). Is the Perry preschool better than Head Start? Yes and no. *Early Childhood Research Quarterly*, 9, 269-287.
- Zigler, E., & Weikart, D. P. (1993). 'Were children randomly assigned in the Perry Preschool Project'? Reply. *American Psychologist*, 48(8), 915-916. doi: 10.1037/0003-066X.48.8.915.b
- Zoritch, B., Roberts, I., & Oakley, A. (2000). Daycare for preschool children. *Cochrane Database of Systematic Reviews* (3), Art. No.: CD000564. Retrieved from <http://www.thecochranelibrary.com>

Glossary

Centre-based care	Childcare that is provided in a childcare centre. This includes kindergarten, crèche, preschool, and daycare centres.
Childcare	Encompasses care of a child other than by the child's parent(s). This may include centre-based care (as above), and individual or group home-based care arrangements by a nanny, au pair, or home educator.
Concurrent arrangements	More than one childcare arrangement occurring at the same time. For example, a child being cared for by a nanny and attending kindergarten.
Externalising behaviour	Overt behavioural difficulties (Sattler & Hoge, 2006), which may include hyperactivity, inattention, aggression and oppositional behaviour (Lipscomb et al., 2014).
Internalising behaviour	Covert difficulties including depression and anxiety (Sattler & Hoge, 2006)
Kindergarten	In the US context refers to the earliest period of their elementary schooling (around 5 years of age). In NZ, it refers to publicly funded kindergarten, which has until recently been provided on a sessional basis (approximately 3 hours per day), for 3- and 4-year-olds, by fully qualified teachers.
Non-maternal care	The term non-maternal care is used when that is the variable that was studied. It refers to care by anyone other than the child's mother (including the child's father). It can include care by other relatives, as well as all forms of childcare, and centre-based care as described above.
Pre-Kindergarten (Pre-K)	Used in the US to refer to preschool education in the year or two before commencing elementary school. Children are typically 3-4 years of age.
Preschool	Typically refers to formal early childhood education occurring for 3- and 4-year-olds in the year or two prior to beginning school.
Sleeper effect	Effects of a child's early experience that may not be evident until later in their development (Vandell et al., 2010).
WISC-R	Wechsler Intelligence Scale for Children – Revised. A standardised intelligence test for children aged 6-16 years (Sattler, 2008).
Woodcock Johnson	A standardised intelligence test for those aged between 2-90+ years (Sattler, 2008).