

## Technical Appendix

### Definition

Early years or early childhood interventions are approaches that aim to ensure that young children have educational pre-school or nursery experiences which prepare for school and academic success, usually through additional nursery or pre-school provision.

Search terms: Early years, pre-school, nursery, pre-kindergarten, pre-k, foundation stage

### Evidence Rating

There are 11 meta-analyses included in the summary, with six conducted in last ten years. The pooled effects from these syntheses range from 0.15 to 0.55, and so provide a consistent estimate of effect (they all fall within 0.40 of a standard deviation of each other), though more recent analyses of immediate impact have tended to be lower (0.15 to 0.32). Some variation is consistently explained by moderator analyses. The estimate of long-term benefit is consistent (0.53 and 0.55). A number of the meta-analyses include experimental and quasi-experimental studies which are not well controlled. Overall, the evidence is rated as extensive.

## References

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## Summary of effects

Meta-analyses	Effect size	FSM effect size	
Anderson, L.M., Shinn, C., Fullilove, M.T., Scrimshaw, S.C., Fielding, J.E., Normand, J., CarandeKulis, V.G., (2003)	0.35	-	
Camilli, G., Vargas, S., Ryan, S., & Barnett, W. S., (2008)	0.23	-	
Chambers, B., Cheung, A., Slavin, R., Smith, D., & Laurenzano, M., (2010)	0.15	-	Literacy
	0.17	-	Maths
Gilliam, W. & Zigler, E.F., (2000)		-	(NPE)
Gorey, K.M., (2001)	0.55	-	(estimate on long term impact)
Karoly, L., Kilburn, R., Cannon, J.S., (2005)	0.28	-	
La Paro, K.M. & Pianta, R.C., (2000)	0.51	-	
Lewis, R.J. & Vosburgh, W.T., (1988)	0.41	-	
Manning, M., Hommel, & Smith, (2010)	0.53	-	(on adolescent education)
Nelson, G., Westhues, A., & MacLeod, J., (2003)	0.52	-	
Shager, H. M., Schindler, H. S., Magnuson, K. A., Duncan, G. J., Yoshikawa, H., & Hart, C. M., (2013)	0.27	0.27	
Washington State Institute for Public Policy, (2013)	0.32	0.31	
<b>Weighted mean</b>	<b>0.38</b>		

The right hand column provides detail on the specific outcome measures or, if in brackets, details of the intervention or control group.

## Meta-analyses abstracts

### 1 Anderson, L.M., Shinn, C., Fullilove, M.T., Scrimshaw, S.C., Fielding, J.E., Normand, J., CarandeKulis, V.G. (2003)

Early childhood development is influenced by characteristics of the child, the family, and the broader social environment. Physical health, cognition, language, and social and emotional development underpin school readiness. Publicly funded, centre-based, comprehensive early childhood development programs are a community resource that promotes the wellbeing of young children. Programs such as Head Start are designed to close the gap in readiness to learn between poor children and their more economically advantaged peers. Systematic reviews of the scientific literature demonstrate effectiveness of these programs in preventing developmental delay, as assessed by reductions in retention in grade and placement in special education.

### 4 Camilli, G., Vargas, S., Ryan, S., & Barnett, W. S. (2008)

**Background/Context:** There is much current interest in the impact of early childhood education programs on pre-schoolers and, in particular, on the magnitude of cognitive and affective gains.

**Purpose/Objective/Research Question/Focus of Study:** Because this new segment of public education may require substantial resources, accurate descriptions are required of the potential benefits and costs of implementing specific preschool programs. To address this issue comprehensively, a meta-analysis was conducted for the purpose of synthesizing the outcomes of comparative studies in this area.

**Population/Participants/Subjects:** A total of 123 comparative studies of early childhood interventions were analyzed. Each study provided a number of contrasts, where a contrast is defined as the comparison of an intervention group of children with an alternative intervention or no intervention group.

**Intervention/Program/Practice:** A prevalent pedagogical approach in these studies was direct instruction, but inquiry-based pedagogical approaches also occurred in some interventions. No assumption was made that nominally similar interventions were equivalent.

**Research Design:** The meta-analytic database included both quasi-experimental and randomized studies. A coding strategy was developed to record information for computing study effects, study design, sample characteristics, and program characteristics.

6 *Chambers, B., Cheung, A., Slavin, R., Smith, D., & Laurenzano, M. (2010)*

This report systematically reviews research on the outcomes of programmes that teach young children in a group setting before they begin reception. Study inclusion criteria included the use of randomised or matched control groups, and study duration of at least 12 weeks. Studies included valid measures of language, literacy, phonological awareness, mathematical, and/or cognitive outcomes that were independent of the experimental treatments. A total of 40 studies, evaluating 29 different programmes met these criteria for outcomes assessed at the end of preschool and/or reception/ kindergarten. The review concludes that on academic outcomes at the end of preschool and/or reception, six early childhood programmes showed strong evidence of effectiveness and five had moderate evidence of effectiveness. Of the 29 programmes reviewed, eight are available for implementation in the UK. A few longitudinal studies have followed their subjects into secondary school, and even adulthood. These studies show that comprehensive programmes, from a cognitive developmental perspective rather than a solely academic focus, had better long-term effects on social adjustment outcomes such as reductions in delinquency, welfare dependency, and teenage pregnancy, and increases in educational and employment levels.

7 *Gilliam, W. & Zigler, E.F. (2000)*

The number of state-funded preschool programs for low-income children has increased dramatically over the past few decades, and recent research has indicated that these programs vary considerably along a variety of dimensions. By 1998 only 13 of the current 33 state preschool programs (which serve children 3 to 5, provide some form of classroom-based educational service, and are primarily funded and administered at the state level) had completed a formal evaluation of the program's impact on child outcomes. This paper presents a critical meta-analytic review of these evaluations, providing measures of standardized effects for all significant impacts to facilitate comparisons across differing domains of outcome and evaluative methods. Although several methodological flaws in these studies are identified, the pattern of overall findings may offer modest support for positive impacts in improving children's developmental competence in a variety of domains, improving later school attendance and performance, and reducing subsequent grade retention. Significant impacts were mostly limited to kindergarten and first grade; however, some impacts were sustained several years beyond preschool. The results of these studies were similar to evaluations of other large-scale preschool programs for low-income children, such as Head Start. Modest outcome goals are warranted for preschool programs serving low-income children, for example, the promotion of school readiness. Suggestions are presented for improved preschool and early intervention program evaluation.

8 *Gorey, K.M. (2001)*

Some scholars who emphasize the heritability of intelligence have suggested that compensatory preschool programs, designed to ameliorate the plight of socioeconomically or otherwise environmentally impoverished children, are wasteful. They have hypothesized that cognitive abilities result primarily from genetic causes and that such environmental manipulations are ineffective. Alternatively, based on the theory that intelligence and related complex human behaviors are probably always determined by myriad complex interactions of genes and environments, the present meta-analytic study is based on the assumption that such behaviors can be both highly heritable and highly malleable. Integrating results across 35 preschool experiments and quasi-experiments, the primary findings were: (a) preschool effects on standardized measures of intelligence and academic achievement were statistically significant, positive and large; (b) cognitive effects of relatively intense educational interventions were significant and very large, even after 5 to 10 years, and 7 to 8 of every 10 preschool children did better than the average child in a control or comparison group; and (c) cumulative incidences of an array of personal and social problems were statistically significantly and substantially lower over a 10- to 25- year period for those who had attended preschool (e.g., school drop-out, welfare dependence, unemployment, poverty, criminal behavior). The need for a very large, well-controlled, national experiment to either confirm or refute these provocative, review-generated findings is discussed.

9 *Karoly, L., Kilburn, R., Cannon, J.S. (2005)*

PNC asked the RAND Corporation to prepare a thorough, objective review and synthesis of current research that addresses the potential for interventions of various forms in early childhood to improve outcomes for participating children and their families. In particular, we consider:

- the potential consequences of not investing additional resources in the lives of children—particularly disadvantaged children— prior to school entry
- the range of early intervention programs, focusing on those that have been rigorously evaluated
- the demonstrated benefits of interventions with high-quality evaluations and the features associated with successful programs
- the returns to society associated with investing early in the lives of disadvantaged children.

10 *La Paro, K.M. & Pianta, R.C. (2000)*

School readiness screenings are prevalent throughout the United States. Although readiness encompasses a multitude of components, readiness assessments generally focus on measuring and predicting children's preacademic skills and behaviors and are often the basis for placement and programming decisions. However, no quantitative estimates of effect sizes exist for the relations between preschool or kindergarten academic/cognitive and social-behavioral assessments and early school outcomes. This review presents the results of a meta-analysis of cross-time relations of academic/ cognitive and social-behavioral assessments from preschool to second grade. Results from 70 longitudinal studies that reported correlations between academic/cognitive and social/behavioral measures administered in preschool or kindergarten and similar measures administered in first and second grade were included in the analysis. Academic/cognitive assessments predicting similar outcomes showed moderate effect sizes across both time spans; effect sizes were small for social/behavioral predictors of early school social outcomes. Effect sizes varied considerably across individual studies and samples. Findings are discussed in terms of assessment and conceptualization of school readiness, the role of school and classroom experiences in contributing to individual differences in school outcomes, and the importance of a quantitative estimate of effect size for early education policy and practice.

11 *Lewis, R.J. & Vosburgh, W.T. (1988)*

Psychologists and educators continue to design and implement kindergarten intervention programs unsubstantiated by previous research. The present study used meta-analysis procedures to examine the effects of kindergarten intervention programs on variables related to school success. The meta-analysis was performed on 444 effect sizes derived from 65 previous studies involving 3194 kindergarten children. The mean effect size of 0.434 indicated that test scores obtained by the treatment groups were raised from the 50th to the 67th percentile in relation to the control groups. Strong to moderate positive effects were demonstrated on all measured variables related to school success. As predicted the effect sizes from highly structured approaches ( $M = 0.517$ ) were larger than those from less structured approaches ( $M = 0.298$ ,  $t = 4.671$ ,  $df = 386$ ,  $p < 0.001$ ). In general there was no significant difference found between various levels of parental involvement ( $F = 0.244$ ,  $df = 2.385$ ,  $p > 0.05$ ). However, when only the long-term effects were compared, a significant difference was found between the programs with active parental involvement ( $M = 0.521$ ) and those without ( $M = 0.362$ ,  $t = 2.067$ ,  $df = 134$ ,  $p < 0.05$ ). Strong effects were found on studies based on behavioral ( $M = 0.523$ ) psycho-educational ( $M = 0.497$ ) and stage referenced ( $M = 0.355$ ) theories. The lack of research to support kindergarten programs based on maturational theories is discussed. The positive results of this meta-analysis should encourage program planners and policy makers to support the widespread implementation of structured early intervention and prevention programs at the kindergarten level.

12 *Manning, M., Hommel, & Smith (2010)*

We present the results of a meta-analytic review of early developmental prevention programs (children aged 0–5: structured preschool programs, center-based developmental day care, home visitation, family support services and parental education) delivered to at-risk populations on non-health outcomes during adolescence (educational success, cognitive development, social–emotional development, deviance, social participation, involvement in criminal justice, and family well-being). This review improves on previous meta-analyses because it includes a more comprehensive set of adolescent outcomes, it focuses on measures that are psychometrically valid, and it includes a more detailed analysis of program moderator effects. Seventeen studies, based on eleven interventions (all US-based) met the ten criteria for inclusion into the analysis. The mean effect size across all programs and outcomes was 0.313, equivalent to a 62% higher mean score for an intervention group than for a control group. The largest effect was for educational success during adolescence (effect size 0.53) followed by social deviance (0.48), social participation (0.37), cognitive development (0.34), involvement in criminal justice (0.24), family well-being (0.18), and social–emotional development (0.16). Programs that lasted longer than three years were associated with larger sample means than programs that were longer than one year but shorter than three years. More intense programs (those with more than 500 sessions per participant) also had larger means than less intense programs. There was a marginally significant trend for programs with a follow-through component into the early primary school years (e.g. preschool to Grade 3) to have more positive effects than programs without a follow-through. We conclude that the impact of well conducted early development programs on quality of life in adolescence can be substantial for social policy purposes.

15 *Nelson, G., Westhues, A., & MacLeod, J. (2003)*

The objectives of this research were to determine the effectiveness of preschool prevention programs for disadvantaged children and families in the short-term (preschool), medium-term (K-8), and the long-term (high school and beyond) and to identify factors that moderate program success. Meta-analysis was used to examine the effect sizes (d) of different outcome domains of 34 preschool prevention programs that had at least one followup assessment when the children were in school. While cognitive impacts resulting from these programs were greatest during the preschool period (d=.52), they were still evident during K-8 (d=.30). Social-emotional impacts on children were similar at K-8 (d=.27) and high school and beyond (d=.33), as were parent family wellness impacts at preschool (d=.33) and K-8 (d=.30). As predicted, cognitive impacts during the preschool time period were greatest for those programs that had a direct teaching component in preschool. Also as predicted, cognitive impacts during the K-8 time period were greatest for those programs that had a follow through educational component in elementary school. The longer the intervention for children, the greater were the impacts on preschool cognitive outcomes and child social-emotional outcomes at K-8; and the more intense the intervention for children, the greater were the impacts on preschool cognitive outcomes and parent-family outcomes at K-8. The largest impacts on preschool cognitive outcomes and child social-emotional and parent-family outcomes at K-8 were found for those programs that served predominantly African-American children. These results indicate that preschool prevention programs do have positive short-, medium-, and long-term impacts on several outcome domains. The findings were discussed in terms of contemporary trends in and future directions for policies and preschool prevention programs for children and families.

16 *Shager, H. M., Schindler, H. S., Magnuson, K. A., Duncan, G. J., Yoshikawa, H., & Hart, C. M. (2013)*

This meta-analysis explores the extent to which differences in research design explain the heterogeneity in program evaluation findings from Head Start impact studies. We predicted average effect sizes for cognitive and achievement outcomes as a function of the type and rigor of research design, quality and timing of dependent measure, activity level of control group, and attrition. Across 28 evaluations, the average program-level effect size was .27. About 41 percent of the variation in impacts across evaluations can be explained by the measures of research design features, including the extent to which the control group experienced other forms of early care or education, and 11 percent of the variation within programs can be explained by features of the outcomes.

17 *Washington State Institute for Public Policy (2013)*

The WSIPP benefit-cost analysis examines the monetary value of programs or policies to determine whether the benefits from the program exceed its costs. Pre-kindergarten funded by states or school districts that is universal or targets low-income students.