

# Early Years

## What is known about the long-term economic impact of centre-based early childhood interventions?

Review conducted by the Early Years Review Group

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Report written by Helen Penn, Veronica Burton, Eva Lloyd, Miranda Mugford, Sylvia Potter and Zahirun Sayeed

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EPPI-Centre  
Social Science Research Unit  
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## **TECHNICAL REPORT**

Review conducted by the Early Years Review Group

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## List of abbreviations

CPC	Chicago Child Parent Centers
DfES	Department for Education and Skills
ECEC	early childhood education and care
EPPI-Centre	Evidence for Policy and Practice Information and Co-ordinating Centre (part of the Social Science Research Unit at the Institute of Education, University of London)
HEFCE	Higher Education Funding Council for England
OECD	Organization for Economic Co-operation and Development

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# CONTENTS

Summary	1
Background	1
Methods	1
Results	2
Discussion and conclusions	2
1. Background	5
1.1 Aims and rationales for the current review	5
1.2 Definitional and conceptual Issues	5
1.3 Policy and practice background	6
1.4 Research background	6
1.5 Authors, funders and other users of the review	8
1.6 Review question	8
2. Methods used in the review	9
2.1 User involvement	9
2.2 Identifying and describing studies	9
2.3 In-depth review	10
3. Identifying and describing studies: results	12
3.1 Studies included from searching and screening	12
3.2 Characteristics of the included studies (systematic map)	12
3.3 Identifying and describing studies: quality-assurance results	14
4. In-depth review: results	15
4.1 Further details of studies included in the synthesis	15
4.2 Synthesis	16
4.3 Quality-assurance results	23
4.4 User involvement with the review	23
4.5 Summary of the findings	23
5. Conclusions and implications	25
5.1 Strengths and limitations of this systematic review	25
5.2 Implications	28
References	30
Appendix 1.1: Authorship of this report	35
Appendix 2.1: Search strategy for electronic databases	37
Appendix 2.2: Journals handsearched	39
Appendix 2.3: EPPI-Centre keyword sheet, including review-specific keywords	40
Appendix 4.1: Aims and methods of the studies	42
Appendix 4.2: Synthesis - data extraction summary tables; weight of evidence	45
Appendix 4.3: Data used for economic analysis	47



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# Summary

## Background

The broad focus of the Early Years Review Group is research on the impact of various policies that promote early education and care. In this third review, we focus on evidence from longitudinal studies of centre-based early childhood interventions. Our question is:

*What is known about the long-term economic impact of centre-based early childhood interventions?*

There is a substantial literature about cost-benefit studies of social welfare interventions. It is widely assumed, and widely quoted by politicians and policymakers, that early childhood interventions in particular are effective and bring returns in the order of seven dollars saved for every one dollar spent. These savings do not appear to be apparent until the children who received the intervention reach adulthood.

We wished to scrutinise this evidence in detail.

## Methods

The Review Group operated at two levels: (i) a core group of academics and practitioners who undertook the research, and (ii) a wider peripheral group, mostly international, which was consulted at various stages in the procedure, and which helped to formulate the research question and write the protocol, and advising about specific issues. The core group and the peripheral group are concerned with early education and care, but because this review also included economic analysis, two economists were recruited, one to the core and one to the peripheral group.

Initial work concentrated on development of definitional statements, and inclusion criteria. Long-term was defined as more than ten years from the date of the intervention so that children should be aged at least 15. Economic impact referred to the

outcomes for children (and for mothers of participants) to which a cost has been assigned, including long-term social integration or mental or physical health, rates of incarceration, remedial education, teenage pregnancy rates, employment and earnings. In addition, we limited the studies to those undertaken after 1950 and which were published in English. A search strategy was developed that included service categories, financial and related categories, and outcome/research categories.

The abstracts were scanned to make an initial decision about whether they met the inclusion criteria. Those where determination was positive or unclear were obtained, and where they still met the criteria on examination of the documents, they were keyworded using the standard EPPI-Centre and review-specific keywords.

Following this exercise a map of relevant literature was produced. Searching - including database searching, internet searching, citation tracking and hand-searching - produced 4,893 reports. The complex nature of the search meant that it was not possible at the search stage to look with any precision for either long-term economic outcomes or early childhood interventions. As a result, 93% of the abstracts were excluded at the initial screening stage because, although they contained the search terms specified, they were not actually about either early childhood interventions or long-term economic outcomes. Only three studies met our criteria, but because the review examined longitudinal data, these were reported in 58 separate reports. There was not a second stage of inclusion/exclusion using further criteria as we had anticipated and described in our review's protocol. Three review-specific questions were added to the EPPI-Centre data-extraction tool:

- A.1 What is the range of domains considered by the cost-benefit analysis?
- A.2 What is the evidence used within those domains as a basis for the analysis?
- A.3 On what basis are future projections of benefits made?

A synthesis of the results was undertaken based on the quality of the evidence provided.

### **Results**

We found only three studies which deal with the long-term economic outcomes of centre-based early childhood interventions, although there is a considerable secondary literature which refers to them. These studies were the Perry High/Scope, the Abecedarian and the Chicago Child-Parent Centers (CPC), all undertaken in the United States.

#### ***Type of study***

Two of the studies, Abecedarian and Perry High/Scope, described themselves as randomised controlled trials, where participants were allocated at random to the early years intervention or a comparison condition. They involved small, single site samples. The third study, the CPC, was a matched controlled trial that identified children at entry into kindergarten (i.e. aged 5-6), who had experienced the CPC programme and established a matched comparison group of children who had not. This study had a much larger sample and was multisite.

#### ***Timescale of studies***

Perry High/Scope was initiated in the 1960s, Abecedarian in the 1970s, and the CPC was an evaluation commencing in the 1980s, of a cohort attending a programme which had been first introduced in the 1960s.

#### ***Nature of the Intervention***

The programmes offered to children were all high quality in that they provided good staff-child ratios and carefully structured curricula. The Abecedarian programme offered longer hours for all children and accepted children into the programme at a very young age. The other two programmes offered part-time, school-term nursery education to children aged three and four years, and parenting support, either through home visits (Perry High Scope) or through required attendance at child-parent centers (CPC).

#### ***Study samples***

All three studies drew almost entirely on low-income African-American populations. There are some differences in the samples (Table 4.1). The Abecedarian study drew on an especially high risk population, and the sampling frame was based on referrals from other agencies.

#### ***Calculation of costs and benefits***

Relatively similar programme cost information was given for the three studies, although the costs are not directly comparable since the levels of inter-

vention differed considerably; different information was collected about participant outcomes. The outcomes studied relate in part to the kind of provision under offer. The Abecedarian study offered full-time provision for children aged 0-5 and collected information about mother's subsequent education and employment patterns, whereas the other two studies assumed that mothers would be available to take part in parent programmes and home visiting; they therefore did not aim to track mothers' education or employment. The Abecedarian study also included a youth risk assessment survey, which enabled the authors to calculate health benefits, especially from cessation of smoking. The other two studies did not include measurement of health benefits. There were also other differences between the three studies in terms of the outcome measures used and the range of projected savings resulting from the interventions. The projected savings were calculated on the basis of a range of US datasets, not necessarily the same ones across the three studies.

#### ***Cost-benefit results***

Each study made an overall estimate of the ratio of dollars spent to dollars saved, taking long-term projections of benefits into account. However, it should be noted that these were headline figures and, as such, did not fully reflect the range of variation in outcome measures within each study or across studies. Each study has a slightly different sample, starting in a different decade, varying in the nature of the intervention, and providing a different configuration of outcomes, and therefore potential savings. The savings were costed on the basis of different datasets for each study. The Abecedarian study claims a projected return rate to society of 1:3:78. The results are not highly sensitive to the presence or exclusion of any one outcome, and there were no savings on juvenile justice. The CPC study claims a projected return rate to society of 1:7:14. The most important single benefit comes from juvenile justice savings. The High/Scope study claims a return rate of 1:7:16 for every dollar invested. By far the largest benefit also comes from juvenile justice savings.

### **Discussion and conclusions**

#### ***The difficulties of longitudinal studies***

Longitudinal studies are problematic for several reasons. They may draw on ideas and assumptions that have become dated or irrelevant over the intervening years: for example, the studies in the review raised problems of relevance concerning race and motherhood, since understanding of these issues has considerably shifted since the 1960s. There is considerable reason to suppose that in the US, the climate of poor neighbourhoods has worsened, owing to drug subcultures, a rise in single parenthood and other socioeconomic issues (Bourgois, 1998; Katz, 2004; Sennett, 2005). In the three studies examined, the Abecedarian appeared



to have the most high-risk sample, and showed no crime effects. It may be the case that in higher-risk groups, the juvenile justice savings are minimal or non-existent, so that a worsening of conditions means that interventions are likely to be less effective. For these kinds of reasons, strategies for early intervention that were considered appropriate in the 1960s and 1970s may not be relevant 30 or 40 years on.

### ***Methodologies of interventions***

There is also an argument about the need for educational and social interventions to bed down before being evaluated. Newly set up programmes (as with the Perry High/Scope and Abecedarian) may shift over time as the intervention becomes established, and initial difficulties are ironed out. Chatterji (2004) and Finn-Stevenson et al. (1998) have argued convincingly for educational interventions which incorporate multi-method analyses of contextual and site-specific variables over time, as well as an experimental design, such as a randomised controlled trial.

### ***The strengths and weaknesses of cost-benefit analysis***

The cost-benefit studies considered here provide sophisticated and complicated economic analyses of a complex range of data, in which many judgments are made about the basis of calculations. As Foster and Holden (2004, p 48) point out, 'cost-benefit analysis provides a way of prioritizing a potentially very large body of information, focusing on those outcomes that have the greatest potential benefits or costs from a particular perspective'. They enable an intervention to be costed and rational decisions to be made about future investment. Some commentators argue that cost-benefit studies of early interventions represent a significant development in economic research (Currie, 2004; Heckman, 1999, 2000) and may play an important role in policymaking (Lynch, 2004).

But however complex the methodology, at best a cost-benefit analysis only aims to provide a range of plausible estimates, based on the outcomes reported in the studies. In undertaking a cost-benefit analysis, there are always decisions to be made about the timeframe of the analysis, the range of costs and benefits to be included (e.g. the range of crime savings) and the datasets used as a basis of projections. The calculations do not necessarily reflect all the variations in the original data, but the use of estimates and headline figures may give rise to an exaggerated sense of precision by those in the field who refer to, or extrapolate from, the data.

### ***What cost-benefit studies leave out?***

Finally any cost-benefit analysis is limited to measurable costs and excludes, at least in most contemporary economic literature, more nebulous

criteria such as child wellbeing. Recent international work arising out of the Convention on the Rights of the Child suggests that this is an increasingly important issue (CRC: General Comment 7, 2005). Distributional issues, such as social justice and universal access, may be seen as legitimate goals in themselves, regardless of strict economic efficiency (Karoly et al., 2001; Phipps, 2001; PricewaterhouseCoopers, 2004; Cleveland and Krashinsky, 2003).

### ***Do early childhood interventions save money over the long term?***

Although there seems to be a general indication from these three studies, and others such as Head Start, that early childhood interventions may make a long-term difference (Currie, 2000, 2004) and save money, the processes involved are relatively unclear. In these three studies of centre-based interventions, the processes appear to be somewhat contradictory. The Abecedarian study is the most extensive intervention, and shows the most marked effects between the experimental and control groups during schooling, but with no impact on crime ratings, which is the major source of cost savings in the other two studies. On the basis of this review, the widespread, international use of the most favourable headline findings, and in particular of the Perry High/Scope study, is unjustified. Apart from the variation within and between studies, and problems of interpretation of the results, especially crime figures, there is also a problem about the context in which these studies were carried out. The targeting of low-income African-American children in ghettoised neighbourhoods, in a period of considerable racial tension, leads to considerable doubts about the generalisability of these interventions outside their original context. For example, Zigler (personal communication, 1986) writes of the time at which the Perry High Scope study was carried out as a period of 'anguish and change' for the education of black children.

### ***Policy***

Given the much wider range of policy initiatives on early childhood care and education in the UK and OECD countries, compared with the US, the *longitudinal* cost-benefit studies of early childhood interventions add little to understanding outside of a US context. This is an important point, since the most generous headline figures from these three studies are so widely cited. There is undoubtedly a trend, reflected in many studies, to indicate that early intervention makes a difference to subsequent outcomes, but the misapplication of the findings from these three studies is likely to lead to a diminished, rather than enlarged, understanding of the processes involved, and the contexts in which they can be said to work.

### ***Practice***

The results of the three studies here can only be cited with caution. While there may well be long-term outcomes from early childhood interventions, these studies say little about processes, and are based on cost estimates and projections which do not appear to apply directly outside a US context. The implications for practice, especially in relation to race and ethnicity, have not only *not* been explored, but have been ignored. The argument against targeted interventions are that they are likely to be stigmatising, and therefore unpopular with recipients. Targeting black children, in particular, may lead to accusations of unequal treatment.

### ***Research***

There seems little point in trying to replicate longitudinal studies in the UK. Apart from the expense of such studies and the difficulty of obtaining

conclusive results, the notion of targeted intervention is itself problematic. On the other hand, it is important to explore different models of providing and costing services. Cleveland and Krashinsky (2003) have suggested that governments have put forward a range of distributional justifications for expenditure on early childhood education and care, and relatively few developed countries have chosen to adopt the model of funded targeted provision within a private market context, as is the case in the US (OECD, 2000). Instead, distributional issues of access and social justice have been of more concern. PricewaterhouseCoopers (2004) have argued for the need to undertake more research on calculating the costs and benefits of universalised services in the UK. More radically, considerations about the rights and status of young children in the here and now, arising from the work on the Convention of the Rights of the Child, imply that the scope of cost-benefit studies in early childhood should be substantially rethought.

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## CHAPTER ONE

# Background

The broad focus of the Early Years Review Group is research on the impact of various policies that promote early education and care. In our first review, we explored the evidence on the impact of out-of-home integrated care and education settings on children aged 0-6 (Penn et al., 2004). In our second review, we investigated the effectiveness of measures taken to mitigate the impact of direct experience of armed conflict on the psychosocial and cognitive development of children aged 0 to 8 (Lloyd et al., 2005). In this third review, our question is 'What is known about the long-term economic impact of centre-based early childhood interventions?'. In writing this report, we also draw on findings and conclusions from earlier reviews - in particular, from the first review.

In this chapter, we explain the background to our choice of topic for this review and the issues we faced in identifying relevant studies. We provide working definitions of our terms, and indicate which policy and practice issues have informed our review and what wider research we have drawn upon. We also outline our own composition and perspective as a review group.

### **1.1 Aims and rationales for the current review**

In this review we wished to explore the evidence on the long-term economic impact of early interventions, since it is commonly assumed that such impact exists and should be factored into policy-making. We arrived at the definition of long-term as more than 10 years following the early intervention; that is, projecting into the adulthood of the children who took part in the early intervention, since it is in young adult life and beyond that many of the benefits are supposed to accrue.

The first stage of the review was to identify and describe studies that examined the long-term economic impact of centre-based early childhood interventions. We aimed to provide:

- a systematic review of existing research meeting explicit criteria for the scope, study design, reporting, language and timeframe
- a database of data extracted from existing reports, using EPPI-Centre systems
- an indication of gaps in the research which need to be filled

A second stage of the review involved synthesis of the characteristics and findings of the studies. These informed the discussion about the costs and benefits of early childhood interventions.

### **1.2 Definitional and conceptual Issues**

We have used the following definitions for the scope of our work:

- long-term: more than 10 years from the date of the intervention (i.e. so that the children at follow up should be aged at least 15)
- economic impact: outcomes for children to which a cost has been assigned, including long-term social integration or mental health, rates of incarceration, remedial education, teenage pregnancy rates, employment and earnings
- early childhood interventions: any kind of centre-based education, daycare or family support or parenting intervention, or any combination of these
- young children: any age before statutory schooling begins

### 1.3 Policy and practice background

There have been a small number of studies and reviews that seek to provide a cost-benefit analysis of the long-term impact and link them to particular kinds of programmes. These studies and reviews have had a wide currency among policymakers, and have been used as a justification for the development of early childhood intervention programmes, such as the Sure Start programme in the UK (Meadows, 2001). The cost-benefit figures of seven or eight dollars saved for every one dollar spent are widely cited in the academic and popular press in many countries, and have frequently been cited by senior politicians in the UK. We seek to explore in detail the basis for these claims and to examine their generalisability.

### 1.4 Research background

#### 1.4.1 The research evidence about early childhood interventions

A central question underpinning the three studies considered here, and other studies of early interventions in the US, is whether targeted early childhood interventions are able to move children out of poverty in a systematic way. Some commentators take an a priori view that this is a mistaken enterprise, because inequality and poverty have to be addressed at a structural level, rather than simply to enable some vulnerable children to do better (Kagan, 1998; Perry and Albee, 1994). It is relevant to this argument that the US has one of the highest gini (inequality) ratings (40.8) among developed countries (UNDP, 2003).

Others argue that the evidence that early childhood interventions make a difference to poor children in the short or long term is at best ambiguous. (Goodson et al., 2000)

The Perry High/Scope project, the Abecedarian Project and other early intervention studies in the US originate within a particular paradigm that assumes that, within a private childcare market, publicly or charitably funded pre-school interventions are only appropriate or justifiable for highly targeted low-income families (Kagan, 1998). This paradigm presents a number of difficulties, apart from distributional issues of social justice and equality of access. There are some suggestions that targeting low-income or multi-problem families can give rise to stigma and low expectations, rather than counteract them (Johnson et al., 2003).

The target families in early intervention studies in the US are also overwhelmingly African-American. There is now considerable criticism voiced in the US about the way in which African-American groups and other people of colour have been treated in research programmes on child development (Johnson et al., 2003). African-American families may face particular problems of discrimination in schooling and elsewhere (Heath, 1983, 1990;

Greenfield and Cocking, 1994). The very high rate of incarceration of black youths in the US is a feature of the US criminal justice system that does not appear to be replicated elsewhere. For all these reasons, generalisations of the findings outside the particular US context of targeted interventions for low-income African-American families may be problematic.

However, the consensus appears to be that, from a long-term if not a short-term perspective, early interventions make a difference to poor children. Children who have attended some kind of educational programme, or who have had some kind of daycare, or whose families have been in receipt of some kind of family support, are expected to perform better in the future than they would have done without the intervention. The journal *The Future of Children* devoted a much cited edition to discussing meta-analyses of various early childhood interventions, and contributors concluded that interventions produced generally positive results (Barnett, 1995).

The mechanisms by which these improvements are brought about are not fully understood. One model is to focus on the child and enrich the child's early experiences through providing an out-of-home early childhood programme. Another model is to focus on the mother, either in her parental role, or as a provider of economic resources for the family. A further model is to try to combine these intervention methods in some form. In this review, we have only considered centre-based interventions. Two of these were of relatively short duration - part-time for one or two years for children before they began school - but these centre-based interventions were also supplemented with attempts to improve mothers' parenting performance (Perry High Scope, CPC). The third intervention (Abecedarian) was more intensive, offering full-day care for children aged 0-5, and also focused on the mother's role as an economic provider. These studies, therefore, offer mixed models of intervention.

There are some concerns, then, about the variability of the interventions, the range of outcome measures used, and the contexts in which the interventions took place in the three studies reviewed here. The three studies were all centre-based but were implemented in substantially different ways. For example, the Abecedarian study included interventions with infants, and the intervention was of a greater intensity than in the other two studies, but the sample was also higher-risk. Non-centre-based early childhood interventions also differ considerably from one another in the scope of their intervention and in the target groups (Karloly et al., 2001; Goodson et al., 2000) We had assumed that at least centre-based interventions would have in common a coherent programme for children themselves, and this would be more likely to produce similar results. But, owing to the variation between studies, we cannot unambiguously answer the question about whether centre-based



interventions do in fact produce similar longitudinal results, although we can point to a trend in that direction.

### 1.4.2 The research evidence about cost-benefit studies

Cost-benefit calculations themselves are a well-established method of evaluation. There is an extensive literature on the use of cost-benefit studies for social welfare interventions, including attempts to cost early childhood interventions and to calculate the range of savings that might arise, in order to aid policymaking (Aos et al., 2001; Behrman, 1999; Carniero and Heckman, 2003; Cleveland and Krashinsky, 1998, 2003; Currie, 2000; Greenwood et al., 1998; Karoly et al., 1998, 2001; Meadows, 2001; Lynch, 2004; PricewaterhouseCoopers, 2004). Karoly et al. (2001, p 101) point out that 'cost and outcome analysis is not one method but rather a set of methods, which serve different purposes, place different demands on data collection, and themselves require differing amounts of resources'. They set out a framework for analysis of the cost-benefits of early childhood interventions, but caution that 'It is thus important to keep cost-benefit analysis, cost-savings analysis, and other forms of cost and outcome analysis in their place. In any decision, some factors can be resolved only through a decision-maker's values and subjective judgement or through negotiation among stakeholders' (2001, p xix)

Meadows (2001) also sets out clearly the standard approach to cost-benefit studies:

- Measure the costs.
- Measure the effects.
- Estimate the monetary value of the effects.
- Adjust for the effects of inflation by placing all costs and benefits in terms of constant values.
- Discount future costs and benefits to take account of the opportunity costs of the use of the original resources.
- Identify the distribution of costs and benefits across different groups (children, families, local community, society).
- Undertake sensitivity analyses.

It is usual practice in cost-benefit studies to apply a discount rate to future costs and benefits within a standard range of 3%-7%. In the UK the discount rate is usually estimated at 6% for cost-benefit studies (Meadows, 2001). Karoly et al. (2001) suggest 4%.

Some commentators argue that cost-benefit studies of early interventions represent a significant development in economic research (Currie, 2004; Heckman, 1999) and may play an important role in policymaking (Lynch, 2004). As Foster and Holden

(2004, p 48) point out, 'cost-benefit analysis provides a way of prioritising a potentially very large body of information, focusing on those outcomes that have the greatest potential benefits or costs from a particular perspective'. They enable an intervention to be costed, and for rational decisions to be made about future investment. Karoly et al. (2001) comment that 'the majority of the analytic effort will come from learning about the domain, structuring the models of how the intervention works, collecting and cleaning data etc.'.

The Perry High/Scope cost-benefit study on the other hand does not include any potential savings to the taxpayer due to the benefits of having mothers in the workforce (for example, fewer benefits paid out to lone parents, more tax income). At the time the study was initiated in the 1960s, it was assumed that part-time educational provision was sufficient to meet children's needs, and no extra care need be provided, because mothers commonly stayed at home. (Most home-visiting programmes/parent-support programmes are also predicated on the availability of mothers' time.) On the other hand, it is likely that the costs of the programme would increase, if care covered working hours.

Cost benefit studies, however valuable and powerful a tool, necessarily approximate costs and benefits. For example, if fewer children appear to become juvenile delinquents as a result of having received the early intervention, then there is a saving in the expenditure on the juvenile justice system. In Perry High/Scope the most significant 'saving' or 'benefit' is in the amount that would be notionally saved over time in compensation to victims of crimes, if the crimes against them had not been committed. As others have pointed out (e.g. Aos et al., 2001), this is a highly conjectural figure. According to the calculations used, crime victim savings could range from the insurance value on items stolen to a dollar value put on the pain, suffering or loss of life of criminal victims. Without an estimate of the costs to the victims of crime, the long-term benefits of the programme appear to be more marginal. Using data from Schweinhart et al. (1993, Table 43), Aos et al. (2001:18) point out that 'The Perry Pre-school evaluation calculated a ratio of \$8.74 of *total* benefits to one dollar of costs. Of this amount the crime reduction benefits alone totalled \$5.70' (2001, p 18) (about 65% of the savings). The Karoly et al. (1998) study calculate this crime reduction figure at 40%, leaving out the more conjectural monetisation of reduction in pain and suffering for victims of crime, which reduces the overall saving.

The Abecedarian Project, which was initiated in the 1970s, did not show a decrease in criminal activities between the intervention and non-intervention groups, although the intensity and duration of the intervention was greater (Campbell et al., 2002). However, the Abecedarian study does claim to have produced significant long-term economic benefits (although less than those of the Perry High/Scope

Project) because it includes the benefits accrued from the better educational achievements of the teenage mothers in the intervention group, and for the higher earnings of the mothers of the intervention group, although it did not show that significantly more mothers were employed (Masse and Barnett, 2003). A randomised controlled trial of a day nursery in the UK similarly found no significant differences in employment rates of mothers (Toroyan et al., 2003). The authors of this study suggested that, in the UK, even if fulltime care was provided, low-skilled mothers would not necessarily seek employment since low paid work would not compensate for loss of other benefits (e.g. housing benefit). A mother might still be marginally better off not working, even where childcare was provided.

The state of health of the children and their parents is likely to affect their education performance as well as to be a benefit per se. The UK Sure Start evaluation includes a range of health measures of outcomes, but the three studies considered in the review did not systematically measure health outcomes.

In the UK, there have been criticisms of targeted approaches to the provision of early education and care services on the grounds of social justice. If the government is considering a more universal service, economic approaches modelled on targeting may be irrelevant, and cost-benefit analyses need to address systemic issues, rather than focus only on project-level data. Two recent economic studies rely on economic modelling of differing levels of universal services to predict long-term economic gains (PricewaterhouseCoopers, 2004; Chevalier and Viitanen, 2002). However, such modelling is predicated on a number of assumptions about childcare provision and women's participation in the workplace, which are also open to interrogation, including the cost-effectiveness of long-term benefits to children, and the relationship of these assumed benefits to different types of childcare.

In a paper commissioned by the OECD, Cleveland and Krashinsky (2003) discuss the financing of early childhood services in OECD countries. They conclude that there is not a universally best design for early childhood interventions, since 'countries will differ in their social and economic objectives, their philosophical approaches to the role of the state in relation to families and children, and their evaluation of the costs and benefits of different ECEC policies' (2003:48). Nevertheless they argue that there are 'design choices' about funding that critically affect the efficacy with which any services is delivered: for example, whether or not to adopt supply-side financing (directly to centres) or demand-side financing (subsidies to parents);

or whether state funding should be used, either directly, or indirectly, to support for-profit centres. In other words, they argue that the wider policy and economic context in which an intervention takes place critically affects any calculation of costs. For example, at a systemic level, a cost-benefit analysis may include an attempt to measure labour force outcomes, such as greater gender equity in the workplace.

## 1.5 Authors, funders and other users of the review

The Review Group operates as a small core group, with a wider, international peripheral group. All authors were involved in the development of the protocol. SP developed the review searches and managed the review databases. SP and VB screened reports for inclusion. All conducted keywording of the reports. HP, EL and MM conducted the data-extraction. HP conducted the synthesis. Due to the centrality of economic analysis to our review question, we have included two economists in our group - MM on the core group and GC in the peripheral group - with whom we have discussed our study methods. We discussed the topic at the initial stage in the Sure Start Unit of the DfES, and at the draft stage of the report. We also discussed the issues on an ongoing basis with groups of students of two of the authors. As with previous reviews, we will hold a seminar for users to disseminate our results, and we will also disseminate them in the professional/popular press.

The review has been funded by the DfES through the EPPI-Centre and indirectly, through the Higher Education Funding Council for England (HEFCE) for academic members. Administrative support was provided from the School of Education, University of East London.

## 1.6 Review question

The review question as outlined in the protocol is as follows:

*What is known about the long-term economic impact of centre-based early childhood institutions?*

Subsidiary questions include the range of outcomes on which the cost benefit is based, the range of domains which the cost benefit includes, and the assumptions and projections used in the cost-benefit calculations. The policy and practice recommendations consider the relevance of these findings to the UK.

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## CHAPTER TWO

# Methods used in the review

In this chapter, we describe our strategy for user involvement, the methods used for identifying

### 2.1 User involvement

The terms of the review were discussed with senior members of the Sure Start Unit, and a representative from Sure Start is a member of the peripheral group. Representatives of the DfES were consulted at the inception of the review. In view of the highly technical nature of some of the data, rather than hold ongoing seminars with interested user groups as with the first review, we aimed to concentrate our user involvement at the penultimate stages, once a draft had been peer-reviewed. We anticipate publishing an account of the review in the popular press for frontline practitioners (for example, *Nursery World*).

### 2.2 Identifying and describing studies

#### 2.2.1 Defining relevant studies: inclusion and exclusion criteria

Studies and reviews at the mapping stage were included only if they met ALL the following criteria:

- i. The provision under investigation was a centre-based childcare or early education intervention which began before the age of statutory schooling in the country where the intervention took place.
- ii. The provision under investigation did not aim to address solely (a) the needs of children with physical and/or severe learning disabilities; (b) child protection issues; (c) issues related to the teaching and/or learning of specific curricular subjects; or (d) any combination of the above.

- iii. The study was an evaluation or systematic review or secondary analysis of studies using longitudinal data and tracked outcomes of the early childhood intervention up to at least age 15.
- iv. The study included the assignment of costs to inputs and outcomes.
- v. The study was written in English.
- vi. The intervention did not take place before 1950.

#### 2.2.2 Identification of potential studies: search strategy

Major bibliographic databases and relevant websites were searched. A list is given in Appendix 2.1.

The search structure and the search categories used to search the databases is also given in Appendix 2.1. Three sets of terms were developed, relating to early years or family services, economic measurement and evaluation. The terms were searched as free text in the subject, title and abstract fields. Where possible, combined searches were run to identify reports that contained at least one term from each set. A simplified search strategy was applied to the ChildData, Cochrane Collaboration and Campbell Collaboration databases, because they did not have the facility to combine sets. For website searching and the searching of journals by hand, reviewers scanned full text reports and citations applying the inclusion criteria directly. The list of journals which were handsearched can be found in Appendix 2.2.

This search strategy was designed to identify studies which had assessed long-term cost-benefits of early childhood programmes. However, in order

to be able to describe and assess these studies effectively, it was also necessary to assess critically earlier reports which described the initial implementation and outcomes of the programmes. Once the core studies were identified, relevant reports were identified by searching again the initial database of results, by scanning the reference lists of included reports (citation tracking) and through email discussions with personal contacts.

The search results were stored in a bibliographic database (Endnote).

### **2.2.3 Screening studies: applying inclusion and exclusion criteria**

The abstracts were screened independently by VB and SP, using the inclusion criteria described above. When they differed, they discussed the abstracts to reach an agreement. At this stage, they left in items where information was inadequate to make a precise determination. The inclusion criteria were further applied by SP while retrieving the reports, and irrelevant items were also excluded at this stage also. The reports which were obtained were allocated to team members, who also applied the criteria while keywording.

### **2.2.4 Characterising included studies**

Full reports were obtained and first classified according to a standardised 'core' keywording system developed by the EPPI-Centre (EPPI-Centre, 2003a). This classifies studies in terms of the country in which the research was carried out; the educational focus; the population focus; and the broad study type. In addition, a second set of keywords was developed to meet the specific needs of the review, covering further details of age at intervention and follow-up; whether the care provided was fulltime; length of the intervention; and whether an intervention with parents was also included. Both sets of keywords can be found in Appendix 2.3.

### **2.2.5 Identifying and describing studies: quality-assurance process**

A member of the EPPI-Centre staff (RR) keyworded 2% of the abstracts independently. Keywording was undertaken initially as a group exercise within the team using one report, then seven reports were keyworded in pairs. Subsequent reports were keyworded individually. SP entered all keywording into the database, and conducted checks for errors in data entry.

## **2.3 In-depth review**

### **2.3.1 Moving from broad characterisation (mapping) to in-depth review**

The protocol for this review described how a further set of inclusion criteria might be applied

to select studies from the map for in-depth study. These draft criteria included items to assure minimum standards of reporting. We found, however, only three studies that met our initial criteria of centre-based longitudinal interventions. We therefore did not need to apply a second set of inclusion criteria for the in-depth review. In the light of our scrutiny of the cost-benefit literature, discussed above, we added the following three review-specific questions to the EPPI-Centre data-extraction tool:

- A.1 What is the range of domains considered by the cost-benefit analysis?
- A.2 What is the evidence used within those domains as a basis for the analysis?
- A.3 On what basis are future projections of benefits made?

### **2.3.2 Description, quality assessment and weight of evidence of studies in the in-depth review**

Data extraction was done in pairs, using a set of standard questions covering the study's aims and rationale; study research questions, and policy and practice focus; study methods, sample, results and conclusions; and study quality (EPPI-Centre, 2003b). The review-specific questions were also addressed. For each report, data extraction was done independently by two of the team, who agreed a final version. The reviewing pairs were HP/RR, HP/EL and HP/MM. We attempted to evaluate the appropriateness of the intervention, the rigour of the evaluation of the effectiveness of the intervention concerned, and the latest cost-benefit analysis.

Where the Review Group had previously scrutinised an evaluation as part of an earlier review, further reports were sought and reference was made to earlier work before adding data relating to cost-benefit analysis.

Clarification was sought on two specific points: the nature of the randomisation in the Perry High/Scope study (from access to correspondence of the authors with a colleague - Plewis, personal communication) and in the maternal education and employment levels in the Abecedarian study (Pungello, personal correspondence).

### **2.3.3 Assessing quality of studies and weight of evidence (WoE) for the review question**

Studies were assessed using the EPPI-Centre REEL system for weight of evidence (WoE) as high, medium or low. In this system, four weightings are given:

- A Soundness of method (i.e. the extent to which a study is carried out according to best accepted practice within the terms of that method)



- B Appropriateness of study type to answer the review question (i.e. appropriateness of methods to the review question)
- C Relevance of the topic focus of the review question
- D Overall weight of evidence that can be attributed to the results of the study

The study samples and interventions were felt to be highly context specific, and thus each study was given a low rating on WoE C. WoE D is simply an average of WoE A, B and C. Further detail is provided in the narrative synthesis in Chapter 4.

### ***2.3.4 Methods for synthesis of evidence***

A narrative synthesis approach was taken to draw together the findings of the studies reviewed in

depth. Details of interventions, study populations and study methods were presented in tabular form and these tables were used to find factors in common and differences between the studies. The findings of all three studies were also presented in tabular form, alongside each study's weight of evidence. Findings were then presented as a whole, with individual study findings weighted in importance according to their attributed weight of evidence.

### ***2.3.5 In-depth review: quality-assurance process***

Any problems encountered were first of all discussed and negotiated between the pairs of reviewers. The EPPI-Centre provided quality assurance on all three data-extractions.

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## CHAPTER THREE

# Identifying and describing studies: results

In this chapter, the results from the searching and screening are described, the characteristics of the studies included in the map are also given.

### **3.1 Studies included from searching and screening**

Searching - including database searching, internet searching, citation tracking and hand searching - produced 4,893 reports. The complex nature of the search made it extremely sensitive. It was not, for example, possible at the search stage to distinguish between current financial management of early childhood interventions and long-term economic outcomes. As a result, over 93% of the abstracts were excluded at the initial screening stage, mostly because they did not describe relevant early childhood interventions, or because they did not describe long-term outcomes. Handsearching produced no records which had not already been found by database searching and citation tracking. Further details can be found in Figure 3.1.

### **3.2 Characteristics of the included studies (systematic map)**

#### ***3.2.1 The studies***

Three studies were included in the map, consisting of 58 reports (Table 3.2).

It is important to note that the list of reports is not exhaustive; nearly all reports were written by members of the study teams; there is also a large secondary literature, discussed below; and the cost-benefit findings have been reworked by many economic commentators.

#### ***3.2.2 Geographical and temporal range***

All the studies reported interventions undertaken in the United States. The Perry High/Scope was initiated in the 1960s, the Abecedarian in the 1970s

and the CPC was an evaluation of a cohort who received the intervention in the 1980s, the programme having begun in the 1960s.

#### ***3.2.3 Settings, populations and interventions***

All the programmes consisted of a centre-based childcare intervention but only one provided full-time care throughout early childhood. All programmes continued until the children moved on to kindergarten. Details are listed in Table 3.2.

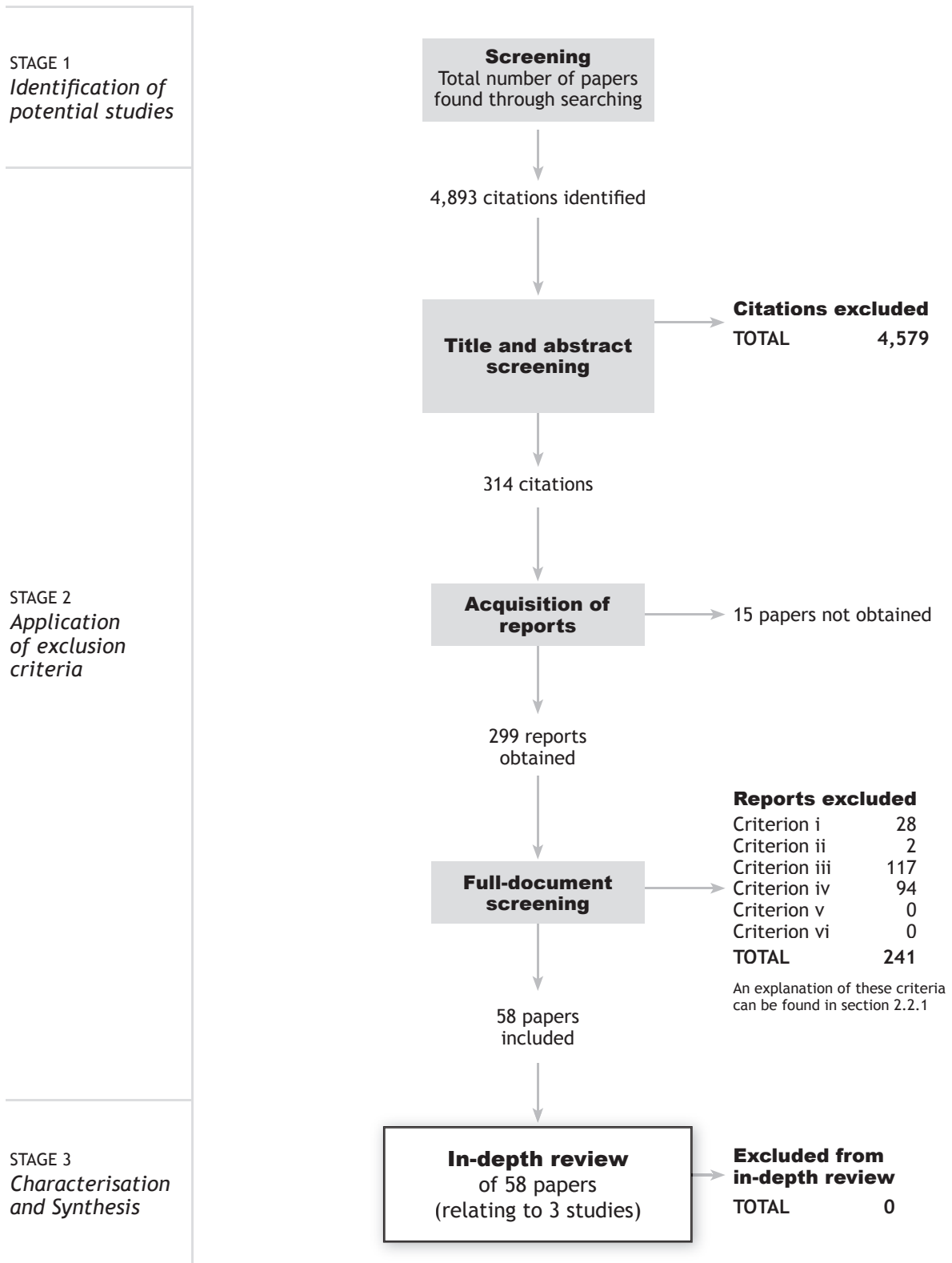
#### ***3.2.4 Age at follow-up***

The review only recorded follow-up studies at or after the age of 15 for the map. All the studies undertook follow-up studies at earlier ages as well. Ages at follow-up can be found in Table 3.3. Figures for cost-benefits may differ within studies according to the time frames used.

#### ***3.2.5 Study types***

The three studies were cost-benefit analyses based upon controlled trials. The Perry High/Scope Program analysis (Barnett, 1996) and the Abecedarian Program analysis (Masse and Barnett, 2003) were based on studies that were described as randomised controlled trials. The CPC study (Reynolds et al., 2000a) identified children at entry to kindergarten aged 5 who had experienced the CPC programme and established a matched comparison group of children who had not experienced the CPC programme. (Kindergarten in the US starts at age 5 and is equivalent in the UK to the first year of primary school.)

**Figure 3.1** Filtering of papers from searching to map to synthesis



**Table 3.1**

Studies included in the map

Study name	Number of reports	Key reports
Perry High/Scope Program	19	Barnett (1993, 1996)
Abecedarian Program	24	Masse and Barnett (2003)
Chicago Child-Parent Centers	15	Reynolds et al. (2002a)

**Table 3.2** Populations, settings and interventions

Programme	Population	Setting	Intervention type
Perry Preschool Program	128 children born to 100 families 'Culturally deprived' African-American children aged 3-5 Attrition by age 21: 123 children remain.	Childcare centre and home, single site; especially set up for intervention	Daily 2.5 hr classroom session for children on weekday am; a weekly 1.5 hour home visit for mothers and children pm and weekly onsite meetings (take-up by mothers very variable -level of take-up not factored into outcome calculations). Those who entered the program as 3-year olds received the intervention for two school years and those who entered as 4-year olds for one school year.
Abecedarian Program	112 children born to 109 families 'High-risk referrals' African- American children aged 0-5 Attrition by age 21: 104 children remain.	University childcare centre, single site, especially set up for intervention	Full-day integrated care and education to cover working hours, throughout year. All children 0-5 received full intervention.  No specific programmes for mothers were included, although informal support was given.
Chicago Child-Parent Centers	1,539 children aged 3-5 from 'low income districts' of Chicago (93% African-American, 7% Hispanic Attrition by age 21: 1,286 children remain (different attrition rates for different measures)	Child-parent centers already in existence located in or near public elementary schools Multi-site	Half-day pre-school sessions in school terms for children aged 3-4, compulsory weekly attendance for mothers for parent support classes. Follow up out of school provision plus continued parent classes until age 8.

**Table 3.3**

Age at follow-up

Study name	Follow-up ages
Perry High/Scope Program	15, 19-20, 27-28, 30
Abecedarian Program	16-21
Chicago Child-Parent Centers	14-15, 17-18, 20-21

### 3.3 Identifying and describing studies: quality-assurance results

SP and VB independently screened abstracts, and had a higher than 99% agreement. The very small number of disagreements were resolved at two meetings. In the selection of abstracts screened by RR, she excluded all the reports excluded by SP and VB, and excluded two reports selected by SP and VB; these two had been subsequently excluded by SP on inspecting the full reports. At the stage of screening full reports, SP found a number of dissemination reports, particularly relating to Perry High/Scope. These were reports aimed at publi-

cising the conclusions of each major study after it was published. Although these reports met the inclusion criteria, they were not included in the map because they did not add anything to the main report.

Where the reports were keyworded in pairs, the categories were agreed by the researchers before entry in the database. Since the reports included related to only three studies, all studies contained keywording from at least two researchers and SP, when inputting the keywording into the REEL database, found that keywording was consistent across researchers.

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## CHAPTER FOUR

# In-depth review: results

In this chapter, we give details of the studies selected for the in-depth review.

### **4.1 Further details of studies included in the synthesis**

#### **4.1.1 Study reports used for data-extraction**

All the cost-benefit studies examined for the in-depth review were reported in one main report (Barnett, 1996; Masse and Barnett, 2003; Reynolds et al., 2000a). The first of these used similar analyses to an earlier cost-benefit study by the same author (Barnett, 1993) but was based upon more recent outcomes data. Each drew on previous evaluations that drew on outcomes from the original intervention over time.

We had already scrutinised reports of the effectiveness evaluation of one intervention, the Abecedarian Project (Penn et al., 2004). The latest report of outcomes from this study that had been seen for this earlier review was compiled by Campbell et al. (2002a). To review the Abecedarian cost-benefit study, we examined two additional reports not seen at the time of the first review, by Campbell et al. (1986) and Pungello et al. (2000). These gave further details of the education and employment rates of mothers of participants.

To study the Chicago Child-Parent Centers cost-benefit analysis, we selected two main accounts (a book: Reynolds, 2000; and a paper, Reynolds et al., 2001), which were considered summarised comprehensively the previous body of work, and we used these as our main sources in assessing the original intervention.

The third study, the High/Scope Perry cost-benefit study, has presented reviewers with a particular problem since the body of previous work runs into scores of articles in academic journals, in the popular press and on the website of the

High/Scope Foundation. However for the purposes of this review we have relied mainly on the latest cost-benefit analysis (Barnett, 1993) and for details of the content and effectiveness of the early intervention, on the first report published in a monograph series by the High/Scope Foundation (Weikart, 1967) since it gives the most detailed account of the intervention (although only for the first three waves of the study) and to the latest monograph reporting outcomes data (Schweinhart et al., 1993).

#### **4.1.2 Study design and implementation**

Two of the studies, the Abecedarian and the Perry High/Scope, are small site-specific studies presented as randomised controlled trials. In the Abecedarian, there is no reason to doubt the randomisation of the sample. This study involved the allocation of 112 children to study groups.

The Perry High/Scope in later reports is described as having randomly allocated two matched groups of children (128 in total) to the intervention and the non-intervention groups. The first study report, however, does not make any reference to the method of allocation (Weikart, 1967). The ambiguities about allocation were raised by Plewis with the authors of the Perry High Scope study in 1986 (Plewis, personal communication). Subsequent papers by Weikart and others acknowledged that there was some manipulation of the sample following allocation: two participants were reallocated from the experimental to the control group on account of non-attendance. This would generally be regarded as problematic for a randomised controlled trial, although Barnett suggested that it made no difference to the outcomes. (Barnett, 1993, p 501). Plewis (1987) also raised queries about siblings in the High Scope study. Once a child was allocated to a specified group,

all siblings recruited later in the study were, for obvious reasons, also assigned to the same group (i.e. 123 children remaining in the study by 1986, but 100 families). Since children within families are likely to be more alike than children in different families, some analysis of this clustering effect would have been useful.

The study of the Chicago Child-Parent Centers (CPCs) is a large, multi-site study. 1,189 children were selected at the time of their entry into kindergarten aged 5. (There was an additional study of children who received school age interventions only, which accounts for the remainder of the sample of 1,539). In the analysis of most interest to this review, all children aged 5 in a low-income district of Chicago were included in the study, divided into one cohort of those who had attended CPCs and another who had not. The criterion for attending the CPC was geographical; the CPCs were provided in some sub-districts but not in others. The study compares the experimental group with the 'business as usual' control group. By locating the multi-site intervention within the school system, it was hoped that the results, if successful, could more easily be generalised and taken to scale.

Plewis (1987) also raised the more general question of the confounding effects of schooling. Some teachers and some schools make a difference to children's outcomes, but the possible effects of schooling do not appear to have been explored statistically in any of our cost-benefit studies.

### **4.1.3 Effectiveness and cost-benefit findings**

Each study reported a number of longitudinal outcomes that were significantly more positive for the intervention group. The Perry High/Scope and CPCs reported a statistically significant difference in juvenile crime rates between the intervention and control groups. In these studies, the benefits are calculated in terms of savings on the direct costs of juvenile justice proceedings, costs of incarceration, and on the basis of savings made on victim compensation. For both these studies, crime reduction is the single largest item in the benefit calculations. The most significant saving in the Perry High/Scope and CPC studies, in the order of 65% and 50%, respectively concerned juvenile justice, and actual and projected savings on payment of victim compensation (see Aos et al. (2001) for a detailed discussion of these figures). However, a recalculation of the Perry High Scope figures by Karoly et al. (1998) give a more conservative figure of 40%, the issue being whether or not the reduction in pain and suffering for victims of crime can be measured in financial terms. By contrast, in the Abecedarian Project, the difference between the intervention and the control group in the number of crimes committed is insignificant (Clarke and Campbell, 1998), and no benefits from crime reduction were included in the cost-benefit analysis.

All three studies reported a significant improvement in school performance, with less repetition and remedial assistance rates. The Abecedarian study reported a significant difference in the education rates of a subgroup of (teenage) mothers of participants, and a significant difference in the type of employment of all mothers (although not in rates of employment). The Abecedarian study also showed a difference in the smoking habits of the intervention group compared with the control group.

The studies' evaluative measures are overlapping rather than identical. As was outlined in Chapter 1, it is usual practice in cost-benefit studies to apply a discount rate within a standard range of 3%-7%. This was the case for the three studies described here, although various presentations of the data use different discount rates.

Appendix 4.2 presents the authors' main findings for each of the three studies in the in-depth review alongside the weight of evidence accorded to each study by the Review Group, and the Review Group's subsequent conclusions about what can be said about each study.

We rated both the original studies and the cost-benefit studies carried out on them as medium to high in terms of soundness of methods and appropriateness of study type. However, there were major concerns about the range of variation in the reporting of the studies, the comparability of the studies, and generalisability of the studies outside the context in which they originated. These are discussed further in Chapter 5.

## **4.2 Synthesis**

The initial interventions were carried out in different decades, and the timeframes used for the outcome measures vary across studies. The three original studies were all centre-based, as was required for inclusion in the review. They were also all studies of high quality care: that is, employing trained staff, with high adult-child ratios and offering a detailed, educationally-based curricular programme.

The differences between the interventions relate to age of sample, and the intensity and extensivity of the intervention. All three studies assumed that support for mothers (either direct parenting advice, or support for mother's entering the labour force) would make a difference to outcomes, although this was not specifically tested. However, the circumstances of the mothers differed, with the most high-risk group in the Abecedarian study. The differences in the interventions and in the target group of mothers are set out in Table 4.1.

### **4.2.1 Benefits of the intervention**

The range of outcome measures used in the studies as the basis for cost benefit analysis are given in



**Table 4.1** Differences in the interventions and in the circumstances of mothers

	Perry High/Scope	Abecedarian	CPC
Age of participants	3-4 years	0-5 years plus school age intervention for sub-sample	3-4 years plus school age intervention for subsample
Intensity of the intervention	Part-time school term (30 weeks) Some children received two years, others one year Adult-child ratio 1:5	Fulltime all year round School-based interventions continue for subset. Adult-child ratio 1:6 for children 3+	Part-time school term (40 weeks) plus eight-week summer programme, plus school age interventions until age 8. School-based interventions only for subset Adult-child ratio 8:1
Support for mothers	Home visits part of programme, but actual number of visits much less than projected; majority of mothers moderate to low participation	Not listed as part of programme, but accounts suggest that some support is given. Links with health services	Condition of participation in programme that mothers attend a minimum of one session per week Links with health services
Description of mothers of participants	Average age 30 years, average number of children 5.1 Single parents: E=45%, C= 49%	13-43 years, average age 20 Approximately one- third of sample teenagers single parents (75% sample) Mothers with average maternal IQ 85% and other high risk factors	Mothers under 20: E=23%, C=19.2%. Average number of children E=2.6, C= 2.8 single parents E= 70.4%, C= 66.1%

tables 4.2-4.5. The synthesis here has focused only outcomes for which comparable measures were made across all three studies. To facilitate making comparisons across studies, the tables draw on presentation of data by Karoly et al. (2001), and Masse and Barnett (2001).

#### 4.2.2 Educational benefits (Table 4.2)

All three studies measured the educational benefits of their interventions in terms of the proportion of children in the intervention and control groups who required special education assistance and/or were retained in grade. The outcome which favoured the intervention would be indicated by the proportion being smaller in the experimental group. In all three studies across all the time periods/ages measured, the outcome favoured the experimental group.

All three studies also measured educational benefit in terms of graduating/completing high school and/or undertaking post-secondary education. The outcome which favoured the intervention would be indicated by the proportion being greater in the experimental group. In all three studies across all of the time periods/ages measured, the outcome favoured the experimental group.

Given this pattern of results, the synthesis confirms the results of the individual studies and gives greater confidence that centre-based early years

interventions do have a positive effect on educational outcomes for this particular group of subjects.

#### 4.2.3 Cognitive benefits (Table 4.3)

All three studies also measured educational attainment/developments in cognitive ability using standardised testing instruments. These tests were undertaken using different instruments in each study and at slightly different ages. The results in Table 4.3 show that, for each test at each across all three studies, the experimental group average score was higher than the control group. Given this pattern of results, the synthesis confirms the results of the individual studies and gives greater confidence that centre-based early years interventions have a positive effect on educational outcomes for this particular group of subjects.

#### 4.2.4 Reduction in criminal activity (table 4.4)

All three studies measured benefits in terms of differences in criminal behaviour between the experimental and control groups. In the case of the Perry High Scope and CPC studies, this analysis formed a considerable part of the outcome analysis from the studies with detailed reporting and analysis being published. In these two studies, criminal activity was lower in the intervention group across all

**Table 4.2** Comparison of programme outcomes: education

	Perry High Scope <sup>1</sup>	CPC <sup>2</sup>	Abecedarian <sup>3</sup>
Special education by age 9		E<C; E=8%, C=9%	
Special education (yrs) through age 14		E<C; E=0.6, C=0.9	
Special education (yrs) through age 18		E<C; E=0.7, C=1.5	
Years retained in grade by age 15			E<C; E=31%, C=55%
Special education by grade 9 (age 14)			E<C; E=25%, C=48%
Time in special education by age 19	E<C; E=16%, C=28%		
Years in special education programs to age 27	E<C; E=1.1, C=2.8		
High school completion	E>C; E=49%, C=39% (by age 21)	E>C; E=50%, C=39% (by age 21)	E>C; E= 67%, C= 51% (by age 19)
High school graduation to age 27	E>C; E=66%, C=45%		
Post-secondary education	E>C; E=33%, C=28% (credits by age 27)		E>C; E=36%, C=13% (college enrolment by age 21)

1. Figures from Karoly et al. (2001, p 51)

2. Figures from Karoly et al. (2001, p 53) and Reynolds et al. (2002, tables 1, 2 and 4)

3. Figures from Masse and Barnett (2003, tables 8.1 and 8.7)



**Table 4.3** Comparison of programme outcomes: cognitive/emotional development

	Perry High Scope <sup>1</sup>	CPC <sup>2</sup>	Abecedarian <sup>3</sup>
IQ (Stanford Binet) age 3			E>C; E=101, C=84
IQ age 4.5 - 5	E>C; E=94.9, C=83.5 (IQ age 5)	E>C; E=49.6, C=43.3 (ITBS Cog. Development age 5)	E>C; E=101, C=91 (GCI aged 4.5)
IQ age 6-7	E>C; E=91.7, C=83.5 (IQ age 7)	E>C; E=66., C=59.8 (ITBS Word Analysis age 6)	
IQ age 8	E>C; E=88.1, C=86.9		
IQ age 14-15	E>C; E=81.1, C=80.7 (IQ age 14)		E>C; 95, C=90 (WISC-R)
Teacher ratings of school adjustment age 9		E=C	
Parental involvement in school at age 9		E>C	

1. Figures from Karoly et al. (2001, p 51)

2. Figures from Karoly et al. (2001, p 53) and Reynolds et al. (2002, tables 1, 2 and 4)

3. Figures from Masse and Barnett (2003, tables 8.1 and 8.7)

**Table 4.4** Comparison of programme outcomes: crime

	Perry High Scope <sup>1</sup>	CPC <sup>2</sup>	Abecedarian <sup>3</sup>
Ever arrested by age 27	E<C; E=57%, C=69%		
Lifetime arrests through age 27	E<C; E=2.3, C=4.6		
Delinquency rate at age 13-14		E<C	
Crime rate age 16-21			E=C (not statistically significant difference)
Juvenile court petitions through age 17		E<C; E=16%, C=26%	
Violent offences by age 17		E<C; E=9, C=15.3	
Child abuse and neglect		E<C; E=5.0%, C=10.3%	

1. Figures from Karoly et al. (2001, p 51)  
 2. Figures from Karoly et al. (2001, p 53) and Reynolds et al. (2002, tables 1, 2 and 4)  
 3. Figures from Masse and Barnett (2003, tables 8.1 and 8.7)

**Table 4.5** Comparison of programme outcomes: employment and earnings

	Perry High Scope <sup>1</sup>	CPC	Abecedarian <sup>2</sup>
Employment rate at age 19	E>C; E=50%, C=32%	<p>Note: CPC cost/benefit projections for lifetime earnings and tax revenues based on difference in high school completion aged 21</p>	
Employment rate at age 27	E>C; E=71%, C=59%		
Monthly earnings at age 27 (1993 \$)	E>C; E=\$1219, C=\$766		
Received public welfare at age 27	E<C; E=59%, C=80%		
Employment effects for teenage parents at participants age of 54 months (none significant to 0.05 level because of small sample size)			
Teenage mothers post-secondary training			E (13) > C (15) E=46%, C=13%
Teenage mothers self-supporting			E (13) > C (15) E=70%, C=58%
Teenage mothers and additional births			E (13) < C (15) E=23%, C=40%

1. Figures from Karoly et al. (2001, p 51)

2. Figures from Masse and Barnett (2003, tables 8.1 and 8.7)

**Table 4.6** Cost and benefits calculations

	<b>Perry High Scope<sup>1</sup></b> (N=121, 4% discount rate, 1996 dollars)	<b>CPC<sup>2</sup></b> (N=1,281, 4% discount rate, 1998 dollars)	<b>Abecedarian<sup>3</sup></b> (N=112, 5% discount rate 2002 dollars)
<b>Costs</b>			
Cost per child of programme	\$12,148	\$9,931	\$13,900
Cost per child of programme (2005 \$) <sup>4</sup>	\$15,274	\$11,705	\$15,416
<b>Savings</b>			
Reduction in education services (special education, grade retention)	\$6,365	\$10,585	\$7,375
Taxes from increased employment	\$6,566	\$3,300	\$16,460
Reduction in criminal justice cost	\$10,195	\$6,085	
Savings on welfare costs	\$13,846	\$11,784	\$129
Reduction in tangible losses to crime victims	\$10,690	\$4,859	\$0
<b>Total saving</b>	<b>\$47,862</b>	<b>\$46,543</b>	<b>\$37,864</b>
<b>Total saving (2005 \$)</b>	<b>\$60,180</b>	<b>\$54,751</b>	<b>\$41,259</b>
Earnings of future generations	-	-	\$1,586
Maternal earnings age 26-41	-	-	\$34,378
Maternal earnings age 42-60	-	-	\$17,561
Smoking/health	-	-	\$4,166

1. Figures from Karoly et al. (2001, p 57)

2. Ibid, p67

3. Masse and Barnett (2001)

4. Figures for 2005 estimated using UK Retail Price Index (CHAW All items Index: January 13 1987=100)

the ages and types of measures used. In the case of the Abecedarian study, there is only one published paper which compared crime rates between the ages 16-21. No data is reported in this paper and the authors merely state that there were no statistically significant differences between the intervention and control groups. However, as there is no data reported it is not clear whether there were differences between the groups that were not statistically significant. If this were the case, it is possible that the overall small sample size in this study was not sufficient to detect differences between the groups as statistically significant. If there were genuinely no differences between the intervention and control groups, this might reflect the fact that the intervention group in the study were notably high risk. In view of the prominence given to crime reduction in the cost-benefit results in the other two studies, it is worth noting that the incidence of crimes committed in the intervention group is still very high in the Perry High/Scope study (57%), although less so for CPC.

#### **4.2.5 Employment related benefits (Table 4.5)**

Only the Perry High Scope study directly measured participants' employment related outcomes. In this study, all the outcomes measured favoured the intervention group. In the CPC study, the cost-benefit calculations were done by making projections of future employment (thus lifetime earnings) and tax revenues, based on differences in high school completion rates at aged 21. The Abecedarian study was the only study which measured employment-related outcomes of the mothers of children participating in the study. Given these differences, it is not possible to synthesise the results from the individual studies in terms of employment-related benefits.

#### **4.2.6 Cost benefit measures (Table 4.6)**

Table 4.6 gives a synthesis of cost-benefit findings. Each study used a slightly different method to estimate costs of the intervention and to estimate financial savings accruing from the better outcomes seen in the intervention group. Furthermore, different datasets were used to provide the basis for financial projections (e.g. average earnings) - see Appendix 4.3 for further details. This may explain some of the differences seen in the overall costs and benefits found between the studies. We have estimated figures for the costs and total benefits of the interventions in US\$ (2005 values) simply to illustrate that the different years for which the studies calculated their figures is not the reason for the differences in cost benefits seen. However, the differences in the way the economic analysis in each study was conducted means that any comparison between and/or synthesis of cost benefit findings between the three studies needs to be interpreted with extreme caution. In Table 4.6 only cost-benefit data that is reasonably comparable has been presented.

A major difference in the findings between the studies concerns the incidence of crimes committed by intervention and control groups. In the Perry High/Scope and the CPCs, a significant proportion of the benefits accrue from the reduced likelihood of the intervention group to commit juvenile crime, and therefore in the potential savings to society in fewer payments in victim compensation. In the case of the Perry High/Scope, this accounts for 65% of the benefits (Barnett, 1993, 1996). However, as has been pointed out, this figure diminishes to 40% if crime compensation is calculated excluding certain aspects of victim compensation. (Karoly et al., 1998, 2001). The lower figures are used in Table 4.6.

Each study made an overall estimate of the ratio of dollars spent to dollars saved, taking long-term projections of benefits into account. However, the differences between the intervention and control groups were a point estimate in a range and therefore the cost-benefit estimates should be presented in the same way. The lower end of the cost-benefit ratio might be much smaller than presented in the headline figure, but this is not reported. Using the studies' own figures (Barnett, 1996; Reynolds et al., 2002; Masse and Barnett, 2003), the Perry High/Scope claimed an overall ratio of \$7.16 dollars saved for every dollar spent; the CPC, \$7.14 dollars saved per dollar spent; and the Abecedarian, \$3.78 dollars saved for every dollar spent.

### **4.3 Quality-assurance results**

There were only three studies included in this review, although the trail of relevant studies by the authors stretched over more than 20 years. Each data extraction was quality assured by a member of EPPI-Centre staff. There was considerable discussion between members of the Review Group and between the Review Group and the EPPI-Centre staff, due to the complexity of the cost-benefit studies.

### **4.4 User involvement with the review**

The framing of the review was discussed with representatives of Sure Start within the DfES. A presentation of the findings will be discussed at a variety of user forums.

### **4.5 Summary of the findings**

- The samples in these three studies were overwhelmingly African-American families in U.S inner cities, and were defined as living in poverty. Given this context, it is argued that results of the three studies are not easily transferable to modern contexts in countries such as England. The results indicated should therefore all be read with the caveat of 'for the specific population in these studies...'

- Centre-based early years interventions do have a positive effect on educational and cognitive outcomes (all three studies).
- Centre-based early years interventions probably reduce the risk of involvement in crime for those who are at a high risk of becoming involved in criminal activity, but the results suggested there are limits to this 'protective effect' (all studies).
- Economic analysis suggest that the money invested in the interventions yielded a positive rate of return: that is, the economic benefit is greater than the initial investment over the long term. However, the magnitude of the return is very sensitive to the assumptions made in the cost estimates. The cost-benefit ratio of centre-based early years interventions may well be lower than that suggested by the headline figures used in the individual study reports.

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## CHAPTER FIVE

# Conclusions and implications

This chapter gives an overview of the conclusions of this review. It covers the issues arising from our identification, description and analysis of studies, and from the many secondary studies they have spawned. We consider the strengths and limitations of this review and consider the policy, practice and research implications of what we have found.

### 5.1 Strengths and limitations of this systematic review

#### 5.1.1. Difficulties arising from longitudinal studies

A particular difficulty, experienced in any longitudinal study, is that the original study may draw on ideas and assumptions that have become dated or irrelevant over the intervening years. As Currie (2000) points out, 'It is risky to extrapolate from studies carried out 20 or 30 years ago to those in effect today'. This datedness was especially the case for one of our studies, the Perry High/Scope. The language and assumptions of the original study, carried out in the 1960s, in describing the black children who took part and the kinds of corrective measures that were perceived as necessary to address their failings, are no longer acceptable. Indeed the authors of the original study have considerably modified their language in subsequent years. They now refer to the participants as coming from 'low-income families' rather than as 'functionally retarded, culturally deprived, Negro, pre-school children' (Weikart, 1967, p 57). References to attitude change in the parents of the participants - for example, that 'culturally deprived'. (The 'cultural deprivation' measure comprised a rating for father's occupational status, the number of years of education completed by parents, and person-density in the home.) Negro mothers could learn to model themselves on white middle-class teachers through home visits (Weikart, 1967, p 51) - have also been dropped.

The difficulty about these racist assumptions is that they confuse understandings about the processes involved in achieving the described outcomes.

The participants in all three studies were overwhelmingly African-American, at a time when racial tensions, especially in the American South, were pronounced, and access to schooling for black children was a fraught issue. However, the possibility that racism may have distorted the results, and their subsequent interpretation, is only marginally addressed by the Abecedarian study (Campbell, 1995) and is not raised by the other studies. Some authors (Brooks-Gunn, 2003; Currie, 2000) argue that poverty is a more critical issue than ethnicity, and ethnicity is unlikely to have significantly influenced the results.

However, other authors, especially black authors, fiction and non-fiction, writing about this period of American history, describe the racism as overwhelming (Heath, 1983; Moseley, 2004; Rosaldo, 1993; Takaki, 1995). An article by Johnson et al. (2003) suggested that research in child development has downplayed the importance of context and largely ignored or misunderstood the position of poor blacks and Hispanics in the US. The ghettoisation of black communities appears to be a singular product of US history (Takaki, 1995).

Perry and Albee (1994, p 1088) also express concern with prevention programmes which focus exclusively on micro-level interventions and ignore wider questions of inequality and social justice:

Our most serious reservations concern the near total absence of prevention programs that strike at the social injustices that play a major role in the appearance of mental and emotional processes...Absent is any concern with sexism, racism and other factors of discrimination so clearly



associated with the incidence of mental and emotional disorders.

Attitudes towards mothering have also changed since the studies were undertaken. Both the Perry High/Scope and the CPCs offered part-time, school-term provision to children, beginning at age three, and assumed (or insisted) that mothers would be available to participate in home visits and/or parent-support programmes. For the Perry High/Scope, a test (Schaefer and Bell parental attitude research instrument, 1956) was carried out to measure mother's attitude to childrearing, which included items such as 'rejection of home-making role; ascendancy of mother; suppression of sexuality; martyrdom; equalitarianism' - items which would not now be acceptable. Again this highlights the difficulty in interpreting the results, or making future predictions, since the processes involved appear problematic.

As Currie (2004) points out, conditions may have become considerably worse for poor children now than in the 1960s, due to, for example, increase in single parenthood, drug use, neighbourhood crime and poor schooling.

Problems with attrition of the sample are usually a major difficulty in undertaking longitudinal studies. These studies took especial pains to follow up their original samples. In two of the studies, the Abecedarian and Perry High/Scope, which were single-site studies, the children went on to the same site school; attrition rates were very low, and a maximum of 15% and 10% respectively. The multi-site Chicago study was very carefully designed to take account of tracking of the sample, and attrition rates, although higher than in the other two studies at 25% aged 14, were still relatively low. Low as these rates are, attrition cannot be ruled out altogether as a contributing factor in the outcomes recorded.

As mentioned above, one of the problems encountered with the Perry High/Scope study was the sheer volume of reports produced by the High/Scope Foundation. The Foundation has published its own series of monographs about the study. There are also many accounts of conference proceedings where the research was presented. There are relatively few peer-refereed journals that report the study's methods and findings. Much of this material appears to have been deliberately marketed and targeted as an attempt to influence policy and practice in the US (cf Schweinhart, 2001, 2002 and 2003) leading to a disproportionate emphasis on the findings. As Gomby et al. (1995:14) more cautiously remark:

The low-income children who attended these programs may do better than other children from their poor neighbourhoods, but most still lag behind middle-class children.....realistic expectations are in order.

### 5.1.2 Differences between the original studies

The evidence in Table 4.2 suggested that the main differences between the three interventions studied relate to the age of the children involved, the intensity and extensivity of the intervention, the support offered to the mothers and in the dependency of the mothers of participants.

The Abecedarian study appeared to draw on the most difficult population, with a high proportion of welfare-dependent teenage mothers. Greenwood et al. (1998) point out that longitudinal studies suggest that poverty, single parenthood, and youthfulness of the parent are the most consistently identified risk factors. However, the Perry High/Scope mothers are older (average age 31 years given in 1967 report) and just under half are described as living with the father. The Abecedarian mothers range from 13 to 43, with an average age of 20. One-third of the sample is described as teen mothers.

The three original studies were all centre-based and high quality: that is, they employed trained staff, with high adult-child ratios, and offered a detailed, educationally-based curricular programme. The sites of two of the studies, Perry High/Scope and Abecedarian, were especially set up for the purposes of the intervention. The CPC study measured an already existing scheme, which had been running for some time. Chatterji (2004) and Finn-Stevenson et al. (1998) suggest that it takes some time to set up and embed a new social or education project, and it may produce misleading results to evaluate it from the start. 'Teething problems' mean that the intervention is likely to change or be modified over time. We do not know if this was an issue, but the modification in the language of Perry High Scope from the first monograph to subsequent papers suggest that it might have been.

As has also been described in Table 4.2, *the major difference* in the findings between the studies also concerns the incidence of crimes committed by the intervention and control groups. The Abecedarian offered the most extensive intervention, and seemed initially to be producing the most significant outcomes, a differenced of 20 IQ points (see Table 4.2), but these did not translate into reduced crime rates in the intervention group. The differences between the experimental and the control group in number of crimes committed are insignificant. However, reduction in crime, and therefore in the putative costs incurred in compensating victims, figures prominently in the other two studies, the Perry High/Scope and the CPC. It is the single largest item in their benefit calculations, but the calculations of crime benefits vary by over 25% according to the projections used for victim compensation (see section 4.1). As estimates for the crime ratings figure so prominently in two of the studies, but not in the third, this must be a cause



for caution in interpretation. It should also be noted that in the Perry High/Scope, the reported crime rate at age 27 was still 57% (Table 4.4) so a majority of children who had been through the programme were still likely to offend.

The Abecedarian authors discuss the differences between the effectiveness results on crime in their study and those of the other two, but are unable to arrive at any definite conclusion. They point out that there is no conclusive evidence from other studies that parental support is a key mitigating factor (Clarke and Campbell, 1998). Feinstein (2000) suggests that the social capital of a neighbourhood in terms of the prevalence of positive role models and mechanisms of social control, or conversely in terms of the level of crime and antisocial behaviour, is an important factor in educational attainment. Masse and Barnett (2003) suggest that there may have been differences in the communities studied in the three studies, and that this may have contributed to the differences in reported crime, and to the impacts recorded for intervention and control groups in two of the studies.

Subsequent schooling may have impacted on the findings, but no statistical tests were carried out to try to ascertain whether this might have been the case (Plewis, 1987).

### **5.1.3 The economic data and analysis used**

The economic methods used were broadly similar for each of the three studies in this review. Indeed one of the authors, Barnett, was involved in two of the studies.

However, the range of costs and benefits ascribed to each study differs mainly due to the differences in the range of evaluative tests carried out on the participants and their outcome measures. For example, the youth risk survey carried out with the Abecedarian sample was not carried out in the other two studies, and therefore health benefits of non-smokers could not be calculated. Similarly, cost-benefit calculations of mothers' earnings could not be made for the CPC and Perry High/Scope studies because insufficient data was collected about mothers' earnings (see Table 4.2).

There were also differences in the range of costs used to calculate projected savings.

The studies draw on a variety of US datasets in order to make projections of benefits. These datasets are unlikely to be generalisable to other countries. Indeed, the major review of crime prevention programmes in the US (Aos et al., 2001) suggests that, for example, Washington datasets they use may not be applicable to the US in general, because sentencing patterns may vary across the US. The datasets used in the studies in the review include, as well as victim compensation

figures, estimates for the processing of juvenile justice cases; estimates for child abuse cases (Abecedarian), and estimates of female workforce participation (Abecedarian). The model of elementary and secondary schooling, which forms the basis for costs and benefit calculations in all three studies is also specific to the localities in the US in which the intervention was carried out - for example, the cost of repeat years and special education interventions (see Table 4.3).

As noted above, the most striking finding from a cost-benefit point of view is in the difference in crimes committed between the intervention and control groups in two of the studies, the Perry High/Scope and the CPC. The benefits are calculated in terms of savings on the direct costs of juvenile justice proceedings, costs of incarceration, and most importantly, on the basis of savings made on victim compensation. Victim compensation estimates vary considerably, and using different calculations gives rise to very different cost-benefit ratios (Aos et al., 2001; Karoly et al., 1998, 2001). If juvenile justice outcomes were less significant, the benefits accruing to society would be more marginal. Recent studies suggest that incarceration rates in the US are higher than in any other industrialised country (International Centre for Prison Studies, 2005). The impact of early childhood interventions on juvenile justice may be less pronounced in countries in which crime rates are lower.

### **5.1.4 Using cost-benefit studies as a basis for policy in early childhood**

It is widely accepted by economists that economic evaluation models of this sort could and should be done, and should be populated with the best available data and knowledge for specific population groups and settings. They need not involve setting up new cohorts for data collection if relevant, valid long-term data exists on costs and outcomes. The specificity of the contexts of these three studies means that the generalisations of the findings to other contexts (e.g. early years interventions in the UK) is not justified.

The three studies discussed here, especially the Perry High/Scope which has been so widely promoted, do not lead to clear conclusions about the nature of the intervention or their likely effects. Yet they serve as the basis for innumerable generalisations beyond their immediate context. On the basis of these studies in particular, the World Bank, for example, claims, 'Early child development (ECD) is the foundation of human capital formation, has the highest rate of return of any child development activity, and is an effective route to reduce poverty' (World Bank, 2005: 2).

A pitfall identified by Foster and Holden (2004) is an exaggerated sense of precision attached to the net benefits. 'At best a benefit-cost analysis can only provide a range of plausible estimates'.

The headline figures (i.e. a saving of \$7 for every \$1 spent) given in the studies represented only a point estimate in a range of possible values which are not given, but these headline figures were not treated as tentatively as might be expected. The evidence is suggestive rather than incontrovertible. The importance of statistically significant findings based on a narrow range of measures, using a small sample - as with the three studies considered here - can easily be exaggerated.

Foster and Holden (2004) go on to argue that cost-benefit studies, although a useful tool, are also inherently problematic. There is likely to be an over-reliance on net benefits as the criterion for determining a project's merits, at the expense of arguing for a value base for services. For example, distributional issues such as equity of access and justice may be as important as efficiency (Karoly et al., 2001; Cleveland and Krashinsky, 2003).

The nature of children's own experiences in the here and now is an increasingly important concept in many of the discussions arising, for example, out of the UN Convention on the Rights of the Child (Alderson, 2000; CRC, 2005). More nebulous criteria like 'child wellbeing' or 'child happiness', which attempt to describe the quality of children's daily experiences in the here and now do not figure in any discussions of cost-benefit studies of early interventions. There are some initial attempts to measure and include such criteria of child wellbeing in economic analyses (Phipps, 2001). Generally a focus on measurable economic benefits excludes child perspectives and considers aggregate impact in the medium to long term, rather than in the present or short term. Similarly, community perceptions of desirability of area and active engagement of members in civil society may be (as in the UK Sure Start programme) hoped for outcomes, but lack measurable criteria.

Both Meadows (2001) and Currie (2000) suggest that a complete cost-benefit analysis would consider not only whether all the benefits of a particular programme were greater than its costs, but also whether the benefits of a particular programme were greater than those of alternative programmes aimed at improving child outcomes: for example, increased child benefit, or other financial assistance to very poor families - see Phipps (2001) for an international comparison of poverty reduction strategies for families with young children.

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. The three-strikes law also means that levels of incarceration are higher than elsewhere (Greenwood et al., 1998). Victim compensation is also a major issue partly on account of the high incidence of gun-related crime in the US. Gomby et al. (1995) comment that it is necessary to maintain a sense of proportion in considering the effect of

early intervention on crime reduction. It should also be noted that the incidence of incarceration rates of black youths in the US is a uniquely high figure and is regarded by some commentators as a reflection of endemic racism and inequality (Bourgois, 1998).

## 5.2 Implications

### 5.2.1. Policy and practice

While they may show long-term benefits for some children in some circumstances, early childhood interventions cannot on their own compensate for lack of social justice. As Brooks-Gunn (2003:9) commented in her evidence to a US Senate committee, evidence suggests that early intervention is important *but not sufficient* on its own to change life chances. 'If policy makers believe that offering early childhood intervention for two years will permanently and totally reduce socio-economic disparities in children's achievement, they may be engaging in magical thinking'.

Zigler (2003) remarks:

Are we sure there is no magic potion that will push poor children into the ranks of the middle class? Only if the potion contains health care, childcare, good housing, sufficient income for every family, child rearing environments free of drugs and violence, support for parents in all their roles, and equal education for all students in schools. Without these necessities, only magic will make that happen.

The three interventions reviewed here do not give very much information about processes. There is no unequivocal evidence that a particular kind of intervention has more marked effects than another. All three studies claimed to be offering 'high quality' provision, in terms of adult-child ratios and a structured curriculum (different in each case). There is no discussion about the suitability of such curricula in relation to, for example, ethnicity. Relatively little is known about staff factors, such as pay structures, recruitment, training, ethnicity, turnover and leadership, all of which are likely to influence what is provided for children (OECD, 2000).

There is little in these three studies that is relevant for policy and practice outside the US, apart from the most general comment that it seems likely that there are some long-term benefits of early childhood interventions. Such general information about trends is available in a number of studies (for example, Currie, 2000). It would seem hazardous for economists to use these results as a basis for precise calculations about investment in human capital outside the specific context in which they were derived.

### 5.2.3 Research

The argument for carrying out longitudinal studies is that cost-benefits for early intervention studies can only be calculated over time, and that intellectual and social benefits to participants from interventions may only be fully apparent in adulthood. There are large-scale cohort studies which show positive trends from a range of early childhood interventions (Currie, 2004; Goodman and Sianesi, 2005), but longitudinal studies of specific early childhood interventions are extremely costly in tracking families (many of them disadvantaged and unstable) over time.

The fact that there were only *three* studies, all based in the US, which met our criteria, suggests that such studies are difficult to administer and fund. Meadows (2001) comments that economic evaluation of the Sure Start programme in the UK has only guaranteed funds for six years.

Most commentators writing from the US suggest that longitudinal cost-benefit studies are essential in order to introduce rigour into policy discussions about early interventions and to justify expenditure. However in the US, economic criteria may be a necessary avenue for justifying expenditure in services for young children, in a situation in which the default position appears to be that the state has no role in providing them (OECD, 2000). Most other developed countries do accept such a responsibility, on grounds of equity (OECD, 2001). A paper commissioned by the OECD (Cleveland and Krashinsky, 2003) points out that countries differ widely in the objectives they define for early childhood services, and public funding is justified on a similar basis to that of publicly funded education. The paper offers financial expenditure comparisons across OECD countries. In the UK, the Government is moving towards a universal strategy in the provision of early childhood studies, and a recent study by PricewaterhouseCoopers (2004) has attempted to cost this approach.

We would therefore suggest that, given the range of policy initiatives in the UK, and in OECD countries, it is somewhat pointless to hark after a longitudinal cost-benefit study of an early childhood intervention as a holy grail for the justification of expenditure.

While it is clearly important to assign costs and benefits to policy initiatives, in order to make strategic decisions, in the case of early interventions this is a problematic exercise, due to the difficulty of estimating future benefits which may be a long way off. Indeed, present benefits, such as child wellbeing, are largely uncoded. White (1985) uses the metaphor of 'a hiker stranded in the mountains during a winter blizzard who stumbles across an unoccupied cabin with enough fuel only for one day. When he arrives he is very cold, but thanks to the firewood he finds he is soon warm and comfortable. The next day as the blizzard continues, he is cold again. Few would argue that there was no benefit for him in being warm for one day, even though there was not enough fuel to sustain the warmth'. For children growing up in hazardous environments, short-term respite from those conditions may be a goal in itself.

This review does *not* recommend that more research is advisable to establish the longitudinal benefits of investment in early childhood interventions. Although conventionally measurable benefits may only show up in the long term, such studies are inherently problematic, not least because of the rapid changes in early childhood services in the UK. The PricewaterhouseCoopers (2004) report suggests a number of areas in which they consider more research is necessary: increases in employment take-up by women; impact of early years provision on earnings; exploring social benefits; improvement in workforce skills; attracting new providers; information requirements of new regimes; and the role of parental contributions. To this we would add that the lack of measures of children's wellbeing in the here and now is a major gap in our understanding of the impact of early childhood interventions.

### 5.2.4 Conclusion

In view of their overwhelming focus on crime reduction, and their problematic targeting of African-American communities, we would also suggest that, however rigorous the studies may appear, their outcomes do not reveal very much about the processes involved, and their contexts are not generalisable. These studies are of relatively little use in policymaking outside the US. It is likely to be misleading to cite the headline figures from these studies.

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## Appendix 1.1: Authorship of this report

This work is a report of a systematic review conducted by the Early Years review group.

The authors of this report are

Helen Penn (University of East London)  
Veronica Burton (University of East London)  
Eva Lloyd (University of Bristol)  
Miranda Mugford (University of East Anglia)  
Sylvia Potter (freelance researcher)  
Zahirun Sayeed (freelance educational psychologist)

They conducted the review with the benefit of advice active participation from the members of the review group.

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### **Review team membership**

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Sylvia Potter (freelance researcher)  
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Members of the Peripheral Review Group were:

Dr John Bennett (OECD)  
Professor Karen Diamond (Purdue University, USA)  
Dr Gordon Cleveland (University of Toronto)  
Sam Mason (Sure Start)

The EPPI-Centre support team for this group consisted of Mark Newman, Professor Ann Oakley and Rebecca Rees. Helen Penn acted as the review group co-ordinator, and ensured the write-up of the final report. Sylvia Potter undertook the searches, obtained documents and administered the keywording process. The group shared the responsibility of keywording and data extraction.

### **Conflicts of interest**

There was no conflict of interest.

### **Acknowledgements**

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## Appendix 2.1: Search strategy for electronic databases

### **Databases**

The databases searched were as follows:

#### ***Bibliographic databases***

Psycinfo 6/5/04  
Eric 1966- 9/4/04  
British Education Index 8/4/04  
IBSS 7/5/04  
Social Services Abstracts 9/4/04  
Sociological Abstracts 9/4/04  
Childdata 28/7/04  
ABI/Inform 14/4/04  
Australian Education Index 8/4/04  
ASSIA 8/4/04  
D H Data 3/7/04  
Campbell Collaboration 7/5/04  
Cochrane Library 7/5/04

#### ***Library catalogues***

British Library 9/5/04  
COPAC 9/5/04

#### ***Other***

Future of Children 2/7/04  
Childcare Canada resources 28/7/04  
ESRC Regard 28/7/04  
Sosig 28/7/04  
Joseph Rowntree Foundation 8/7/04  
Social Market Foundation 2/7/04  
Scottish Council for Research in Education (web) 7/7/04  
B van Leer Foundation effectiveness initiative and publications list (web) 8/7/04  
High/Scope websites (US and UK) 2/7/04  
Abecedarian website 2/7/04  
Head Start website 2/7/04  
NIHCD website 28/7  
National Child Development Study website 25/7

## **Search strategy**

The search strategy was as follows:

### **1. Service categories**

nurser\* or NNI or family cent\* or integrated cent\* or sessional or prekindergarten\* or kindergarten\* or play-school\* or play school\* or play group\* or playgroup\* or early education or early years WITHIN 3 (education or program\* or provision or setting) or early childhood WITHIN 3 (education or program\* or provision or setting) or pre-school WITHIN 3 (education or program\* or provision or setting) or preschool WITHIN 3 (education or program\* or provision or setting) or educare or High/Scope or High?Scope or Perry or Headstart or Head start or Montessori or Reggio Emilia or Sure Start or Early Excellence Centre\* or Elmira or Chicago Child Parent or Chicago Child-Parent or Abecedarian

### **2. Financial and related categories**

financ\* or cost-effectiveness or cost effectiveness or costeffectiveness or cost to scale or cost-to-scale or costtoscale or cost-benefit\* or costbenefit or benefit\* or saving\* or tax or taxes or taxation or welfare or social security or income support or state support or fiscal or delinquency or crime\* or crimin\* or youth justice or economic or prosocial or pro-social or antisocial or anti-social or felon\*

### **3. Outcome/research type categories**

Evaluat\* or Outcome\* or effectiveness or effects or random\* or longitud\* or cohort\* or control\* or comparison\* or comparative or time series or time-series or timeseries or pretest or pre-test or pre test or posttest or post-test or post test or impact\* OR correlat\* OR predict\* or impact\* or experiment\* or research\* or follow up or follow-up or followup or prospective or retrospective or meta analy\* or meta-analy\* or metaanaly\* or systematic review or empiric\*

1 and 2 and 3

\* = truncation/wildcard

All searches were full-text. The search was modified to meet the technical requirements of each database.

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## Appendix 2.2: Journals handsearched

*Child Development* 31-75(3), 1960-2004 except vol. 50

*Early Childhood Research and Practice* 1-6(1), 1999-2004

*Early Childhood Research Quarterly* 1-19(2), 1986-2004

*Economics of Education Review* 3-23(4), 1984-2004

*Feminist Economics* 1-10(2), 1995-2004

*Future of Children* 1-14(1), 1991-2004

# Appendix 2.3: EPPI-Centre keyword sheet, including review-specific keywords

## V0.9.7 Bibliographic details and/or unique identifier

### A1. Identification of report

- Citation .....
- Contact .....
- Handsearch .....
- Unknown .....
- Electronic database (please specify) .....

### A2. Status

- Published .....
- In press .....
- Unpublished .....

### A3. Linked reports

- Is this report linked to one or more other reports in such a way that they also report the same study?*
- Not linked .....
- Linked (please provide bibliographical details and/or unique identifier) .....
- .....
- .....
- .....

### A4. Language (please specify)

- .....

### A5. In which country/countries was the study carried out? (please specify)

- .....
- .....

### A6. What is/are the topic focus/foci of the study?

- Assessment .....
- Classroom management .....
- Curriculum\* .....
- Equal opportunities .....
- Methodology .....
- Organisation and management .....
- Policy .....
- Teacher careers .....
- Teaching and learning .....
- Other (please specify) .....

### A7. Curriculum

- Art .....
- Business studies .....
- Citizenship .....
- Cross-curricular .....
- Design and technology .....
- Environment .....
- General .....
- Geography .....
- Hidden .....
- History .....
- ICT .....
- Literacy - first language .....
- Literacy further languages .....
- Literature .....
- Mathematics .....
- Music .....
- PSE .....
- Physical education .....
- Religious education .....
- Science .....
- Vocational .....
- Other (please specify) .....

### A8. Programme name (please specify)

- .....

### A9. What is/are the population focus/foci of the study?

- Learners .....
- Senior management .....
- Teaching staff .....
- Non-teaching staff .....
- Other education practitioners .....
- Government .....
- Local education authority officers .....
- Parents .....
- Governors .....
- Other (please specify) .....

### A10. Age of learners (years)

- 0-4 .....
- 5-10 .....
- 11-16 .....
- 17-20 .....
- 21 and over .....

### A11. Sex of learners

- Female only .....
- Male only .....
- Mixed sex .....

### A12. What is/are the educational setting(s) of the study?

- Community centre .....
- Correctional institution .....
- Government department .....
- Higher education institution .....
- Home .....
- Independent school .....
- Local education authority .....
- Nursery school .....
- Post-compulsory education institution .....
- Primary school .....
- Pupil referral unit .....
- Residential school .....
- Secondary school .....
- Special needs school .....
- Workplace .....
- Other educational setting (please specify) .....

### A13. Which type(s) of study does this report describe?

- A. Description .....
- B. Exploration of relationships .....
- C. Evaluation
  - a. naturally-occurring .....
  - b. researcher-manipulated .....
- D. Development of methodology .....
- E. Review
  - a. Systematic review .....
  - b. Other review .....



**Review-specific keywords**

(For each category, select as many characteristics as required.)

**16 Expansion of 10: Age of children at the beginning of the intervention**

0-2  
3-5  
6-7  
8+

**17 Age of intervention subjects at follow-up**

15-17  
18-21  
22-30  
30+

**18 Does the intervention provide fulltime day care?**

Yes  
No  
Don't know

**19 Length of intervention (in years)**

Less than 1  
1  
2  
3  
4  
5+  
Figure marked above is an estimate  
Don't know

**20 Is an intervention with parents included?**

Yes  
No  
Don't know

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# Appendix 4.1: Aims and methods of the studies

## **Cambell et al. (2001) (original early childhood intervention) Masse and Barnett (2003) (cost-benefit analysis)**

### *Country*

USA

### *Study type*

Researcher-manipulated prospective evaluation RCT (Campbell et al.); cost-benefit study (Masse and Barnett)

### *Aim of the early childhood intervention*

Series of studies (known as the Abecedarian project) to assess the impact of educational daycare provided from birth to age 5 on the children's and parental outcomes in multi-risk families

### *What was studied in the early childhood intervention?*

*Sample:* Families referred to project through local hospitals, clinics, social services and other referral services. 109 families (112 children) from African-American low-income multi-risk families identified as eligible; children recruited between 3 and 6 months.

*Intervention:* Specially set up programme offering full-time daycare and highly specific educational curriculum. Children continued at same linked school.

*Measurement:* For children IQ, communication skills, academic achievement, special needs at school; social adjustment; vocational skills through to age 21.

How was it studied?

Children allocated by researchers to experimental and control groups.

Groups compared at regular intervals up to 54 months across a battery of tests, then subsequently on academic achievement and social adjustment up to age 21; youth risk assessment

*Methods of analysis:* Various since complex data collected; includes analysis of variance, mediation analysis, hierarchical regression models.

What was studied in cost-benefit study?

Records of 104 children who remained in study aged 21.

Programme benefits generated for 6 categories on which it was possible to obtain monetary estimates:

- earnings and fringe benefits of participants and children of participants
- maternal employment and earnings
- elementary and secondary education cost savings
- improved health
- higher education costs
- welfare use

### *How was it studied?*

Actual costs of care for programme participants and control group (2002 \$ prices).

Future earnings forecasted, using cross-sectional data from US Bureau of Census 1998. Future earnings forecast for children of participants, using data from National Longitudinal Surveys of Labour Market experience.

Maternal productivity and earnings calculated on basis of educational attainment and earnings of mothers of experimental and control group participants.

Education costs based on estimates for repeat years and special education input for control and experimental groups in local district.

Health benefits estimated on the basis of 1993 youth risk survey of participants and control group. Calculations based on national datasets for education, household income and smoking.

Welfare benefits calculated on the basis of a comparison of welfare claims between control and experimental group participants, costed against Aid to Families with Dependent Children (AFDC) figures (applies mainly to female participants).

## Reynolds (2000) (original early childhood intervention study)

**Country**  
USA

### **Study type**

Evaluation: Researcher-manipulated (Reynolds); cost-benefit study (Reynolds et al.)

### **Aim of the early childhood intervention**

Series of studies (known as the Chicago Child Parent Centers (CPC) Program) to assess the impact of a multi-site federally funded intervention operating in Chicago schools, offering part-time preschool aged 3-4; kindergarten age 5; and extended care age 6-9; plus parental support and resources.

What was studied in the early childhood intervention?

Sample: 1,539 low income children in cohort (93% African-American, 7% Hispanic); fell to 1,159 by age 21.

**Intervention:** (i) 24 sites linked to public schools. 3 hours preschool in term time concentrating on basic skills acquisition plus 8 week summer programme. (ii) Full day kindergarten age 5, (iii) out of school programme aged 6 to 9; parent support. Health and nutrition referral services.

**Measurement:** Battery of tests to age 21 including school achievement, family support for education, school remedial services use, child maltreatment, juvenile arrest records, educational attainment; retrospective parents' reports.

### **How was it studied?**

Quasi-experimental design: Home residence rather than parent interest determined participation, 989 who completed preschool and kindergarten at local CPCs, and 550 controls from randomly selected schools. Subsequent statistical checks suggested groups matched on all major indicators.

Groups compared across range of measures as listed.

Wide range of methods of analysis: includes analysis of variance, OLS regression, FIML latent variable covariance structure modelling

What was studied in cost-benefit study?

Records of 1,159 children who remained in study aged 21.

Programme benefits calculated for:

- abuse and neglect
- crime victims
- justice system
- future earnings and tax contributions
- higher education costs
- grade retention
- special education

### **How was it studied?**

Costs of care for intervention factored to 1998 prices.

Abuse and neglect based on referrals to juvenile court by the Department of Child and Family services, and assumption that one third of all reports were proven. Administrative costs and victim costs added in, based on estimates from National Institution of Justice.

Crime victims costings based on mean number of juvenile arrests multiplied by estimates of costs for victims of crime.

Justice figures based on number of referrals listed in computer searches of Chicago records, and weighted national average costs from Bureau of Justice Statistics.

Earnings calculated on 1999 census data on relationship between educational levels and projected earnings

Higher education costs based on local Chicago college rates.

Grade retention costs based on average pupil annual expenditure in Chicago, plus average school costs for special education.

## Weikart (1967), Schweinhart (1983) (original study)

**Country**  
USA

### **Study type**

Researcher manipulated prospective evaluation RCT (Weikart, Schweinhart); cost-benefit study (Barnett)

### **Aim of the early childhood intervention**

Series of studies (known as Perry High/Scope Preschool) to assess the impact of a single-site early years intervention for children age 3-4.

What was studied in the early childhood intervention?

Sample: 100 families, 128 'African American culturally deprived Negro children'

**Intervention:** Intervention group received 2.5 hours school terms plus home visits for one or two years. Children continued at same linked school.

**Measurement:** Battery of tests to aged 21 including school achievement tests, teacher ratings, school remedial services use, juvenile arrest records, educational attainment.

How was it studied?

Children allocated to intervention and control groups by researchers.

Groups compared across a battery of measures at regular intervals as listed. Very low attrition.

Mostly basic tests of statistical significance between intervention and control groups; sensitivity tests for attrition.

What was studied in cost-benefit study?

Records of 118 children who remained aged 21 (and subsequently later data not included in this review)

Programme benefits calculated for:

- juvenile justice
- crime victims
- grade retention
- special education
- higher education costs
- future earnings projections

***How was it studied?***

Costs of care factored to 1998 prices.

Justice figures based on number of referrals listed in computer searches of district records, and self-reports; weighted national average costs from Bureau of Justice Statistics.

Crime victims costings based on mean number of juvenile arrests multiplied by estimates of costs for victims of crime.

Education costs based on estimates for repeat years and special education input for control and experimental groups in local district.

Future earnings forecasted using cross-sectional data from US Bureau of Census 1998. Future earnings forecast for children of participants using data from National Longitudinal Surveys of Labour Market experience.

## Appendix 4.2: Synthesis - data extraction summary tables; weight of evidence

### Masse and Barnett (2003) (Abecedarian)

#### *Authors' report of findings*

Projected return rate to society of approximately 1:3.78; Results not highly sensitive to the presence or exclusion of any one outcome.

No savings on juvenile justice.

#### *Weight of evidence*

A. *Soundness of study within design: how well was it designed and carried out?*

**High** for original study which was small RCT.

Cost-benefit study follows standard procedures, but dependent on different range of outcomes from other studies

B. *Ways in which this type of study helps to answer review question*

**Medium-high**. Statistically robust. Cost-benefit projections do not include crime effect but do include earnings projections including those of mothers of participants. However, not all results on maternal earnings significant.

C. *How close is topic to review question being addressed?*

**Low**. The context is not generalisable outside the US. The study sample is a highly targeted group of African-American children; the datasets on which the cost-benefit calculations are based refer specifically to USA.

D. *Overall*

**Medium**

Reviewers' report of study findings

Surprising that there are no crime effects, given their prominence in other two studies.

Some concerns about maternal earnings projections.

### Reynolds et al. (2003) (Chicago Child-Parent Centers)

#### *Authors' report of findings*

Projected return rate to society of 1: 7.14. Significant benefit from juvenile justice savings (approx 50% on measured results; approx 11% on projected results).

#### *Weight of evidence*

A. *Soundness of study within design: how well was it designed and carried out?*

**Medium-high** for original study; large scale quasi-experimental comparison of groups.

Cost-benefit study follows standard procedures, but dependent on different range of outcomes from other studies

B. *Ways in which this type of study helps to answer review question*

**Medium-high**. Large, statistically robust study although not RCT; cost-benefit projections include earnings. Large part of effect due to savings on criminal justice and victim compensation which is a highly conjectural figure; intervention part-time so no figures for working mothers.

C. *How close is topic to review question being addressed?*

**Low**. The context is not generalisable outside the US. Although based on intervention within public school system, the sample is 93% African-American and 7% Hispanic. the datasets on which the cost-benefit calculations are based, especially the criminal justice projections, refer specifically to the USA.

D. *Overall*

**Medium-low**

Reviewers' report of study findings

Results depend heavily on estimation of victim compensation. Other studies suggest ratio 1:4 would be more appropriate.

Some concerns about attrition rates.

## **Barnett (1993) (High/Scope Perry)**

### *Authors' report of findings*

Return rate 1: 7.16 for every dollar invested.

Largest benefit from juvenile justice savings on measured result (65%).

### *Weight of evidence*

*A. Soundness of study within design: how well was it designed and carried out?*

**Medium-high** for original study since earlier and later accounts of study give different descriptions and explanations of the sample and the phenomena observed; some problems about randomisation procedures.

Cost-benefit study follows standard procedures, but dependent on different range of outcomes from other studies.

*B. Ways in which this type of study helps to answer review question*

**Medium-high.** Small sample but significant differences on many results. Original sample may be atypical (e.g. mother's average age 31).

Large part of effect (65%) due to inclusion of victim compensation in crime figures which is a highly contro-

versial figure. Part-time intervention, so no figures for working mothers.

*C. How close is topic to review question being addressed?*

**Low.** The context is not generalisable outside the US. The study sample is African-American and the original study raises ethical questions about the nature of the intervention and questions about the processes involved. The datasets on which the cost-benefit projections are based, especially the criminal justice figures, refer specifically to the US.

*D. Overall*

**Medium-low**

### *Reviewers' report of study findings*

The original study done in 1960s; findings may be dated. Cost-benefit findings heavily influenced by estimates of victim compensation. Other workings of same data suggest ratio of \$1 spent to \$4 saved.

Concerns about the discrepancies between original and subsequent reports of study, concerning description of sample, and description of randomisation.



## Appendix 4.3: Data used for economic analysis

	Perry High/Scope	CPC	Abecedarian
<i>Cost per child of programme</i>	Averages out costs of one- and two-year interventions	Based on one year of pre-school programme and one year follow-on services	-
<i>Reduction in education services (special education, grade retention)</i>	Estimates based on average costs for repeat years and special education input from Ypsilanti, Michigan	Based on average per pupil annual expenditure on special education in Chicago and Illinois State Board for grade retention	Special education cost estimates based on state finance reports 1994-1996 given by Parish et al. (1997)
<i>Taxes from increased employment</i>	Cross-sectional data from US Census; National Longitudinal studies of Labour Market	Based on US Census and Labour Dept data for black fulltime workers	US Bureau of Census 1998 cross-sectional data, matched with US Bureau of Labour Statistics 2000. Taxes and earnings calculations not disaggregated by gender.
<i>Reduction in criminal justice cost</i>	Based on national estimates on costs per arrest by type of crime and costs of incarceration and probation	Based on searches of Court records in Chicago (and two other cities) and costs of incarceration and other treatments in Chicago	-
<i>Savings on welfare costs</i>	Based on welfare programme participation histories, average value of welfare payments and Medicaid expenses	Based on US DHSS figures, and calculations by Miller et al. (1996)	Study findings based on trends - non-significant data. Calculations based on estimates of take-up of Aid to Dependent Families (AFDC) programme.
<i>Reduction in tangible losses to crime victims</i>	Based on national data on victim costs by type of crime	Based on calculations by Greenwood et al. (1998)	
<i>Earnings of future generations</i>	-	-	National Longitudinal Surveys of Labour Market Experience
<i>Maternal earnings age 26-41</i>	-	-	Study findings on mothers of participants earnings based on trends - non-significant data
<i>Maternal earnings age 42-60</i>	-	-	
<i>Smoking/health</i>	-	-	Based on National Bureau of Economic Research estimates on economic value of increase in mortality for a year of life





The results of this systematic review are available in three formats:

**SUMMARY**

Explains the purpose of the review and the main messages from the research evidence

**TECHNICAL REPORT**

Includes the background, main findings, and full technical details of the review

**DATABASES**

Access to codings describing each research study included in the review

These can be downloaded or accessed at <http://eppi.ioe.ac.uk/reel/>

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