Early Childhood Interventions and Outcomes

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Editorial Note

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Abstract

Recent advances in brain research have provided new evidence that early experience matters and have greatly increased interest in the effects of early childhood interventions on outcomes for children. This paper reviews what is now known about the potential benefits and potential ill effects of early childhood interventions, with particular attention to evidence from the Rand study of early interventions, recent studies of the Head Start program, and the NICHD study of early child care. The evidence shows that early childhood interventions can make a difference in improving outcomes for children. However, there are two important knowledge gaps. Not enough is known about the types of child care young children in Britain are currently using, and not enough is known about what types of early childhood interventions would achieve the best outcomes for disadvantaged children in Britain.

Introduction

Recent advances in brain research have provided new evidence that experience in the earliest days, weeks, and years of life matters. The human brain, we now know, grows very rapidly in the first three to five years of life (see Figure 1), and what happens in those first years can either promote development or curtail it.[1]

This new evidence from brain research has greatly increased interest in the effects of early childhood interventions on outcomes for children. This interest tends to focus on two broad questions: what we know about the potential benefits of early childhood interventions; and what we know about the potential ill effects. I am going to argue that we now know a good deal about both sets of questions. But, I am also going to argue that our current knowledge base, particularly with regard to Britain, could be much improved.

I first want to touch upon some issues that affect the analysis of early childhood interventions and outcomes. Then I will consider what we know about potential benefits and ill effects, before concluding with some comments about what we don't know.

Issues in the Analysis of Early Childhood Interventions and Outcomes

Before reviewing the evidence on early childhood interventions and outcomes, it is important to establish some ground rules for the analysis. The first is that one must be clear about what type of intervention one is analysing. Early childhood intervention and childcare are not synonymous. Early childhood intervention refers to programs such as childcare or home visiting that are designed to promote the development of children from birth through the time they enter school, and typically these programs are targeted to children identified as high-risk for poor development. Childcare, in contrast, is not always designed primarily as an early childhood intervention, and may be targeted to other groups (for instance, the children of employees or students). Childcare is very heterogeneous, with provision ranging from

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[1] See Carnegie Task Force on Meeting the Needs of Young Children (1994) and Shore (1997).

childminders, babysitters, and nannies to playgroups and nurseries and pre-schools.[2] Moreover, we do not know very much about the quality of childcare being offered in most childcare settings.[3] Yet, we know that quality of childcare matters for child outcomes.[4] Thus, in reviewing any study of early childhood intervention and outcomes, it is important to establish what model of intervention was provided, whether it included childcare, and, if so, what, if anything, we know about the quality of that care. It is also important to think about what the intervention was meant to provide; some models, for instance, place more weight on cognitive development than others.

The second ground rule is that one must be clear about when the intervention was provided. In the case of childcare, there is a great deal of evidence that childcare begun in the first year of life has a different effect on later emotional adjustment than care begun thereafter (Haskins, 1985; Belsky and Eggebeen, 1991; Baydar and Brooks-Gunn, 1991; Smith, 1994; Bates *et al*, 1994). The same may be true of cognitive development, with childcare begun in the first year of life appearing to have negative effects for some groups (Desai, Chase-Lansdale, and Michael, 1988; Blau and Grossberg, 1990; Baydar and Brooks-Gunn, 1991; Smith, 1994), while care after the first year of life seems to have positive effects (Blau and Grossberg, 1990; Baydar and Brooks-Gunn, 1991; Brooks-Gunn, Liaw, and Klebanov, 1992; Brooks-Gunn *et al*, 1993).[5] The few studies that have been able to control for childcare quality find that it plays an important mediating role (Vandell, Henderson, and

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[2] To narrow the scope of this paper, I am specifically referring to childcare programs rather than to childcare policy more generally. There is a large literature on the effects of childcare costs on women's employment. For recent reviews, see Anderson and Levine (1998) and Han and Waldfogel (1998).

[3] Nor is there agreement on how to define quality of childcare. Childcare advocates tend to point to structural features of childcare programs such as the group size, child-staff ratio, and health and safety requirements, while parents tend to look for a caregiver who is warm and sensitive, and conveniently located. Researchers try to measure both types of characteristics, as well as continuity and stability of care.

[4] For recent evidence on this point, see Burchinal *et al* (1998) and the NICHD Early Child Care Network (1998).

[5] Very few studies have examined differences in outcomes associated with differences in timing within the first year of life. Baydar and Brooks-Gunn (1991) is an important exception.

Wilson, 1988; Field, 1991; NICHD, 1997), as does the type of care (Howes, 1988 and 1990; Baydar and Brooks-Gunn, 1991; Field, 1991; Smith, 1994). It may also matter whether the care was full-time or part-time.

The third caution is that one must be clear about which children received the intervention. Again using childcare as an example, the age at which a child enters childcare is obviously a critical mediating factor, but so too are factors such as the child's attributes, family background, and current living situation. These characteristics may influence both the type of childcare used and the child's outcomes; thus, if child and family characteristics are not properly controlled, one may erroneously attribute outcomes as the result of childcare when they are in fact the result of other factors. Further complicating the analysis is the fact that childcare and family characteristics may have an interactive effect. For instance, the NICHD study of early childcare in the U.S. found that infants whose parents had more sensitive childrearing styles fared better than other children in early childcare (NICHD, 1997), while many studies have found that children from families that are economically disadvantaged gain more from childcare in terms of their cognitive development than do other children (see, for example, Desai, Chase-Lansdale, and Michael, 1988; Vandell and Ramanan, 1992; Caughy, DiPietro, and Strobino, 1994).

The fourth point is that one must be clear about what outcomes one cares about. To a large extent, the outcomes one tracks will depend on the type of intervention being considered, the time at which it was delivered, and the type of children who received it, but it is important to remain open to unanticipated outcomes as well. Thus, in tracking the effects of early childcare, it is natural to focus on issues of separation and attachment, but it would be useful to look at later social and cognitive outcomes as well. And, in assessing cognitively-oriented programs for older pre-schoolers, it makes sense to look at school outcomes but it is also important not to lose sight of other outcomes that may be affected. Implicit in this discussion is the notion that it makes sense to look at long-term as well as short-term outcomes, and at potential benefits for society as a whole in addition to those that may accrue to the child and his or her family.

With these ground rules in mind, let us now turn to the evidence on the potential benefits, and the potential ill effects, of early childhood interventions.

Potential Benefits

We now know a good deal about what types of interventions at what time can have positive effects for what types of children and in what respects. Much of the evidence comes from research conducted in the United States, and that is also the research that I am most familiar with, so the summary that I present will have a very American flavour. I will have more to say on this point later.[6]

There have been several excellent reviews of the U.S. research on early childhood interventions and outcomes. The most recent, and the most useful for the purposes of this paper, is the RAND study which rigorously assessed nine early intervention programs (Karoly *et al*, 1998).[7] In order to be included in the RAND review, studies had to meet high scientific standards; in particular, they had to have used random assignment or other techniques to control for pre-existing differences between treatment and controls and they had to follow the treatment and control groups over time so that they could assess long-term as well as short-term outcomes.

The results of the RAND review, summarised in Table 1, show that well-designed early intervention programs can make a positive difference in the lives of children. The results also show that the effects of programs vary by what specific type of program was offered. Eight of the nine programs were cognitively oriented and all of these programs were successful at raising children's cognitive test scores or school achievement as measured by higher IQ scores, higher school achievement test scores, less time in special education, better grades, less grade repetition, or higher rates of graduation from high school (the one exception, the Elmira PEIP, was a parental support program that was designed to reduce abuse and neglect). But the gains of these programs

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6 An important exception is the work on the long-run effects of childcare in Sweden, which finds that children who had been in day care before the age of two had better socio-emotional and cognitive outcomes at ages 8 and 13 than children who had not attended out of home care, with the best outcomes for children who began day care before age one (Andersson, 1989). Other Swedish research, while failing to find an overall effect of child care, did find that higher quality child care was associated with better outcomes for children (Hwang, 1990).

7 See also recent reviews by Barnett (1995), Crane (1998), Ramey and Ramey (1998a, 1998b, and in press).

were not limited to cognitive outcomes. The High/Scope Perry Pre-School Project, for instance, led to higher employment, earnings, and income; it also led to lower rates of crime and delinquency, as did two other programs (the Syracuse FDRP and the Chicago CPC programs). Interestingly, although most programs were child-focused, many were successful at changing parents' behaviours in positive ways: the Elmira PEIP home visiting program reduced abuse and neglect and also reduced parental welfare use; the Houston PCDC and the IHDP home visiting and day care programs improved mother-child interaction and the HOME score (an index of how well the home environment promotes child development); the Syracuse FDRP home visiting and day care program and the Carolina Abecedarian program raised mothers' levels of education; the Carolina Abecedarian and IHDP programs raised maternal employment; and the Chicago CPC day care and follow-through program raised parents' involvement in their child's school.[8] Some of these effects on parents were intended but most were not.

Program outcomes varied by when services were delivered. In general, programs that intervened earlier and that were more intensive (such as Carolina Abecedarian and IHDP) had stronger effects than those that intervened later and less intensively, and programs (such as Carolina Abecedarian and the Chicago Child-Parent Centers) that included a follow-through component were more successful at sustaining gains than those that didn't. Consistent with prior research, some programs were more beneficial for higher-risk children. For instance, the IHDP program produced the greatest IQ gains for the children with the least educated parents, as we can see in Figure 2 (from Ramey and Ramey, 1998c).

The RAND study did not include Head Start because no Head Start evaluation met the RAND criteria for scientific rigour. However, Head Start is an important example: it is the single largest American childcare program and probably the best known. Early studies of Head Start concluded that the program had positive effects on children's cognitive abilities and school achievement but these effects seemed to "fade out" over time (see, for instance, McKey *et al*, 1985). However, the most recent evidence on Head Start reveals a more nuanced story (Lee *et*

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[8] Unfortunately, not all programs tracked parental outcomes, and the few that did tended to track outcomes for mothers only. Thus, we do not know very much about the effectiveness of early childhood interventions in changing the behaviour of fathers.

al, 1990; Currie and Thomas, 1995, 1996a, and 1996b). Children who attended Head Start have higher test scores at the end of the program than siblings who stayed at home or attended some other type of pre-school. Head Start children are also more likely to be immunised than siblings who stayed home. While the test score effects for African-American children fade out fairly rapidly, perhaps because they go on to attend poor schools, the effects for white and Hispanic children are longer-lasting. White and Hispanic children who attended Head Start have higher test scores at age 10 than comparable children who did not attend Head Start. White Head Start children are also less likely to have repeated a grade by age 10 than comparable white children who did not attend Head Start.

Head Start continues to enjoy broad public and bipartisan support in the United States, and the program is now being expanded in two directions. First, Early Head Start is now delivering Head Start services to children under the age of three, reflecting the new emphasis on interventions in the first three years of life (and also reflecting the fact that older pre-school age children are increasingly likely to be served by the public schools or other pre-schools). Second, Head Start Follow-Through programs are now following Head Start children into the school years, to see whether Head Start gains can be better maintained if follow-through services are provided.

Potential Ill Effects

There is also a fairly large body of research on the potential ill effects of early childhood interventions, although this research has tended to focus on a very narrow question, namely, whether maternal employment and early childcare – childcare begun in the first year of life – have adverse outcomes for children. Much of the emphasis in this line of research has been on socio-emotional rather than cognitive outcomes, with a particularly vigorous debate about attachment. Several studies found differences in attachment between children who had been in early childcare and those who had not, but experts disagreed about how to interpret these results. If children who had been in early childcare engaged differently with their mothers, this might be a symptom of attachment problems (Belsky, 1988) or it might be a mature, adaptive response to the child care experience (Clarke-Stewart, 1988). Nor was it clear how such attachment differences might affect later outcomes.

This line of research, and the associated debate, dominated the childcare research agenda in the United States for many years. Only recently has it given way to an interest in how specific types of child care early in a child's life can affect outcomes, for good or ill, for specific types of children.[9]

The progress in this area, at least in the U.S., is to a large extent a result of the formation of the NICHD early childcare network. This unprecedented initiative brings together many of the country's leading developmental psychologists, including prominent representatives from both sides of the attachment debate, in a unique national longitudinal study of the effects of early childcare on child outcomes. Results from this study, which is still ongoing, are shown in Table 2. These results suggest that one can not make sweeping conclusions about whether early childcare harms, or helps, children; rather, the effects of early childcare on a child's attachment, child-mother interactions, and cognitive and behavioural outcomes depend critically on the characteristics of that care (including the quality of the care, its continuity, and the number of hours that the child is in care) and the characteristics of the child and family.[10] Thus, increasingly, interest is shifting from the question of whether early childcare (or maternal employment) harms children to the question of what types of early childcare can be most helpful for what types of children.

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[9] There has been a very active debate on these topics in Britain as well (McGurk *et al*, 1993). Studies in Britain have produced mixed results about socioemotional development; for instance, Osborn and Milbank (1987) found negative effects but Melhuish and Moss (1991) didn't. The results for cognitive development have been more consistently positive; for instance both Osborn and Milbank (1987) and Melhuish and Moss (1991) report positive effects, as do recent reviews by Ball (1994) and Zoritch and Roberts (forthcoming), but see also Morgan (1996).

[10] Early results from the NICHD study of early child care, which is following a total of 1364 children from 10 sites across the U.S., have been reported by the NICHD Early Child Care Research Network (1996, 1997, 1998, and in press).

What Don't We Know About Early Childhood Interventions and Outcomes

In this concluding section, I want to particularly focus on what we don't know about early childhood interventions and outcomes in Britain. Much of the evidence I have cited comes from the United States which probably at least in part reflects my lack of knowledge about the British research base but also reflects the smaller size of that base.[11] I want to focus on two knowledge gaps in particular.

One, we don't know enough about who is minding the children while mothers work in Britain. The labour force participation of women with young children, and especially those with infants, has increased sharply over the past few decades and is likely to increase further in future.[12] This trend presents both a challenge and an opportunity (as Lynch (1998) has noted in the American context), and the outcomes for children will depend to a large extent on the type and quality of the care they receive. Yet we know very little currently about what forms of childcare these mothers are using, and the quality of that care.[13] Nor do we know which children begin care early, how young they are, and how many hours a week they are in care. Before we can begin to analyse the effects of childcare on outcomes for these children, we need to understand who they are, when they are beginning care, and what types of care they are in.

Two, we don't know enough about the effects of childcare and other early childhood interventions as delivered in Britain on outcomes

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11 For recent reviews of the British research, see Oliver, Smith, and Barker (1998) and Sylva (1994). See also the recent research by Francesconi and Ermisch (1998a, 1998b, and 1998c) on the effects of maternal employment on later child outcomes.

12 The share of infants with working mothers has risen from 20% in 1981 to 36% in 1990 to 47% in 1997 (Gregg and Wadsworth, 1998). Current policy initiatives such as increased rights to parental leave, the childcare tax credit, and the New Deal for lone parents are expected to lead to further increases in the share of women working and using childcare while their children are very young.

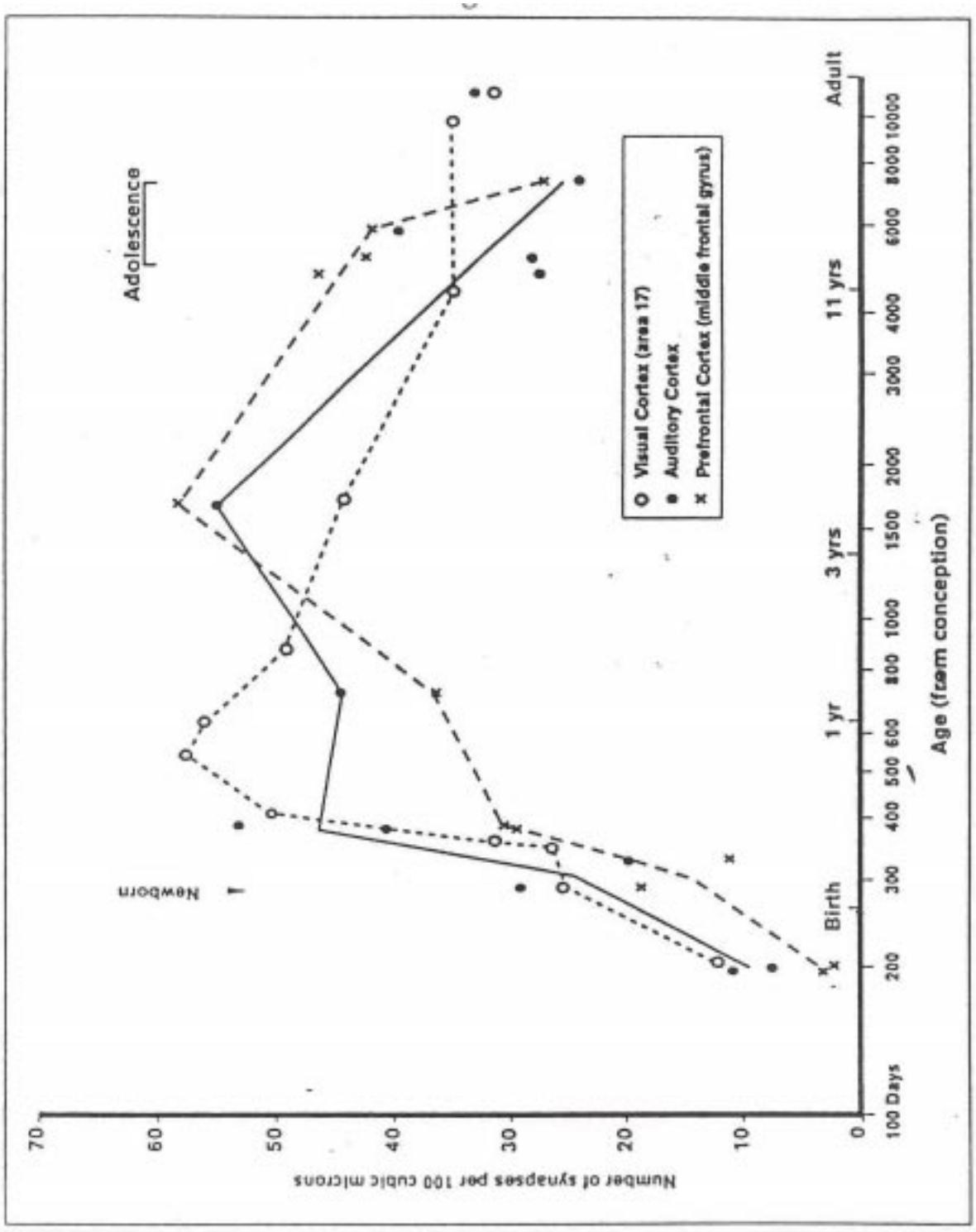
13 In the 1991-92 GHS, 46% of families with a child under the age of one used some form of non-parental child care, with about 16% using unpaid informal care, 10% using nurseries, and 20% using other forms of paid care. The share of infants in care has probably risen a good deal since then.

for children. Although we can learn a great deal from carefully conducted research in other countries, we do need to be careful to compare like to like. We noted earlier that childcare is very heterogeneous, and of course there is even more variation across countries than there is within them. Moreover, the effects of childcare may also be sensitive to the broader policy context. For instance, we have seen in recent research that the long-run effects of pre-school intervention may depend on how supportive the child's later school is and on whether follow-through programming is provided. Thus, longitudinal research on British children, receiving British early childhood interventions and then entering British schools, is essential if one wants to know which early childhood interventions would be most effective and whether follow-through programming will be necessary to ensure that effects do not fade out over time.

Conclusion

In summary, we now have enough evidence to conclude that early childhood interventions can make a difference in improving outcomes for children. However, there are two important knowledge gaps. We need to learn more about what types of childcare young children in Britain are currently using. We also need to learn more about what types of childcare and other early childhood interventions, delivered at what time and for which children, would achieve the best outcomes for disadvantaged children in Britain.

Figure 1



Adapted from P.R. Huttenlocker and A.S. Dobholkar (1997). "Regional Differences in Synaptogenesis in Human Cerebral Cortex", *The Journal of Comparative Neurology*, 387.

Figure 2

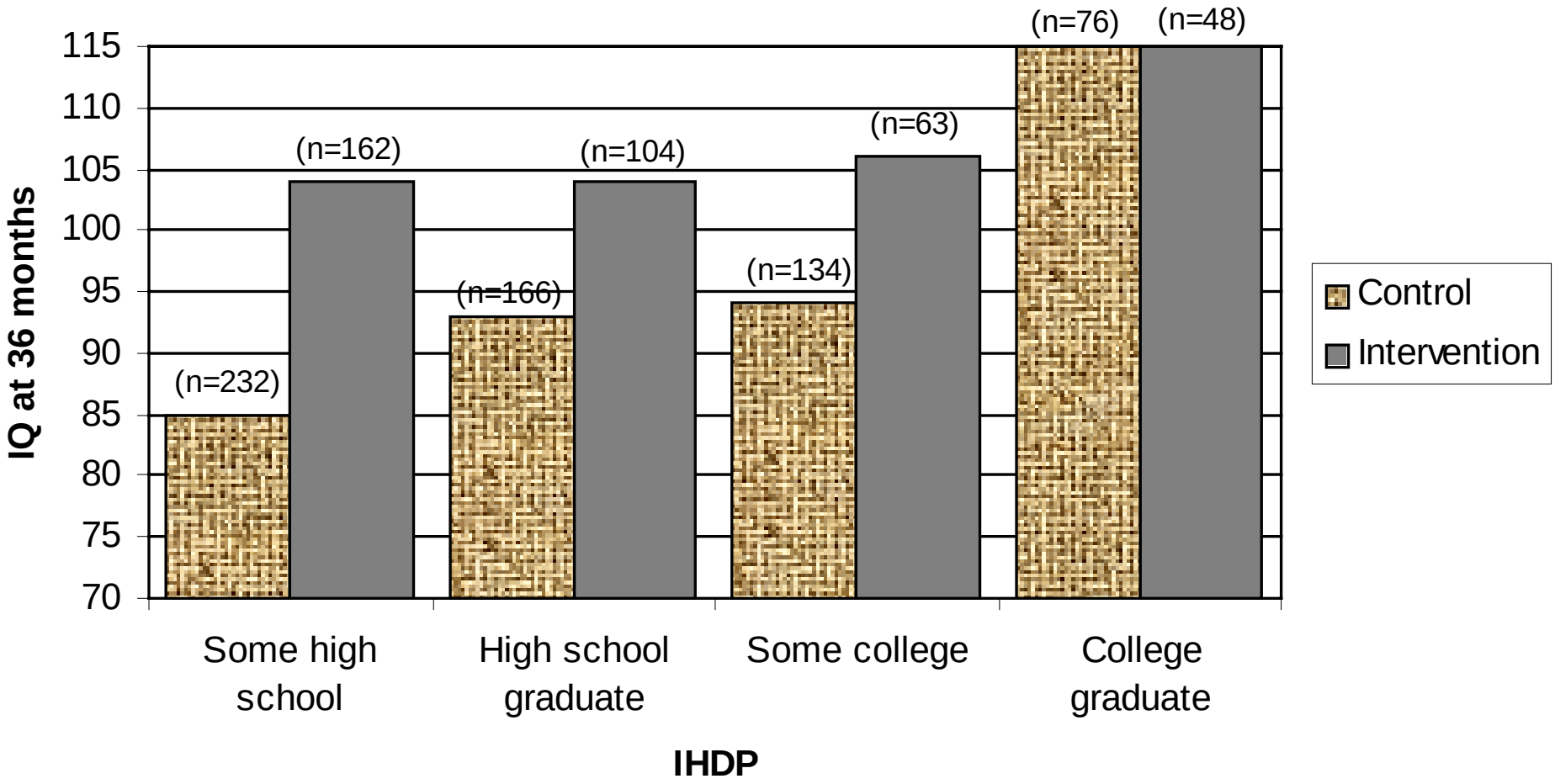

115
110
105
100
95
90
85
80
75
70
IQ at 36 months
(n=232)
(n=162)
(n=166)
(n=104)
(n=134)
(n=63)
(n=76)
(n=48)
Some high school
High school graduate
Some college
College graduate
IHDP
Control
Intervention

Table 1: The Effects of Early Childhood Interventions: Selected U.S. Studies

Program	Statistically Significant Difference between Treatments and Controls	No Statistically Significant Difference between Treatments and Controls
Prenatal / Early Infancy Project (PEIP) Elmira, New York, 1978-1982 N=304, Random Assignment (RA) First births to young, single, or low SES mothers, served ages 0-2. Home visiting.	Emergency room visits at ages 2-4. Crime / delinquency by age 15.* Reports of abuse / neglect by age 15. Mom's welfare use by age 15.	IQ at age 3 and 4. HOME score at age 4. Mom's education by age 4. Mom's employment by age 15.
Early Training Project (ETP) Murfreesboro, TN, 1962-1965 N=65, RA Low SES children, ages 4-6. Summer part-day (PD) pre-school & home visiting.	IQ at age 6. Achievement at age 7. Special education by age 18. High school (HS) completion after pregnancy by age 18.	IQ at age 7 and 17. Achievement at age 10 and 17. Grade repetition by age 18. HS completion by age 18. Teen pregnancy by age 18.
High / Scope Perry Pre-School Ypsilanti, Michigan, 1962-1967 N=123, RA Low SES & low IQ, ages 3-5. School-year PD pre-school & home visiting.	IQ at age 5 and 7. Achievement at age 9 and 14. Employment at age 19. Special education by age 19 and 27. HS completion by age 27. Crime / delinquency by age 27. Income at age 27. Welfare participation at age 27. Earnings at age 27.	IQ at age 8 and 14. Teen pregnancy by age 19. Grade repetition by age 27. Post-HS education by age 27. Employment at age 27.

Houston Parent-Child Development Center (PCDC) Houston, Texas, 1970-1980 N=291, RA Low SES, ages 1-3. PD day care & home visiting.	IQ at age 2. Mother-child interaction at age 3. HOME score at age 3. Behavior at ages 4-7. Achievement at ages 8-11. Bilingual education at ages 8-11.	IQ at age 3. Special education at ages 8-11. Grade repetition at ages 8-11. Grades at ages 8-11.
Syracuse Family Development Research Program (FDRP) Syracuse, New York, 1969-1975 N=216, control group but not RA Low SES, Ages 0-5. PD (for infants) & full-day (FD) family day care & home visiting.	IQ at age 3. Behavior at age 3. Mom completed HS by age 5. Crime / delinquency at age 15. Grades at age 15.** School attendance at age 15.** Teacher ratings at age 15.** Referred by probation by age 15.**	IQ at age 6. Behavior at age 6. Special education by age 15. Grade repetition by age 15.
Carolina Abecedarian 1 site in NC, 1972-1985 N=117, RA High-risk families, ages 0-8. FD year-round center-based educational day care for pre-schoolers, followed by parent program for school-age kids.	IQ at age 5 Mom's education by age 5. Mom's employment by age 5. IQ at age 8. Achievement at age 8. IQ at age 12. Achievement at age 15. Special education by age 15. Grade repetition by age 15.	HOME score at age 5. IQ at age 15.

Project CARE (Carolina Approach to Responsive Education) 1 site in NC, 1978-1984 N=65, RA High-risk families, ages 0-5. Home visiting & FD year-round center-based educational day care, or home visiting only.	IQ at age 1. IQ at age 3. IQ at age 5.	Childrearing attitudes at age 3. HOME score at age 5.
Infant Health and Development Project (IHDP) 8 sites, 1985-1988 N=985, RA Premature & low birth weight (LBW) infants, ages 0-3. Home visiting for infants followed by FD year-round center-based educational day care.	IQ at age 3. Behavior at age 3. Mother-child interaction at age 3. HOME score at age 3. Mom's employment at age 3. Behavior at age 5.*** IQ at age 5.*** IQ at age 8.*** Math achievement at age 8.***	Mom's education by age 3. Time on welfare by age 3. Subsequent pregnancy by age 3. Behavior at age 8. Grade repetition by age 8. Special education by age 8.
Chicago Child-Parent Center (CPC) Chicago, Illinois, 1967-present N=1539, statistical controls Low SES, ages 3-9. PD pre-school followed by FD kindergarten followed by extra support in classroom and after school in primary grades.	Achievement at age 9. Parents involved in school at age 9. Achievement at age 14. Grade repetition by age 14. Special education by age 14. Crime / delinquency by age 14.	Behavior at age 9. Crime / delinquency by age 16.

Note: * Differences were statistically significant for the high-risk group only; ** differences were significantly significant for girls only; *** differences were statistically significant for the heavier LBW children only.
Source: Karoly *et al* (1998), Tables 2.1, 2.2 and 2.3.

Table 2: Results from the NICHD Study of Early Child Care

- Childcare per se neither helps nor harms attachment.

For children whose mothers are sensitive caregivers, childcare has no effect on attachment. For children whose mothers are not sensitive, care matters: high quality care leads to more secure attachment, while poor quality care, more than 10 hours per week of care, or more than 1 care arrangement by age 15 months leads to less secure attachment.

- Quality of care has an effect on mother-child relationships.

Higher quality care predicts greater involvement and sensitivity by the mother at 15 and 36 months and more positive interactions at 36 months. Low-income mothers using high-quality child care have more positive interactions with their children at age 6 months than those who do not use care or who use lower-quality care.

- The quantity of care seems to matter as well.

Longer hours of care in the first six months are associated with lower maternal sensitivity and less positive interactions at 36 months. Longer hours of care are also associated with more reported behaviour problems at age 2. But, child and family characteristics are more important.

- The quality of child care in the first three years of life affects children's cognitive and language development.

The higher the quality of care – in terms of language stimulation and the type of interactions between the child and caregiver – the higher the child's language skills at 15, 24, and 36 months. Higher quality care also is associated with cognitive development at age 2 and school readiness at age 3. Children in day care centres that meet quality standards across all four domains assessed – child-staff ratio, group size, teacher training, and teacher education – have better language comprehension and school readiness, and fewer behaviour problems, than children whose day care centres fail to meet the standards in all four domains.

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