

# Assessing the potential or actual impact on health and health inequalities of policies aiming to improve Early Child Development in England

5 May 2009

Demetris Pillas<sup>1,2</sup>, Marc Suhrcke<sup>3</sup>

<sup>1</sup> ESRC International Centre for Life Course Studies in Society and Health, London UK.

<sup>2</sup> Department of Epidemiology and Public Health, Imperial College London, UK.

<sup>3</sup> School of Medicine, Health Policy and Practice, University of East Anglia, UK

## Contents:

1. Executive Summary	1
2. Introduction	3
3. The Importance of ECD and the Roots of Inequality	3
4. The Rationale for Investing in ECD	5
5. ECD Interventions – What We Know so Far	7
6. ECD Interventions – Evidence from the UK Sure Start Local Programmes	10
7. ECD Interventions – Evidence from high income countries	14
8. ECD Interventions – The Long-term Economic Impact	17
9. Methodological Considerations	20
10. Recommendations for Policy, Strategy, and Future Evaluations	22
11. Conclusions	24
12. References	26

## Executive Summary

Early childhood, defined as prenatal development up to eight years of age, is increasingly recognised as the most crucial period of lifespan development (ECDKN, 2007). During this period, the foundations are laid for every individual's physical and mental capacities. The science of early childhood development (ECD) has revealed that virtually every aspect of early human development (physical, cognitive, socio-emotional) is highly sensitive to external influences in early childhood, starting in the uterus, and with lifelong effects (Shonkoff and Phillips, 2000). We now have an increasingly refined understanding of the characteristics of more and of less favourable environments, which either promote a healthy development and lay the foundations for a good life or increase the probability of adverse developmental outcomes and, hence, worse health and behavioural and economic outcomes over the lifecourse. Economists now argue on the basis of the accumulating evidence that investment in early childhood is one of the most powerful investments a country can make, with returns over the lifecourse many times the amount of the original investment (Carneiro and Heckman, 2003). Furthermore, knowing that overall inequality originates in early life, ECD interventions are an exceptionally promising – if not the single most promising – tool for tackling the roots of health inequality. Over the last quarter century, several ECD interventions have been implemented in various settings and contexts and with different aims.

Aim: This background paper aims to assess the potential impact of ECD interventions in improving health and reducing health inequalities in England. For this purpose, the effectiveness of ECD

interventions is examined in the context of high-income countries, with emphasis on the largest scale ECD intervention to take place in the UK – the Sure Start programme – and also on the economic research in this area. We complement the extensive work of the Commission on Social Determinants (CSDH) on this subject (see CSDH, 2008; ECDKN, 2007; Maggi et al., 2005) by adding where possible an economic perspective and evidence.

Findings: Evidence on the effectiveness of ECD interventions in high-income countries, primarily the US, suggests that ECD interventions are associated with a number of improved developmental, socio-emotional/ behavioural and health outcomes, both child and parent related. Although several factors, such as better trained staff and a child-focused approach, have been suggested as associated with improved outcomes, the widely differing contexts in which these interventions were conducted mean that this limited evidence can be extrapolated to the UK context only with caution.

Recent evidence from the only large-scale ECD intervention in the UK, the Sure Start programme, suggests that when the participating families fully utilise the programme's services, a number of positive outcomes are generated. Although initial findings were not very encouraging, now that Sure Start has matured, a number of positive findings have been observed. Unfortunately, although the best possible research evaluation was conducted under the imposed constraints, due to the lack of randomisation and the lack of focus on measuring health/ health inequality outcomes, solid conclusions cannot be made on the effectiveness of this intervention in terms of improving children's health and reducing health inequalities in the future.

Since no evidence exists on the long-term economic impact of ECD interventions in the UK/ Europe, one has to rely on such evidence from the US. Although economic evaluations suggest that ECD interventions bring substantial returns to investment in the long-term, making them a worthwhile investment, this message comes from a very limited evidence base, precluding extrapolations that every ECD intervention will generate such high returns. Health outcomes have been neglected in such evaluations, making it difficult to evaluate the potential economic gains that may result from improved health/ health behaviours and suggesting the potential for higher returns had they been included.

Recommendations: Several actions should be taken to measure and ensure increased effectiveness/ cost-effectiveness of ECD interventions in the UK, such as: i) performing rigorous and ongoing evaluation of each intervention with the aim of addressing key questions relevant to the aims and goals, ii) pilot evaluation of the potential impact before expansion or substantial changes to the programme, iii) maintaining the focus on the most deprived children and their families, iv) limiting the large variation observed in implementation, v) maintaining close links with similar services (such as the National Health Service [NHS] early years services), and vi) devising a long-term plan to maintain a level of support for the most disadvantaged children and families.

## Introduction

Early childhood, defined as prenatal development to eight years of age, is increasingly recognised as the most crucial period of lifespan development (ECDKN, 2007). During this period, the foundations are laid for every individual's physical and mental capacities. The science of early childhood development (ECD) has shown that virtually every aspect of early human development (physical, cognitive, socio-emotional) is highly sensitive to external influences in early childhood and has lifelong effects (Shonkoff and Phillips, 2000). We now have an increasingly refined understanding of the characteristics of advantageous and disadvantageous environments, which either promote a healthy development and lay the foundations for a good life or increase the probability of adverse developmental outcomes and, hence, worse health and behavioural and economic outcomes over the lifecourse. Economists argue on the basis of, mostly recent, evidence that investment in early childhood is one of the most powerful investments a country can make, with returns over the lifecourse many times the amount of the original investment. Knowing that overall inequality has its origins in early life, ECD interventions are the obvious tool for tackling the roots of health inequality. Over the last quarter century, many ECD interventions have been implemented in various settings and contexts and with different aims. The purpose of this background paper is to assess the potential impact of ECD interventions in improving health and reducing health inequalities in England. The effectiveness of ECD interventions will be examined in the context of high-income countries, with special emphasis on the largest scale ECD intervention to take place in the UK – the Sure Start programme. We complement the extensive work of the Commission on Social Determinants (CSDH) on this subject (see CSDH, 2008; ECDKN, 2007; Maggi et al., 2005) by adding where possible an economic perspective and evidence.

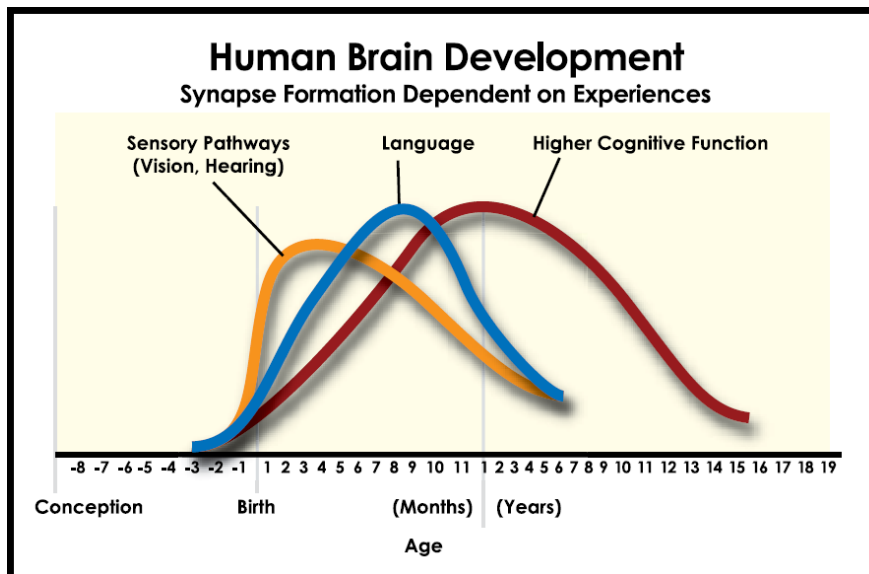
### ***Importance of ECD and the Roots of Inequality***

Research from diverse fields, ranging from behavioural genetics and neurobiology to behavioural neuroscience and psychology, confirms that during early childhood the foundations are laid for an individual's physical, cognitive and socio-emotional competencies (see Knudsen et al., 2006; Shonkoff and Phillips, 2000). This is most highlighted by the fact that the increase in brain volume reaches its peak already by the end of year 1 (Figure 1) and by nine years of age, the brain has reached 95% of the volume of the adult brain (Caviness et al., 1996). As one would expect, this massive increase in brain volume correlates with all aspects of a child's development, such as linguistic development (Sakai, 2005), with children experiencing a 'vocabulary spurt' from one word at the end of year one to 1000 words by age three, with new words spoken every day (Goldfield and Reznick, 1990).

The ECD period is also characterised by increased sensitivity to the effects of both positive and negative experiences (Figure 1). Negative experiences, such as exposure to alcohol and cocaine during the prenatal period or extreme neglect during childhood, have been shown to lead to poor neurodevelopmental outcomes, some of which may be impossible to compensate for, even via later intervention (see McCain and Mustard, 1999). Positive experiences, such as frequent mother-child interactions and high quality nutrition, such as breastfeeding, lead to improved neurodevelopmental and cognitive outcomes (Gutman and Feinstein, 2007; Morley and Lucas, 1997; Treyvaud et al., 2009). The science of ECD has gone beyond establishing which positive or negative experiences have a strong influence on a child's outcomes to explore the complex pathways through which these experiences affect a child's physical, cognitive and socio-emotional development, health, and mortality. Evidence-based path diagrams have now been constructed for most environmental factors known to influence ECD, ranging from poor nutritional practices

(Lozoff et al., 1998), to parental separation (Hetherington, Bridges, and Insabella, 1998) and maternal depression (Stein et al., 2008).

**Figure 1. Brain development during ECD and increased sensitivity to experiences**



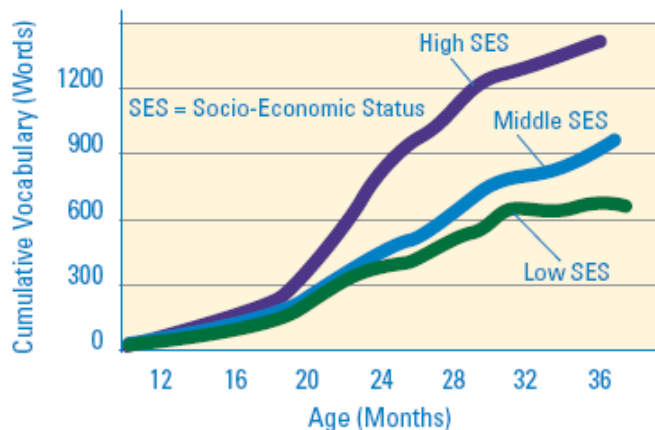
Source: Charles A. Nelson (University of Minnesota, Minneapolis, MN, US) and published in Shonkoff, J. and Phillips, D. (2000).

The impact of environmental experiences/ exposures on ECD becomes even more important considering that ECD outcomes have been shown by many studies to have a lifelong impact. Outcomes such as physical and cognitive development and growth during infancy and early childhood have been shown to have a striking long-term explanatory power over the lifecourse, as they have been associated with income, educational attainment, executive function, physical performance, mental health and a wide range of metabolic outcomes in adulthood. These associations suggest common developmental patterns for health and disease between ECD and adulthood (Barker, 1992; Feinstein and Duckworth, 2006; Isohanni et al., 2001; Kuh et al., 2006; Murray et al., 2006). Three separate processes, which operate in complex and interrelated manners, have been suggested through which ECD may influence lifespan development and lead to increased heterogeneity in outcomes over the lifecourse: latent effects (e.g., the foetal origins hypothesis), pathway effects (e.g., school readiness) and a process of accumulating advantage or disadvantage (see Maggi et al., 2005).

Many studies have shown how inequality follows this path of accumulation, by documenting the increasing and cumulative effect of socio-economic disparities on various aspects of health and development (see Figure 2 for an example relating to linguistic development). Case, Lubotsky and Paxson (2002) demonstrated how the adverse health effects of being born in a lower-income family accumulate throughout from early life and throughout the lifecourse. Feinstein (2003), using data from a British longitudinal birth cohort study, illustrated how upward mobility in developmental outcomes after 22 months occurs mainly for high or medium socio-economic status (SES) children, **with low SES children, on average, not being able to overcome the hurdle of lower initial attainment.** The same study indicated that even when children showed positive signs of advanced development early on, low SES proved to be detrimental to their later development. This suggests that a substantial proportion of low SES children may be 'locked in' to a lower, long-term, overall level of development unless an early and effective intervention takes place. Other things equal, this increases the economic rationale for early interventions, both from an efficiency perspective – as the 'return on investment' from early intervention is likely higher – and from an equity perspective.

These findings show that ECD is a critical period for the lifespan development of every individual and that inequality over the lifecourse – both in terms of socio-economic indicators and health – is largely determined by ECD. Therefore, any strategy aiming at reducing socio-economic and health inequality would require specific focus and interventions on improving ECD outcomes and reducing the substantial inequalities that are observed and start to accumulate from this key period.

**Figure 2. Inequality in linguistic development has its roots in early life and then accumulates, widening the gap between the poor and the wealthy**



Source: Hart and Risley (1995).

### ***The Rationale for Investing in ECD***

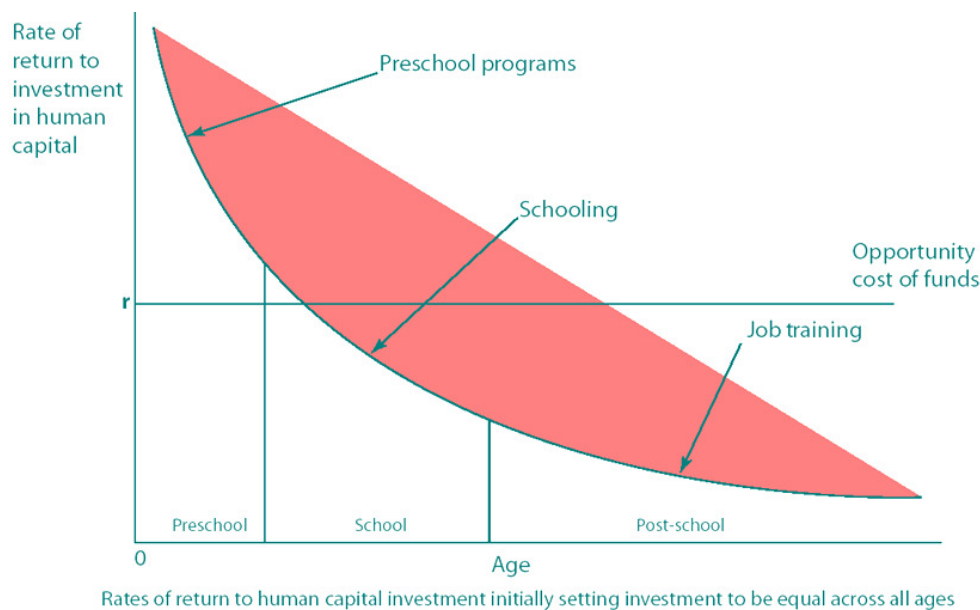
Numerous theoretical frameworks have been offered to support why investing in ECD interventions should be a priority in terms of the tools available to reduce health and other inequalities in society. The most commonly used framework relates to formation of human capital.

The importance of ECD on the formation of both cognitive and non-cognitive abilities, which subsequently explain socio-economic success and other outcomes in adulthood, has been widely recognised by recent econometric research (summarised in Carneiro and Heckman, 2003; Cunha et al. 2006, and Knudsen et al., 2006). The gaps in cognitive and non-cognitive skills between children of different socio-economic groups have been shown to emerge early and persist throughout the lifecourse (Carneiro and Heckman, 2003). Given the cumulative nature of the process of skill formation, early cognitive and non-cognitive skills are likely to influence future learning, the development of social abilities and other outcomes that are closely related to health and health behaviours (Knudsen et al. 2006).

Additional evidence supporting this theory has been recently provided through the use of longitudinal datasets based on UK populations. The 1958 National Child Development Study was utilised to demonstrate how the home environment contributes to cognitive and non-cognitive skill formation and how those skills matter for schooling, teenage pregnancy, crime and labour market outcomes (Carneiro, Crawford, and Goodman, 2006). More recently, data from the 1970 British Cohort Study explained how cognitive and non-cognitive skills may account for intergenerational income persistence (Blanden, Gregg, and Macmillan, 2007). These findings highlight how skills formed early in life can have long-lasting and substantial effects on a variety of important outcomes, suggesting that early human interventions can be among the most effective policy instruments to combat early school leaving, unemployment, teenage pregnancy, criminal behaviour as well as many other behaviours and outcomes (Carneiro, Crawford and Goodman, 2006).

Since research on the technology of skill formation and accumulation suggests that early skill acquisition facilitates later skill acquisition (Heckman, 2006), early investment is likely to raise the productivity of later investment. Figure 3, which summarises the findings of a large literature, illustrates that there is a higher rate of return at younger ages for a constant level of investment. Cunha et al. (2006) and Doyle et al. (2009) highlight that the economic argument for later investment does not preclude later investment; rather it argues that there are “dynamic complementarities to be gained from investing at different stages of the life cycle, starting as early as possible”.

**Figure 3. Rates of return to investment in human capital setting investment to be equal across all ages**



Source: Cunha et al. (2006).

It is evident that what applies to human capital also applies to health, as fundamental indicators of poor human capital in adulthood, such as lower educational attainment, are strongly linked to poorer self-reported health (Kunst et al., 1995), higher rates of mortality (Feldman et al., 1989; Pappas et al., 1993; Morris, Blane, and White, 1996), poorer mental health outcomes (Hammond and Feinstein, 2006), and more harmful health-related behaviours such as smoking, alcohol consumption, and unhealthy diet (Braddon et al., 1988; Winkleby et al., 1992; Hammond and Feinstein, 2006).

It is, therefore, clear that interventions during the earlier stages of life have the potential to generate cumulative benefits by altering a child’s physical, cognitive, and socio-emotional developmental trajectory (Heckman, 2000; Heckman and Masterov, 2007). These interventions, especially when targeted towards disadvantaged children, have much higher returns than later interventions and reduce the inequality gap between them and more advantaged children. Hence, when devising social and economic policy toward ECD, such interventions should be given the relevant emphasis (Heckman, 2006).

Another theoretical approach, which is even more relevant to health, is to consider that the cost to society of failing to prevent an illness early in life or to intervene during the early stages of disease onset may become disproportional compared to the cost of investing in remediation early on. The costs to society of not preventing or intervening early on can be very high. A recent review of economic evaluations of mental illness – such as emotional and behavioural disturbances, or

antisocial behavior – during childhood and adolescence found mean costs to UK society to range from €13,000 to €65,000 annually per child (Suhrcke, Pillas, and Selai, 2008). These costs are disproportionately higher than the cost of early prevention/ intervention. In a UK-based study, Scott et al. (2001) contrasted their estimated £70,000 per head direct costs to the public of children with severe conduct disorder, with a £600 per child cost of parent training programmes. Although such figures do not imply cost-effectiveness, they highlight the very low costs of early intervention compared to later expenditures once the problem is not addressed.

## **ECD Interventions – What We Know So Far**

Scientists, parents, and public health and education practitioners have always intuitively understood and accepted the importance of ECD, but it is only after the accumulation of scientific evidence during the last quarter century or so that ECD has been given the attention it deserves as a medium of potential intervention (Dodge, 2004). Although, in theory, ECD intervention is more a concept than a specific program (Guralnick, 1998; Shonkoff and Meisels, 2000), in practice, ECD interventions generally involve co-ordinated, multidisciplinary provision of health, educational and social services to families with pre-school children (Gray and Francis, 2007). In general, the aim of such interventions is to promote children's health, as well as their physical, social and cognitive development (Guralnick, 1997; Shonkoff and Meisels, 2000; Zigler, Finn-Stevenson, and Hall, 2002). Table 1 presents an overview of the range of benefits to different groups at the individual, household and community levels. In a comprehensive review of all ECD interventions implemented, Karoly et al. (2005) found that early intervention programmes usually do not follow specific strategies/ approaches, but rather tend to follow a combination of strategies/ approaches to achieve their aims – a feature that does not facilitate their evaluation. Therefore, ECD interventions vary according to a number of aspects, ranging from the outcomes targeted for improvement, to the people and ages targeted, to the type of services provided (see Table 2 for a tabulation of the various dimensions ECD programmes may take).

The first large-scale ECD intervention programme, Head Start, was established in the US in 1965. Since then, a large number of ECD intervention programmes have been performed globally, most of them in developed countries, such as Australia, Canada, France, the UK, and the US (OECD, 2006). A number of these programmes have undergone extensive evaluations in regard to their efficacy in achieving their aims, whether these aims were related to education, behaviour, health, or economic related. Hence, evidence is now available from which conclusions could be attempted regarding the effectiveness of such programmes in achieving the various outcomes which they set out to improve, as well as whether they represent a cost-effective intervention policy. The findings of these evaluations may identify the most effective/ cost-effective ECD interventions, the specific outcomes achieved and in what ways, the potential harmful effects, the temporal considerations of all these effects, and exactly what type of economic benefits may be gained in the future by investing in ECD.

Although the UK has a less distinguished record than North America of robustly evaluated ECD interventions and policies, since the implementation of the recent Sure Start initiative, evidence is beginning to accumulate in the UK context, too.

**Table 1. Potential benefits of ECD programmes by beneficiary group**

Beneficiary group		Examples
<b>Children</b>	<i>Psychosocial development</i>	Improved cognitive development Improved social development Improved emotional development Improved language skills
	<i>Health and nutrition</i>	Increased chances of survival; reduced morbidity; Improved hygiene; improved weight/height for age; Improved micronutrient balance
	<i>Progress and performance in primary school</i>	Higher chance of timely enrolment (for siblings also) Less chance of repeating Higher learning and better performance
<b>Adults</b> (programme staff/ parents and older children)	<i>Changes in general knowledge</i>	Health and hygiene; nutrition Leadership skills
	<i>Changes in general attitudes and practices</i>	Health and hygiene; preventive medical monitoring Opportune treatment; nutrition; improved diet; Improved self-esteem
	<i>Changes in relationships</i>	Husband-wife; parents-children; among children
	<i>Improved employment</i>	Caregivers freed to seek or improve employment; New employment opportunities created by programme; Increased market for programme-related services
<b>Communities</b>	<i>Changes in physical environment</i>	Sanitation; spaces for play; new multipurpose facilities
	<i>Greater social participation</i>	Increased social capital
	<i>Improved solidarity</i>	
	<i>Community projects benefiting all</i>	
<b>Institutions</b>	<i>Improved efficiency</i>	Better health attention through grouping or changed user practices; reduced repetition and dropout rates in schools
	<i>Improved effectiveness</i>	Greater coverage
	<i>Improved capacity</i>	Changes in ability/ confidence or organisation
	<i>Improved practice and content</i>	Methods; curriculum content
<b>Society</b>	<i>A healthier population</i>	Reduced days lost to sickness
	<i>A more literate, educated population</i>	Increased tax base Lower rates of crime and violence

Source: Deutsch, 1998; adapted from Myers, 1995 and Morán and Haefeli, 1998



**Table 2. Key dimensions of ECD intervention programs**

Dimension	Examples
<i>Outcomes targeted for improvement</i>	Pregnancy outcomes (parent) Cognitive Socio-emotional Behavioural Health Economic (parent or child) Parent education (e.g., literacy) Parenting skills
<i>Target person(s)</i>	Child Parent Child-parent dyad Carer Family unit
<i>Targeting criteria</i>	Child or family characteristics (minority or immigrant status, single-parent family, mother's age, first-time parents) Low-SES or low-income families Child health problems (e.g., low birthweight) Child cognitive problems (e.g., low IQ) Child behavioural problems Child assessed as high risk (e.g., developmental delay) Parental problems (e.g., substance abuse, low education, psychological, divorce, child abuse or neglect) Relationship or social problems (parent-child, child-peers, child-adults, parent-parent) Universal
<i>Age of focal child</i>	Prenatal to age 8, for shorter or longer age spans
<i>Location of services</i>	Home Non-home (centre, school, medical setting)
<i>Services offered</i>	Educational (e.g., preschool, parenting education) Family supports (e.g., links to social services) Health- or nutrition- related Job-related Therapeutic Facility related (e.g., affordable leisure facilities, 'child-friendly' facilities) Monetary benefits (e.g., tax breaks)
<i>Intensity of intervention</i>	Starting age to ending age Hours per week Weeks per year
<i>Individualized attention</i>	Individuals Small or large group
<i>Programme reach</i>	National State-/ county-wide Citywide Single setting

Source: Adapted from Karoly et al. (2005).

## ***ECD Interventions – Evidence from the UK Sure Start Local Programmes***

Sure Start is an ECD intervention established as part of a concerted effort by the UK Government to reduce poverty and disadvantage in young children as well as prevent social exclusion. Sure Start manifests through Sure Start Local Programmes (SSLPs), which are area-based interventions aiming to improve services for young children and their families in deprived communities, promote health and development and reduce inequalities (Belsky, Barnes, and Melhuish, 2007). The first 60 SSLPs were established in 1999 and, with the allocation of almost £2 billion, expanded rapidly by 2004 to 524 programmes serving more than 400,000 children. The Government has now committed to creating 3500 Sure Start Children's Centres by 2010 (H.M. Treasury, 2004; DfES, 2004).

The Sure Start programme was designed and implemented as an evidence-based initiative (Glass, 1999), largely based on the successful Head Start and Early Head Start ECD initiatives in the US (Eisenstadt, 2002). Thus, in the design, evaluation, monitoring and further improvement of the programme, a number of reports which reviewed all the relevant evidence from a variety of perspectives were considered (see NESS [2007] for a description of these reports). The extent to which Sure Start is an evidence-based initiative is tentative, since the evidence on which it is based is from US interventions, which have a very dissimilar context.

The main differences between SSLPs and other ECD interventions in other countries are: i) SSLPs are area based, with all children in the covered age group and their families living in a prescribed area serving as the intervention 'targets', and ii) SSLPs are given substantial autonomy regarding the combinations of services they provide and the forms in which they provide them (Gray and Francis, 2007; Belsky, Barnes, and Melhuish, 2007). SSLP services were universally available and, unlike most ECD interventions, did not have a prescribed 'curriculum'. Instead, each SSLP had local autonomy to create and improve services as needed, with the only specification being that the programme should be 'evidence based'. In addition, the interventions provided with the SSLPs were not necessary to be manualised – meaning that none of the areas need specify precisely what they were doing. The rationale behind this open-ended approach was that it would lead to increased effectiveness by: i) avoiding the mechanised rigidity of highly specified programmes, ii) giving the sense of 'ownership' to those providing the services, and iii) including the recipients of the services in the decision-making process (Rutter, 2006). It has been argued that this has led to: i) enormous variation in implementation of services between SSLPs, ii) difficulty in evaluating the extent to which what was happening in a specific SSLP showed fidelity to the model of what should be happening (Rutter, 2006).

SSLPs aim at children under four years old and have four key objectives:

- i) To improve social and emotional development,
- ii) To improve health,
- iii) To improve the ability to learn, and
- iv) To strengthen families and communities.

To reach these objectives, SSLPs offer five core services:

- i) Outreach and home visiting;
- ii) Support for families and parents;
- iii) Good quality play, early learning and childcare;
- iv) Primary and community health care and advice about child and family health; and
- v) Support for children and their families with special needs or disabilities (NESS, 2007).

More recently, SSLPs have evolved, having changed their model of service delivery – of targeted support in the most deprived areas – by becoming Sure Start Children's Centres during 2004–2006. The aim to achieve universal coverage to all areas of the country, regardless of level of deprivation, by 2010. This decision has been criticised, especially for not being based on any type

of evidence or pilot investigation, which would explore the effectiveness/ cost-effectiveness of this substantial and costly transformation (House of Commons Health Committee, 2009).

To date, two large evaluations have been performed investigating the effectiveness of the Sure Start programme. The first focused on 16,502 families and their 9-month or 3-year-old children living in the first 150 SSLP areas. In order to ascertain Sure Start's effect, these families were compared with 2610 families with children at similar ages in 50 communities destined to become SSLP areas (NESS, 2005). The second evaluation focused on 9192 families and their 3-year-old children living in 150 SSLP areas, and compared them with 1879 families/ children who participated in the Millennium Cohort Study (MCS) and who resided in similar areas that did not have SSLPs (NESS, 2008). This evaluation differed from the first in a number of ways: i) SSLPs had now evolved to Sure Start Children's Centres; ii) the 3-year-old children studied in the first evaluation were not exposed to SSLPs during their entire lives and were exposed to relatively immature programmes; and iii) the first evaluation was carried out by the same research team (NESS) at the same time in both SSLP and non-SSLP areas, whereas the second evaluation compared two separate studies, the NESS Impact Study and the MCS, for which data collection was carried out two years apart by different research teams.

Both Sure Start evaluations showed that the intervention had a small to moderate impact on the children and families served (Table 3). This is not surprising, since previous research from the US indicates that there is likely to be a delay between early interventions and the detection of their effects: Effects of ECD interventions often take time to emerge and depend on multi-year exposure to the services offered (Love et al., 2002; Burr and Grunewald, 2006). The first evaluation reported benefits on parental outcomes, such as reduced risk of negative parenting and increased parental acceptance. The overall family environment also improved, as household chaos was found to be reduced in families covered by SSLPs. In regard to child development outcomes, differential effects were reported in children born to non-teenage mothers (86% of the sample population) as opposed to children born in the most disadvantaged households (teenage mothers, mothers living in workless or lone parent households). Whereas children born to non-teenage mothers showed more positive outcomes on social competence and behavioural problems, children born in the most disadvantaged households had negative outcomes in three aspects of child development. It has been suggested that the reasons for this may be that socially deprived families with greater personal resources were better able to take advantage of the SSLP services and resources offered, which may have left those with fewer resources (the most disadvantaged households) with less access to services (Belsky et al., 2006). Nevertheless, this interpretation should be treated with caution as the evidence supporting it is speculative. On the other hand, the finding that an intervention has produced greater benefits for the moderately disadvantaged compared to the more severely disadvantaged has also emerged in other evaluations of ECD interventions (Love et al., 2002).

**Table 3. Effectiveness of Sure Start based on the first two evaluations performed**

<b>Outcome</b>	<b>1<sup>st</sup> Evaluation (NESS, 2005)</b>	<b>2<sup>nd</sup> Evaluation (NESS, 2008)</b>
<b>Child</b>		
<i>Child Health</i>		Increased number of immunisations* Reduced number of accidental injuries *
<i>Child Development</i>	Increased social competence (**) Reduced behavioural problems (**) Lower scores on verbal ability (**)	Increased positive social behaviour Greater independence/ self-regulation
<b>Parents/ Family</b>		
<i>Parenting</i>	Reduced risk of negative parenting Increased parental acceptance	Reduced risk of negative parenting Improved home-learning environment
<i>Family</i>	Reduced household chaos	
<b>Community/ Services</b>		
<i>Services</i>		Increased service utilisation supporting child/ family
<i>Community</i>	Lower rating of community ***	
<b>Overall Impact</b>		
All population:		Positive: 5 (7*) Negative: 0
Non-teenage mothers:	Positive: 5 Negative: 0 (1***)	
Most disadvantaged households:	Positive: 3 Negative: 3 (4***)	

\* Analyses indicated that apparent better performance on these two outcomes may be erroneous, the result of time measurement effects.

\*\* In non-teenage mothers (86% of sample), children showed positive outcomes on social competence and behavioural problems, but children born to teenage mothers, and to mothers living in workless or lone parent households, had negative outcomes on social competence, behavioural problems, and verbal ability scores. \*\*\* Lower rating of community was only reported in mothers of children aged 36 months (but not aged 9 months), indicating that mothers of children who were exposed to SSLPs during their entire lives were not negatively affected..

Although the findings of the first evaluation are not encouraging, they should be treated with great caution since, at the time of the evaluation, the programme had been in place for only a few years and therefore was relatively immature. Estimates from the NESS' cost-effectiveness module showed that it is not until the third financial year of operation that most SSLPs are spending allocated funds to an extent that indicates widespread effects on services (Meadows, 2005). Also, the three-year-old children examined in the first evaluation were not exposed to SSLPs during their entire lives, as they lived in communities that had only programmes implemented for about one or two years when studied. Hence, in some measures where the 3-year-old children were associated with negative outcomes, this association was not found for the 9-month-old children who followed a more mature programme and one which was fully available since their birth.

The fact that implementation features play a substantial role in outcomes was confirmed by the fact that, in this evaluation, better outcomes were reported by SSLPs that achieved greater reach. Also, SSLPs led by health services had better outcomes than those led by other agencies. This variation in effectiveness amongst SSLPs was examined in a separate study, which showed that SSLPs that had more parent-focused services, more improved child-focused services and a greater proportion of staff that was health related reported improved outcomes (NESS, 2007). In general, the findings indicated a tendency for Sure Start programmes which were well integrated with local health services to have the most effective outcomes. This is not surprising, considering that the health services have immediate access to parents in pregnancy and children at birth and, therefore, the Sure Start programmes can approach those families very early on. In areas where such a level of integration is absent, Sure Start programmes are often unable to know, amongst others, when a new birth occurs in their area and whether the new family is in need of help (House of Commons Health Committee, 2009).

Suggestions have been made that the variation in the programmes' effectiveness was due to a lack of guidance and direction of those in the communities who were initially charged with implementing the programmes. Since the communities had almost complete control at the start regarding how they delivered their programmes, in the absence of published guidelines about the kinds of services to be delivered at the early start-up (guidelines were written but not distributed to the SSLPs), an enormous diversity was observed in the programmes' organizations (House of Commons Health Committee, 2009). This deviation from the original model on which the programme was based made the evaluation of the programme very difficult.

These statements may explain why the second evaluation identified substantially improved outcomes, in that no negative outcomes were reported and a wide range of benefits was noticed on child development outcomes, parental outcomes, and increased use of services. More specifically, children in SSLPs showed more positive social behaviour and greater independence/self-regulation, and parents showed reduced risk of negative parenting and provided an improved home-learning environment. In total, benefits at a statistically significant level were observed in 5 of the 14 outcomes examined. One interesting feature found in the first evaluation and replicated in the second was that any beneficial effects observed in child development outcomes were mediated by the effect of SSLPs on parenting (NESS 2005 and 2008). This is encouraging, as better parenting is an obvious means through which an ECD intervention would aim to improve children's outcomes.

In summary, both evaluations of the Sure Start programme suggest that overall effects of this ECD intervention are small to moderate. But, they are still sufficiently large to be of policy significance considering that they were applied on a population-wide basis (Melhuish et al., 2008). The first findings on the cost-effectiveness of Sure Start are due by the end of 2009 and will be of great interest in providing indications of the cost-effectiveness of the first large-scale ECD intervention to take place in the UK.

## ***ECD Interventions – Evidence from High-Income Countries***

Although many ECD interventions have taken place over the last quarter century, only a few have been systematically evaluated. A review on the effectiveness of ECD interventions performed globally showed that although 108 national and international interventions with some type of published evaluation data were identified, only 32 were child focused and had a sufficient evaluation component, and only 12 reported evaluations of effects on a number of child outcomes (Wise et al., 2005). Another review, on the effectiveness of ECD interventions implemented and evaluated in the US, identified 20 programmes that had reported effects on child outcomes (Karoly et al., 2005).

In the high-income-country context, evaluated ECD interventions took place almost entirely in the US, with the only exceptions being specific programmes taking place in Canada and Australia. Apart from the aforementioned UK-based studies, no other relevant evidence exists with findings in developed European countries. If such existed, their findings could be more directly extrapolated to the UK context and avoid the US bias (Wise et al., 2005).

Considering that the aim of most ECD interventions is to enhance ECD outcomes, it is no surprise that the barometer of success of these programmes is whether the children had improved developmental outcomes compared to their control/ comparison group counterparts. Hence, most outcomes measured during childhood related to the child's cognitive and socio-emotional/ behavioural development. Other types of outcomes, especially those relating to health, were not given a similar emphasis, as only eight of 20 evaluations reported effects on health outcomes (Karoly et al., 2005).

Overall, evaluations of ECD interventions showed statistically significant benefits in at least 70% of the programmes (Karoly et al., 2005). Although evaluations focused on developmental outcomes, when health or other outcomes were included in the evaluation, positive effects were identified. Table 4 presents the type of outcomes that were measured and the benefits that were identified at a statistically significant level. Only a few studies reported effect sizes relating to the outcomes measured, indicating that although immediate and short-term effects were noticeable, the effects were often small to moderate (Wise et al., 2005). Similar effect sizes have been reported regarding the benefits that ECD interventions bring to the children's parents, particularly when they are specifically targeted by the intervention.

Of the 20 ECD interventions reported in the 2005 Karoly et al. review, only five had undergone some form of systematic evaluation in the long term while the participating children became adults. Results indicate that the benefits accrued by the study participants were maintained over the longer term as the children transition to adulthood. This effect was reported to be the case in the various domains evaluated in adulthood, such as educational attainment, employment and earnings, and criminal behaviour. Effect sizes reported in long-term evaluations are somewhat larger than those reported during childhood, ranging from 0.2 to 0.5 (Karoly et al., 2005). Brooks-Gunn (2003) notes that even a small effect size retained at primary school-aged follow-up is impressive, and an effect retained throughout childhood and until adulthood is even more so. It must be noted that **no study to date has evaluated effects on outcomes directly relevant to health or health inequality over such a long period.**

The beneficial impact of some ECD interventions has been shown to fade in the long term in some domains, such as school test scores. Studies that have explored this phenomenon explain that ECD intervention participants, coming from disadvantaged backgrounds, attend schools of significantly lower quality than their counterparts who did not participate. Hence, no matter how beneficial the intervention was initially, such benefits are structurally undermined when the children are subsequently exposed to systematically lower quality schooling (Lee, 1995). This

indicates the necessity of continuity of support necessary in order for the benefits of ECD interventions to be maintained until adulthood and when the participant enters the labour market.

Since the vast majority of the ECD interventions included in both reviews have had targets, e.g., focused on high-risk children and/ or children from low-income families, one may suggest that the positive effects of these interventions are essentially reducing the inequality gap between the deprived and the affluent. Since very few ECD interventions have been carried out with universal coverage, the current evidence base does not allow any solid conclusions as to whether universal interventions are more or less effective than targeted ones. On the other hand, some evidence on this issue may be derived from a meta-analysis of 34 preschool prevention programmes in the US, which found that programmes serving predominantly African-American children demonstrated substantially larger benefits than non-targeted programmes (a three times larger positive impact on cognitive and parent-family outcomes) (Nelson, Westhues, and MacLeod, 2003). Future research on ECD interventions will hopefully address this fundamental issue.

Because ECD interventions vary greatly in terms of their strategy/ approach, populations targeted and resources/ services available, it is very difficult to isolate specific characteristics/ types of interventions which may be more effective than others. Considering the very limited evidence base available, several features of ECD interventions have been suggested to be associated with better outcomes for the participants:

1. Programmes are more successful when they have smaller child-to-staff ratios (Karoly et al., 2005; Reynolds and Temple, 2008)
2. Programmes with better-trained caregivers/ teachers appear to be more effective (Karoly et al., 2005; Reynolds and Temple, 2008).
3. More intensive and comprehensive programmes that meet the different needs of children are associated with better outcomes (Berlin et al., 1998; Karoly et al., 2005; MacLeod and Nelson, 2000; Nelson, Westhues, and MacLeod, 2003; Reynolds and Temple, 2008).

It is apparent that all three features rely on substantial increases in the cost of an ECD intervention, hence, one can only hope that they will be matched by higher benefits and a higher benefit-cost return.

**Table 4. Benefits of ECD interventions performed in the US on children and adults**

Type of ECD Intervention	Positive impacts of ECD interventions performed in the US						
	Health	Child Maltreatment	Behavioural/ Emotional	Cognitive/ Achievement	Crime	Education	Employment and Earnings
<b>Child outcomes</b>							
<i>Visiting the home or parent education</i>	Emergency room visits Hospitalisations Reflexes Weight gain Child health rating Injuries	Child abuse/ maltreatment	Positive behaviours Developmental delay Behaviour problems Social competence	Achievement test scores Mental indices Vocabulary Developmental level	Arrests	(not measured)	
<i>Home visiting or parent education combined with early childhood education</i>	Child health rating Teen pregnancy Immunisations Other positive health behaviours	Child abuse	Positive behaviours Behaviour problems Social competence	Achievement test scores IQ	Arrests Delinquency	Grades (girls) Attendance (girls) Teacher ratings (girls) Special education Grade retention	(not measured)
<i>Early childhood education only</i>	(not measured)			Achievement test scores	(not measured)		
<b>Adult outcomes</b>							
<i>Visiting the home or parent education combined with early childhood education</i>	(not measured)				Arrests Charged with crime Time in prison/jail	Years of completed schooling High school graduation College attendance	Employment/ skilled employment Earnings Income

Source: Adapted from Karoly et al. (2005).



## ***ECD Interventions – The Long-Term Economic Impact***

Since social and economic policy decisions are made under resource constraints, the value of public investments must be judged, at least in part, in terms of economic efficiency, that is, in terms of value for money (Heckman, 2000). In deciding how funds should be allocated, one needs to know not only what is most effective, but also which choice brings the greatest benefits (appropriately defined) for a given set of resources.

In the case of ECD interventions, the long-term economic impact would be determined by comparing the benefits to society to the costs accrued. Benefits to society would include the benefits to the programme recipient and family as well as broader benefits to society (Table 1). Costs to society would include the benefits foregone from not using the resources for some other use (Wise et al., 2005).

Because of the large differences in the methodologies adopted by studies aiming to evaluate the economic impact of ECD interventions, it is difficult to compare results across interventions. Nevertheless, these studies do provide indications regarding whether ECD interventions generate benefits in the long term which outweigh the costs.

A number of reviews that include, more or less, the same cost-benefit evaluations of ECD interventions have investigated the long-term economic impact of these programmes (see Aos et al., 2004; Karoly et al., 2005; Penn et al., 2006; Reynolds and Temple, 2008; Watson and Tully, 2008; Wise et al., 2005; Wolfe and Teft, 2007). Overall, the returns to society for each dollar invested varied considerably, from \$1.26 to \$17.07, but, overall, indicated the potential for efficient ECD interventions to provide returns to society substantially larger than the resources invested in programme delivery. The limited evidence available indicates that the internal rates of return (the interest rate received for an investment consisting of payments and revenue that occur at regular periods) are high enough to suggest that ECD interventions are worthwhile investments. A benefit-cost analysis of four US-based ECD interventions found that, even when adjusted for inflation, internal rates of return from these interventions, ranged from 7 percent to 20 percent (Burr and Grunewald, 2006). Rolnick and Grunewald (2003) focused on the rates of return of ECD interventions, arguing that such rates are high when placed next to other spending by governments made in the name of economic development, such as subsidies and preferential tax treatment for private businesses, and yet ECD interventions are rarely considered as an economic development measure. The authors argue that **with such high rates of return, ECD interventions should also be portrayed as economic development initiatives.**

The positive net benefits that the ECD interventions accrued were found to be irrespective of per-child costs, suggesting that large per-child investments may not be the most efficient. Overall, evaluations with a longer-term follow-up were associated with the largest benefit-cost ratios, because they could include measurements at older ages of outcomes which more conveniently translated into monetary benefits, such as educational attainment, earnings, and criminal behaviour (Karoly et al., 2005). This finding indicates that the benefit-cost estimates from the various economic evaluations of ECD interventions are very likely to be underestimated, since not all benefits could be translated into monetary values. For example, had juvenile justice savings not been included in the cost-benefit evaluations, the rate of returns for certain programmes would be substantially lower (Penn et al., 2006). These studies' conclusions may not apply to the context of the UK, as certain aspects of the criminal system in the US, such as incarceration rates, are different from other industrialised countries. For example, the US has higher incarceration rates than other countries (International Centre for Prison Studies, 2005). This difference would inflate savings if the intervention had an impact on criminal activity. Penn et al. (2006) state that the fixation in the US literature on early intervention as a means of crime reduction is partly a reflection of the very high costs of crime in that country.

Economic evaluations did not analyse all the potential positive effects that an intervention may have. For example, economic evaluations failed to include health outcomes in their estimations of the benefits, and no study monetised health outcomes in order to provide a valuation of health itself. Therefore, the limited number of evaluations which included health outcomes, focused only on cost-savings (such as savings from reduced emergency room visits during childhood, or public health care savings due to a reduced incidence of smoking and substance abuse). Instead, economic evaluations focused largely on savings generated in the areas of educational attainment, earnings, crime and delinquency, or from reduced expenses in child welfare and social welfare programmes (Karoly et al., 2005). The reason for omitting the inclusion of health measures in such cost-benefit evaluations may be due to the fact that such outcomes are more difficult to monetise in comparison to other outcomes (e.g., income), although this may also be due to other methodological reasons (see Kenkel, 2009 for an analysis of the issue of incorporating health benefits in cost-benefit evaluations of ECD interventions). In addition, many of the outcomes affected by ECD interventions can generate spillover benefits which may take a monetary value (for a comprehensive list of potential quantifiable effects, including spillover effects from ECD-interventions see Karoly et al., 2005; Meadows, 2007). Additional benefits have been showed to incur for younger siblings of ECD intervention participants (Garces, Thomas, and Currie, 2002) and may potentially incur benefits on the decedents of the participants, as improved outcomes for participating children could very likely result in improved parenting towards their own children (Wolfe and Haveman, 2002). Also, considering that many of the benefits of ECD interventions accrue over the long term, certain returns to investment can only be detected over the long-term, 15 to 20 years after the intervention took place (Burr and Grunewald, 2006), suggesting that a long-term follow up is necessary in order to detect the complete returns to the initial ECD-intervention investment.

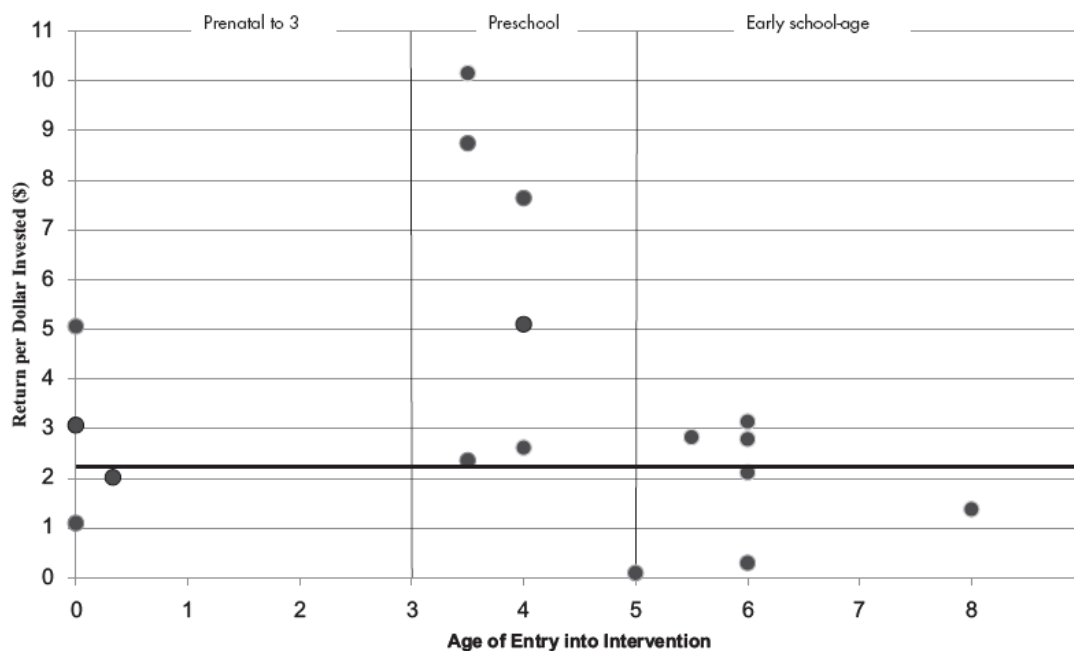
An important finding arising from the economic evaluations is that the economic returns from investing in ECD intervention programmes are larger when the programmes follow a targeted approach. This can be observed within ECD interventions, as a US-based intervention showed that the returns for each dollar invested were five times higher for the high-risk population than for the lower-risk population (Burr and Grunewald, 2006). Analyses from other studies support this finding, suggesting that the returns from a universal pre-school programme would be less than those from programmes that target a more disadvantaged population (Belfield, 2004; Burr and Grunewald, 2006; Karoly and Bigelow, 2005). Karoly et al. (2005) suggest that these findings indicate that it is not reasonable to expect the returns from a programme serving a specific disadvantaged population to apply when the same programme serves a different population.

Other key features observed of ECD interventions with a better cost-effectiveness potential are to involve children as participants, to focus on enhancing parenting efficacy, and to be intensive in nature (Wise et al., 2005). On the issue of programme intensity, other studies have shown different results, as a US-based intervention indicated that benefit-cost ratios decline with increased programme intensity (Reynolds et al., 2002). On the other hand, with the limited data available it is impossible to draw precise conclusions regarding the minimum amounts of programme intensity necessary to achieve substantial returns or the optimal intensity required to achieve the highest benefit-cost ratio (Karoly et al., 2005). In addition, limited evidence exists suggesting that increased cost-efficiency may be achieved through increased investment on aspects of programmes that reach the child directly. Findings from the US Head Start intervention indicate that even when holding per capita expenditure constant, regional programmes that devoted higher shares of their budgets to child-specific expenditures resulted in better outcomes for the children (Currie and Neidell, 2007).

Cost-effectiveness has also been shown to vary by age of entry into an ECD intervention. A recent review of the cost-effectiveness of pre-school interventions on children aged from three up to nine years old showed that interventions at age three to four are substantially more cost-effective than

those at age five and older or even compared to interventions which took place prenatally (Reynolds and Temple, 2008) (Figure 4). It must be noted that such findings must be treated with caution as, given the large differences in costs and saving components included in these estimations, it is difficult to compare results across interventions. Research into the cost-effectiveness of ECD programmes such as Sure Start, with infancy as the age of entry, is needed to elucidate how such interventions would compare, in terms of returns to investment, to those starting during pre-school.

**Figure 4. Return per dollar invested by age of entry into intervention**



Source: Reynolds and Temple (2008).

## Methodological Considerations

The best research studies are those that are so rigorously designed that one may conclude with confidence that the results obtained are due only to the intervention (Barnett, 1995). Considering the wide variety – in terms of size, ages and populations targeted, services offered and other important factors – of interventions implemented to date, it is easy to imagine the considerable variability that will emerge in the strategy and quality of research design. Ideally, these evaluations would be systematic, comprehensive and use rigorous scientific controls, such as randomised controlled trials and sufficient statistical power, to find meaningful programme effects (Sanders, 2003). Barnett (1995) suggests that ECD intervention evaluations vary with respect to four key aspects of research design: the ways in which the comparison groups were formed, initial and follow-up sample sizes, attrition, and who was measured and how to assess the effects of the programme. Wise et al. (2005) used an evidence-rating system to evaluate the strength of the evaluation strategy used for the various evaluations of ECD interventions so far. The rating system included nine important elements set as the standards necessary for an ECD intervention to be adequate: appropriate evaluation design methodology, pre-intervention data, intermediate follow-up and long-term follow-up, representative sample of participants in the evaluation, low attrition at follow-up and non-random attrition, adequate statistical power, reliable measures, appropriate choice of measures and appropriate analytic approach. This methodological evaluation found a great variability in adequacy of evaluations, ranging from evaluations with very good to very poor integrity (Wise et al., 2005). The findings also indicate a positive feature in that most of the evaluations included other objective measures in addition to parental reports, which tend to be subjective.

In the case of the evaluation of the ECD intervention that is of most interest to England, Sure Start, the score performed on the evaluation standard set by Wise et al. (2005) was the lowest in comparison to other ECD intervention evaluations (1 out of 10). This is not surprising since the scientists who performed the evaluation were hindered severely by the fact that they were not permitted to follow a randomised controlled trial strategy. This clearly led them to seek out the best possible statistical designs which would allow them to make arguments by inference, whilst having a large number of threats to validity. As the scientists who carried out the evaluation acknowledge, a randomised controlled trial would have been the strongest evaluation strategy, but this possibility was precluded by governmental decisions (Melhuish et al., 2008). This happened against the advice of most of the research advisors consulted (Rutter, 2006). The reasons for this decision are unclear, although one rationale against performing a randomised controlled trial could be the fear of highlighting the denial of a presumptive good to the control group (which, in contrast to the experimental group, would not receive the services of the ECD intervention). Unfortunately, the methodological limitations of the approach that was adopted in this case are large enough to warrant questioning many of the evaluation's findings and make it difficult to come to any solid conclusions about the efficacy of the ECD intervention. This is despite the fact that the research was exceptionally thorough in seeking to ensure that any findings were unlikely to be due to either social selection or chance association (Rutter, 2006). Three key methodological limitations are highlighted below:

1. The children and families residing in the most deprived areas were not included in the control group, so no comparisons could be made with the most deprived children covered by the Sure Start programme (NESS, 2008). This led the evaluation scientists to seek out alternative statistical designs, which would allow them to make arguments by inference. Such designs, although the most optimal under the constraints, are not equivalent to those based on data derived directly from the most deprived areas.
2. The control group and the experimental group were examined two years apart, so one cannot be certain that the differences in outcomes are not simply a function of the two-year gap in measurement, even though this may be unlikely.
3. Comparisons across areas proved to be very difficult, since a substantial amount of variation was observed in implementation of services across SSLPs. Since SSLPs did not have a prescribed curriculum, it was left up to each area to decide how to proceed, thus leading to enormous variation between SSLPs.

An additional issue in the case of the Sure Start evaluation, and of ECD intervention evaluations in general, is selective attrition. In the case of the second Sure Start evaluation, among the nine-month children and their families in SSLP areas randomly selected for enrolment in the study, the response rate was 84.4%. Questions have arisen as to whether the non-respondents were those with the greatest need for services (Kane, 2008).

A recent report on Healthy Start – a new UK government programme to enhance nutrition for vulnerable pregnant women, breastfeeding women and children up to age four – indicated a number of important parameters that would enhance the overall strength of the evaluation strategy for such interventions (Dyson et al., 2007). The report notes that the processes of data collection, monitoring and evaluation should not be restricted to one specific approach, but should aim to incorporate a combination of data collection tools and evaluation strategies, as each provides essential information which other types of studies may not be able to provide (e.g., a cohort study would provide the opportunity to measure the potential incremental effect of an ECD intervention over time, whereas small-scale qualitative data would provide information on process outcomes regarding the impact of the intervention on recipients) (see Dyson et al. [2007] for a

comprehensive overview of options and recommendations for optimal evaluation of the Healthy Start ECD intervention).

The methodological challenges posed for cost-benefit evaluations of ECD interventions are even greater. Cost-benefit studies in this area differ substantially in a number of key methodological aspects, all of which may affect estimates of net program benefits and benefit-cost ratios: differences in evaluation methodologies, follow-up periods, methods used for discounting returns, and benefits/ beneficiaries included (for a comprehensive discussion of ECD intervention cost-benefit methodology see Karoly et al. [2005] and Wise et al. [2005]). Given the large differences among methodologies, it is difficult to draw solid conclusions regarding comparisons between studies. Also difficult is knowing whether every ECD intervention has brought substantial returns to investment, although it could be suggested that the returns to investment are understated, as the scope followed by all the evaluations was a narrow one at best. In the context of health and health inequalities, it is disappointing to observe that health outcomes have been largely neglected from long-term cost-benefit evaluations of ECD interventions.

## **Recommendations for Policy, Strategy, and Evaluation**

A substantial amount of evidence highlights the potential for interventions during the early life period to improve a number of outcomes, including health, and to reduce health and general inequalities.

Although there is an apparent lack of systematic evidence on the effectiveness of ECD interventions in the UK, the findings of the second and most recent evaluation of the Sure Start programme are encouraging. These findings, based on a mature programme with a comprehensive service utilisation by the participating families, indicate that large-scale ECD interventions in the UK can help disadvantaged families and children overcome some of the impact of adversity in today's unequal society.

Since this ECD intervention is both novel and recent, a great opportunity is offered to address any potential initial downsides in implementation or evaluation, in order to achieve the maximum benefits on the large sums that will be invested. The evidence to date indicates a number of actions that should be performed, ranging from those relevant to policy and strategy to those for improved future evaluation, as detailed in this section.

Policy and strategy recommendations:

1. The Government is commended for taking very positive and decisive steps by implementing the Sure Start programme and, hence, placing ECD at the heart of policy to address health inequalities. Nevertheless, a more cautious approach should be taken at this crucial stage, when plans have already been made to expand the initiative to all areas of the country, regardless of level of deprivation. The consequences of this expansion from a more targeted approach to a more universal one cannot be estimated, as they have not been piloted or evaluated. There is substantial risk in becoming distracted from the original key aim: to focus on deprived families and their children who are the most in need of support and thereby tackle the roots of poverty and inequality. It is recommended that Children's Centres be rigorously monitored and evaluated on an ongoing basis in order to explore their effectiveness/ cost-effectiveness and their success in reducing poverty and inequality. Considering that the results of the first SSLP evaluation indicated that the least deprived benefited more from the intervention, indicating increasing inequality, more emphasis should be placed on the most deprived, not on expanding the programme to include middle- and higher-income families. Ideally, a programme expansion would focus on including

many seriously disadvantaged families who are located in not-so-disadvantaged areas. Of note, US-based preliminary evidence suggests that ECD interventions with targeted approaches are substantially more cost-effective than universal approaches.

2. Specific actions must be taken to ensure that service utilisation of the Sure Start initiative is comprehensive and not balanced against the most deprived families. Having more personal resources should not be an advantage in availing the Sure Start services and resources. Especially when universal services are provided, decision makers must expect that people will differ in the ability to take advantage of the opportunities offered (Ceci and Papierno, 2005). This is a critical issue, considering the evidence that ECD interventions can produce greater benefits for the moderately disadvantaged than the more severely disadvantaged (Love at al., 2002). Failure to address this key issue may lead to the intervention's increasing inequality rather than reducing it.
3. Steps must be taken so the variations in implementation of ECD interventions, such as those observed for the initial stages of the Sure Start programme, are avoided. A clear blueprint of guidelines, in the form of a prescribed curriculum, must be used whenever the intervention is implemented, expanded, changed/ improved, and these guidelines must be circulated in a timely fashion, prior to set-up. Local staff implementing the programmes must be well informed of the implementation strategy. This is a key point, as variation in implementation could lead to increased inequality and complications in programme evaluation.
4. Links with the NHS early years services should be maintained. The evaluation of the Sure Start programme indicated that the SSLPs which were well integrated with local health services had the most effective outcomes. The links between these two services should be revisited and an improved protocol, which will achieve optimal collaboration between the two services, should be established. Relatedly, with the evolution of SSLPs to Children's Centres, it has been argued that putting the Children's Centres under the auspices of local authorities has dislocated children's services from the NHS (House of Commons Health Committee, 2009). In addition, since Sure Start aims to integrate early years education, childcare, parenting programmes, health promotion and early years services, a realistic and comprehensive re-evaluation must be performed to plan the exact functional links between these services and how optimal collaboration could be achieved.
5. Evidence suggests that continuity in support is necessary for ECD interventions to be most effective – that is, for beneficial impact support must be sustained in the long-term. A long-term plan of maintaining a level of support for (at least) the most disadvantaged children and families should be designed and implemented.

#### Recommendations for future evaluation:

1. Overall, more appropriate evaluation design methodologies should be sought and, if possible, a combination of evaluation strategies should be employed, as each evaluation strategy tends to provide additional information and insights.
2. Evaluations should be performed which include baseline (pre-intervention) data and data at programme completion, in order to enable a determination of the effectiveness of the programme in reducing health differences and other inequalities within a population.
3. A more comprehensive set of quantitative health outcomes should be included in the evaluations. Ideally, such data would be derived from health services and be continuous (such as instruments that measure infant development) and, therefore, more sensitive to

noticing even small differences in children's development. This will also decrease the reliance on parental reporting, which is subjective.

4. An intermediate and long-term follow-up evaluation strategy should be established from the outset, so when such evaluations occur, the foresight of early preparation will have ensured an improved methodology (with reduced attrition at follow-up; adequate health, behavioural and economic cost measures taken at the baseline; a representative sample of participants included in the evaluation; adequate statistical power to detect small differences; etc).
5. A continuous influx of rigorous, systematic and comprehensive evaluation findings is necessary to achieve the optimal effectiveness/ cost-effectiveness of any ECD-intervention. This is especially the case of ECD interventions in the UK, where the evidence has been very limited and any assumptions of best practice have to be borrowed from evaluations of US-based interventions. Consequently, a larger percentage of the budget for implementation of the Sure Start programme (or future ECD interventions) should be directed towards evaluating the intervention's performance and helping to understand how to continually improve it. Having in mind the substantial sums now to be invested in this area, any type of improved efficiency or lack thereof should incur a high monetary cost/ saving. Several important questions remain, such as: i) which outcomes are improved, in what ways, at which point in the lifecourse and by how much, ii) what are the costs incurred and saved by improving such outcomes iii) how could this intervention be optimised to best reduce inequalities, and iv) how could this intervention be optimised for potential positive effects to be sustained/ prolonged throughout the entire lifecourse.

## Conclusions

Evidence from various disciplines accumulated over the last quarter century demonstrates the significance of ECD and its long-lasting cumulative influence throughout the lifecourse, indicating its importance to health outcomes and health inequalities in every society. Econometric evidence suggests that returns on investment from early interventions would likely be higher than from interventions later in life.

Evidence regarding the effectiveness of ECD interventions in high-income countries, primarily the US, suggests that ECD interventions are associated with numerous improved developmental, socio-emotional/ behavioural and health outcomes, both child and parent related. Although a number of factors have been suggested to be associated with improved outcomes, such as better trained staff and a child-focused approach, the widely differing contexts in which these interventions were implemented mean that this limited evidence can be extrapolated to the UK context only with caution.

Recent evidence from the Sure Start programme suggests that when programme services are fully utilised by the participating families, a number of positive outcomes ensue. Although initial findings were not very encouraging, now that Sure Start has matured, subsequent findings are positive. Unfortunately, although the best possible research evaluation was conducted under the imposed constraints, due to the lack of randomisation and the lack of focus on measuring health/ health inequality outcomes, solid conclusions cannot be made regarding the effectiveness of this ECD intervention in terms of improving children's health and reducing health inequalities.

Since no evidence exists regarding the long-term economic impact of ECD interventions in the UK/ Europe, one has to rely on such evidence from the US. Although economic evaluations suggest that ECD interventions bring substantial returns to investment in the long-term, making them a worthwhile investment, this message comes from a very limited evidence base, precluding extrapolations that every ECD intervention will result in such high returns. The inclusion of health outcomes in such evaluations has been neglected, making it difficult to evaluate the potential

economic gains resulting from improved health/ health behaviours and highlighting the potential for higher returns had they been included.

A number of actions should be taken to ensure increased effectiveness/ cost-effectiveness of ECD interventions in the UK, such as rigorous and ongoing evaluation of the intervention, with the aim of addressing key questions relevant to the aims and goals, pilot evaluation of the potential impact before expansion or substantial changes to the programme, maintaining the focus on deprived children and their families, limiting the large variation in implementation, maintaining close links with similar services (such as the NHS early years services), and devising a long-term plan of maintaining a level of support for the most disadvantaged children and families.

## References

Aos, S., Lieb, R., Mayfield, J., Miller, M. and Pennucci, A. (2004) *Benefits and costs of prevention and early intervention programs for youth*. Olympia: Washington State Institute for Public Policy.

Barker, D.J.P. (1992) *Fetal and Infant Origins of Adult Disease*. London, United Kingdom: BMJ Publishing Group.

Barnett, S.W. (1995) Long-term effects of early childhood programs on cognitive and school outcomes. *The Future of Children* 5, 25–50.

Belfield, C.R. (2004) *Investing in early childhood education in Ohio: An economic appraisal*. Washington, DC, US: Renewing Our Schools, Securing Our Future: A National Task Force on Public Education.

Belsky, J., Barnes, J. and Melhuish, E. (2007) *The National Evaluation of Sure Start: Does Area-Based Early Intervention Work?* Bristol: Policy Press.

Belsky, J., Melhuish, E., Barnes, J. et al. (2006) Effects of Sure Start local programmes on children and families: Early findings from a quasi-experimental, cross sectional study. *BMJ* 332 (7556), 1476–78. Available at [http://www.minneapolisfed.org/publications\\_papers/pub\\_display.cfm?id=1839](http://www.minneapolisfed.org/publications_papers/pub_display.cfm?id=1839), accessed 6/24/09.

Berlin, L.J., O'Neal, C.R. and Brooks-Gunn, J. (1998) What makes early intervention programs work? The program, its participants, and their interaction. *Zero to Three* 18, 4–15.

Blanden, J., Gregg, P. and Macmillan, L. (2007) Accounting for intergenerational income persistence: Noncognitive skills, ability and education. *Economic Journal* 117, 43–60.

Braddon, F.E.M., Wadsworth, M.E.J., Davies, J.M.C., and Cripps, H.A. (1988) Social and regional differences in food and alcohol consumption and their measurement in a national birth cohort. *J Epidemiol Community Health* 42, 341.

Brooks-Gunn, J. (2003) Do you believe in magic? What we can expect from early childhood intervention programmes. *Social Policy Report*, XVII(1), 3–14.

Burr, J. and Grunewald, R. (2006) *Lessons learned: A review of early childhood development studies*. Minneapolis, MN, US: Federal Reserve Bank of Minneapolis.

Carneiro, P., Crawford, C. and Goodman, A. (2006) Which skills matter? *LSE CEE Discussion Paper* 59.



- Carneiro, P. and Heckman, J.J. (2003) *Human capital policy*. NBER Working Papers 9495. Washington, DC: National Bureau of Economic Research, Inc.
- Caviness, V.S., Kennedy, D.N., Richelme, C., Rademacher, J. and Filipek, P.A. (1996) The human brain age 7–11 years: A volumetric analysis based on magnetic resonance images. *Cereb Cortex* 6, 726–36.
- Case, A., Lubotsky, D. and Paxson, C. (2002) Economic status and health in childhood: The origins of the gradient. *Am Econ Rev* 92, 1308–34.
- Ceci, S.J. and Papierno, P.B. (2005) Psychoeconomic consequences of resource allocation: What happens when an intervention works for those it was intended for, but works even better for others? *American Psychologist* 60, 149–60.
- Cleveland, G. and Krashinsky, M. (2003) *Financing ECEC services in OECD countries*. Paris: Organisation for Economic Co-operation and Development.
- CSDH (Commission on Social Determinants of Health). (2008) *CSDH final report: Closing the gap in a generation: Health equity through action on the social determinants of health*. Geneva, Switzerland: World Health Organization.
- Cunha, F., Heckman, J.J., Lochner, L.J. and Masterov, D.V. (2006) Interpreting the evidence on life cycle skill formation. In E.A. Hanushek and F. Welch (eds.) *Handbook of the Economics of Education*, 12, 697–812, Amsterdam: North-Holland.
- Currie, J. and Neidell, M. (2007) Getting inside the "black box" of Head Start quality: What matters and what doesn't? *Economics of Education Review* 26, 83–99.
- DfES (Department for Education and Skills). (2004) *Departmental report. Cm 6202*. HMSO, Norwich, UK. Available at: <http://www.dfes.gov.uk/deptreport2004/uploads/DfES-Annual%20Report.pdf>.
- Deutsch, R. (1998) *How early childhood interventions can reduce inequality: An overview of recent findings*. Working Paper No. 384. Washington, DC, US: Inter-American Development Bank.
- Dodge, D. (2004) Human capital, early childhood development and economic growth. In Tremblay, R.E., Barr, R.G. and Peters R.DeV. (Eds.) *Encyclopedia on Early Childhood Development* [online]. Montreal, Quebec: Centre of Excellence for Early Childhood Development.
- Doyle, O., Harmon, C.P., Heckman, J.J. and Tremblay, R.E. (2009) Investing in early human development: Timing and economic efficiency. *Econ Hum Biol* 7, 1–6.
- Dyson, L., Renfrew, M.J., Jenkins, R., Thomas, J. et al. (2007) *Approaches to evaluating Healthy Start – a scoping review*. York: Public Health Research Consortium.
- ECDKN (Early Child Development Knowledge Network) (2007) *Early child development: A powerful equalizer. Final report of the Early Childhood Development Knowledge Network of the Commission on Social Determinants of Health*. Geneva, Switzerland: World Health Organization.
- Eisenstadt, N. (2002) Sure Start: Key principles and method (Editorial). *Child: Care, Health and Development* 28, 3–4.

Feinstein, L. (2003) Very early evidence: How early can we predict future educational achievement? *Centrepiece*. Vol 8, Issue 2.

Feinstein, L. and Duckworth, K. (2006) *Development in the early years: Its importance for school performance and adult outcomes*. London: Centre for Research on the Wider Benefits of Learning.

Feldman, J.J., Makuc, D.M., Kleinman, J.C. and Cornoni-Huntley, J. (1989) National trends in educational differentials in mortality. *Am J Epidemiol* 129, 919–33.

Garces, E., Thomas, D. and Currie, J. (2002) Longer-term effects of Head Start. *American Economic Review* 92, 999–1012.

Glass, N. (1999) Sure Start: The development of an early intervention programme for young children in the United Kingdom. *Children and Society* 13, 257–64.

Goldfield, B.A. and Reznick, J.S. (1990) Early lexical acquisition: Rate, content, and the vocabulary spurt. *J Child Lang* 17, 171–84.

Gray, R. and Francis, E. (2007) The implications of US experiences with early childhood interventions for the UK Sure Start programme. *Child Care Health Dev* 33, 655–63.

Guralnick, M.J. (1997) *The Effectiveness of Early Intervention*. Baltimore, MD, USA: Brookes.

Guralnick, M.J. (1998) The effectiveness of early intervention for vulnerable children: A developmental perspective. *Am J Ment Retard* 102, 319–45.

Gutman, L.M. and Feinstein, L. (2007) *Parenting behaviours and children's development from infancy to early childhood: Changes, continuities, and contributions*. London: Centre for Research on the Wider Benefits of Learning.

Hammond, C. and Feinstein, L. (2006) *Are those who flourished at school healthier adults? What role for adult education?* London: Centre for Research on the Wider Benefits of Learning.

Hart, B. and Risley, T. (1995) *Meaningful Differences in the Everyday Experiences of Young American Children*. Baltimore, MD, USA: Paul H. Brookes.

Heckman, J.J. (2000) Policies to foster human capital. *Res Econ* 54, 3–56.

Heckman, J.J. (2006) Skill formation and the economics of investing in disadvantaged children. *Science* 312, 1900–02.

Heckman, J. and Masterov, D.V. (2007) The productivity argument for investing in young children. *Review of Agricultural Economics* 29, 446–93.

Hetherington, E.M., Bridges, M. and Insabella, G.M. (1998) What matters? What does not? Five perspectives on the association between marital transitions and children's adjustment. *Am Psychol* 53, 167–84.

H.M. Treasury (UK). (2004) *Choice for parents, the best start for children: A ten year strategy for childcare*.

Available at: [http://www.hm-treasury.gov.uk/media/426/F1/pbr04childcare\\_480upd050105.pdf](http://www.hm-treasury.gov.uk/media/426/F1/pbr04childcare_480upd050105.pdf).

House of Commons Health Committee. (2009) *Health inequalities: Third report of session 2008–09. Volume I*. London, UK: The Stationary Office.

- International Centre for Prison Studies. (2005) *World Prison Report*. London, UK: Kings College.
- Isohanni, M., Jones, P., Moilanen, K. and Rantakallio, P. (2001) Early developmental milestones in adult schizophrenia and other psychoses. A 31-year follow-up of the Northern Finland 1966 Birth Cohort. *Schizophr Res* 52, 1–19.
- Kane, P. (2008) Sure Start local programmes in England (Comment). *Lancet* 372, 1610–11.
- Karoly, L.A. and Bigelow, J.H. (2005) *The economics of investing in universal preschool education in California*. Santa Monica, CA, US: The RAND Corporation, MG-349-PF.
- Karoly, L.A., Kilburn, M.R. and Cannon, J.S. (2005) *Early childhood intervention: Proven results, future promise*. Santa Monica, CA: RAND Corp.
- Kenkel, D. (2009) Valuation in health economics. Prepared for Panel 5: Valuation of Outcomes and Resources/Costs, Workshop on Strengthening Benefit-Cost Methodology for the Evaluation of Early Childhood Interventions, National Research Council/ Institute of Medicine Board on Children, Youth and Families. Washington, DC, US, March 4–5. Available at [www.bocycf.org/benefit\\_cost\\_workshop\\_presentations.html](http://www.bocycf.org/benefit_cost_workshop_presentations.html).
- Knudsen, E.I., Heckman, J.J., Cameron, J.L. and Shonkoff, J.P. (2006) Economic, neurobiological, and behavioural perspectives on building America's future workforce. *PNAS* 103, 10155–62.
- Kuh, D., Hardy, R., Butterworth, S., Okell, L. et al. (2006) Developmental origins of midlife physical performance: Evidence from a British birth cohort. *Am J Epidemiol* 164, 110–21.
- Kunst, A.E., Geurts, J.J. and van den Berg, J. (1995) International variation in socioeconomic inequalities in self reported health. *J Epidemiol Community Health* 49(2), 117–23.
- Lee, V.E. (1995) Where do Head Start attendees end up? One reason why preschool effects fade out. *Educational Evaluation and Policy Analysis* 17, 62–82.
- Love, J. M., Kisker, E. E., Ross, C. M., Schochet, P. Z., et al. (2002) *Making a difference in the lives of infants and toddlers and their families: The impacts of Early Head Start, Vol. I: Final technical report*. Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research, and Evaluation, Child Outcomes Research and Evaluation and Administration on Children, Youth and Families, Head Start Bureau.
- Lozoff, B., Klein, N.K., Nelson, D.K., McClish, D.K., Manuel, M. and Chacon, M.E. (1998) Behavior of infants with iron-deficiency anemia. *Child Dev* 69, 24–36.
- MacLeod, J. and Nelson, G. (2000) Programmes for the promotion of family wellness and the prevention of child maltreatment: A meta-analytic review. *Child Abuse and Neglect* 24, 1127–49.
- Maggi, S., Irwin, L.G., Siddiqi, A., Poureslami, I., Hertzman, E. and Hertzman, C. (2005) *Analytic and strategic review paper: International perspectives on early child development*. The World Health Organization's Commission on the Social Determinants of Health: Geneva, Switzerland.
- McCain, M. N. and Mustard, J. F. (1999) *Early years study: Reversing the real brain drain*. Toronto: Publications Ontario.
- Meadows, P. (2005) *Interim report of the cost-effectiveness of implementation of Sure Start local programmes*. London: DfES.

- Meadows, P. (2007) The costs and benefits of Sure Start local programmes. In Belsky, J., Barnes, J. and Melhuish, E. (Eds.) *The National Evaluation of Sure Start: Does Area-Based Early Intervention Work?* Bristol: Policy Press.
- Meluhish, E., Belsky, J., Leyland, A.H., Barnes, J. and the National Evaluation of Sure Start Research Team. (2008) Effects of fully-established Sure Start local programmes on 3-year-old children and their families living in England: A quasi-experimental observational study. *Lancet* 372, 1641–47.
- Morán, R. and Haefeli, J. (1998) *An ECCD strategy dialog: An outline of messages. Levelling the field for the children of poverty: Early child care and development and the IDB*. Discussion Draft Number 1. Washington, DC, US: SDS/SOC (Social Development Division, Inter-American Development Bank).
- Morley, R. and Lucas, A. (1997) Nutrition and cognitive development. *Brit Med Bull* 53, 156–59.
- Morris, J. N., Blane, D. B. and White, I. R. (1996) Levels of mortality, education, and social conditions in the 107 local authority areas of England. *J Epidemiol Community Health* 50, 15–17.
- Murray, G.K., Veijola, J., Moilanen, K. et al. (2006) Infant motor development is associated with adult cognitive categorisation in a longitudinal birth cohort study. *J Child Psychol Psychiatry* 47, 25–29.
- Myers, R. (1995) *The Twelve Who Survive: Strengthening Programmes of Early Childhood Development in the Third World (2<sup>nd</sup> edn)*. Ypsilanti, MI, US: High/Scope Press.
- Nelson, G., Westhues, A. and MacLeod, J. (2003) A meta-analysis of longitudinal research on preschool prevention programs for children. *Prevention and Treatment* 6.
- NESS (National Evaluation of Sure Start). (2005) *Early impacts of Sure Start Local Programmes on children and families: Report of the cross-sectional study of 9- and 36-month old children and their families* (No. NESS/2005/FR/013). London: Institute for the Study of Children, Families and Social Issues, Birkbeck, University of London.
- NESS. (2007) *Understanding variations in effectiveness amongst Sure Start local programmes: Final report of the NESS Programme Variability Study* (No. NESS/2007/FR/024). London: Institute for the Study of Children, Families and Social Issues, Birkbeck, University of London.
- NESS (2008) *The impact of Sure Start Local Programmes on three year olds and their families* (No. NESS/2008/FR/027). London: Institute for the Study of Children, Families and Social Issues, Birkbeck, University of London.
- OECD (Organisation for Economic Co-operation and Development). (2006) *Starting strong II: Early childhood education and care*. Paris: Author.
- Pappas, G., Queen, S., Hadden, W. and Fisher, G. (1993) The increasing disparity in mortality between socioeconomic groups in the United States, 1960 and 1986. *N Engl J Med* 329(2), 103–09.
- Penn, H., Burton, V., Lloyd, E., Potter, S., Sayeed, Z. and Mugford, M. (2006) What is known about the long-term economic impact of centre-based early childhood interventions? Technical report. In *Research Evidence in Education Library*. London: EPPI (Policy and Practice Information

and Co-ordinating)-Centre, Social Science Research Unit, Institute of Education, University of London.

Reynolds, A.J. and Temple, J.A. (2008) Cost-effective early childhood development programs from preschool to third grade. *Ann Rev Clin Psychol* 4, 109–39.

Reynolds, A.J., Temple, J.A., Robertson, D.L. and Mann, E.A. (2002) Age 21 cost-benefit analysis of the Title I Chicago Child-Parent Centers. *Educ Eval Policy Anal* 24, 267–303.

Rolnick, A. and Grunewald, R. (2003) Early childhood development = Economic development (Editorial). *Fedgazette* (a publication of the Federal Reserve Bank of Minneapolis, MN, US), March. Available at [http://www.minneapolisfed.org/publications\\_papers/pub\\_display.cfm?id=1839](http://www.minneapolisfed.org/publications_papers/pub_display.cfm?id=1839), accessed 6/24/09.

Rutter, M. (2006) Is Sure Start an effective preventive intervention? *Child and Adolescent Mental Health* 11, 135–41.

Sakai, K.L. (2005) Language acquisition and brain development. *Science* 310, 815.

Sanders, M.R. (2003) Triple P – positive parenting program: A population approach to promoting competent parenting. *Australian e-Journal for the Advancement of Mental Health (AeJAMH)* 2(3).

Scott, S., Spender, Q., Doolan, M., Jacobs, B. and Aspland, H. (2001) Multicentre controlled trial of parenting groups for childhood antisocial behaviour in clinical practice. *BMJ* 323, 194–98.

Shonkoff, J. and Phillips, D (Eds). (2000) *From neurons to neighbourhoods: The science of early childhood development*. Washington, DC, US: National Academy Press.

Shonkoff, J.P. and Meisels, S.J. (Eds.) (2000) *Handbook of Early Childhood Intervention, 2<sup>nd</sup> Edn*. New York, NY, USA: Cambridge University Press.

Stein, A., Malmberg, L.E., Sylva, K., Barnes, J., Leach, P. and the FCCC (Families, Children and Child Care project) team. (2008) The influence of maternal depression, caregiving, and socioeconomic status in the post-natal year on children's language development. *Child Care Health Dev* 34, 603–12.

Suhrcke, M., Pillas, D. and Selai, C. (2008) Economic aspects of mental health in children and adolescents. In *Social cohesion for mental well-being among adolescents*. Copenhagen: WHO Regional Office for Europe.

Treyvaud, K., Anderson, V.A., Howard, K., Bear, M. et al. (2009) Parenting behaviour is associated with the early neurobehavioral development of very preterm children. *Pediatrics* 123, 555–61.

Watson, J. and Tully, L. (2008) *Prevention and early intervention update: Trends in recent research*. Sydney: Centre for Parenting & Research: New South Wales Department of Community Services.

Winkleby, M.A., Jatulis, D.E., Frank, E. and Fortmann, S.P. (1992) Socioeconomic status and health: How education, income, and occupation contribute to risk factors for cardiovascular disease. *Am J Public Health* 82(6), 816–20.

Wise, S., da Silva, L., Webster, E. and Sanson, A. (2005) *The efficacy of early childhood interventions: A report prepared for the Australian Government Department of Family and Community Services*. Melbourne: Australian Institute of Family Studies.

Wolfe, B.L. and Haveman, R.H. (2002) Social and nonmarket benefits from education in an advanced economy. In Kodrzycki, Y.K. (Ed.) *Education in the 21<sup>st</sup> Century: Meeting the Challenges of a Changing World*. Conference Series No. 47, Boston, MA, US: Federal Reserve Bank of Boston, 97–131.

Wolfe, B. and Tefft, N. (2007) *Child interventions that may lead to increased economic growth* (Early Childhood Research Collaborative Discussion Paper 111). Madison, WI: University of Wisconsin-Madison.

Zigler, E.F., Finn-Stevenson, M. and Hall, N.W. (2002) *The First Three Years and Beyond*. New Haven, CT, USA: Yale University Press.