

Intelligence development of socio-economically disadvantaged pre-school children

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Título: Desarrollo de la Inteligencia en Niños en Edad Preescolar con Desventajas Socioeconómicas.

Resumen: Diversos factores influyen en el desarrollo intelectual de niños en edad preescolar con desventajas socioeconómicas. El desarrollo de la inteligencia es un concepto multidimensional que está determinado por factores biológicos, sociales y ambientales. Sin embargo, en la presente revisión únicamente se analizan y discuten los aspectos sociales y ambientales. Algunos de los factores que presentan profundos efectos en el desarrollo cognitivo son los siguientes: la estimulación del medio ambiente, las actitudes de los padres, la edad materna y la educación. Se ejemplifican también algunos programas de prevención e intervenciones exitosas encaminadas al enriquecimiento del desarrollo cognitivo infantil. Parece que los programas de intervención temprana en el segundo y tercer año de la vida infantil tienen efectos fundamentales en el desarrollo cognitivo de aquellos niños con ciertas desventajas.

Es claro que el aprendizaje se inicia con el nacimiento. Algunos estudios longitudinales mostraron que el periodo más efectivo para la intervención es durante la niñez temprana. Aquellos niños que han estado en programas de estancias y jardines infantiles han mantenido estos logros en la adolescencia y en la edad adulta. Algunos de estos beneficios incluyen puntuaciones elevadas en pruebas de IQ, mejores calificaciones en pruebas de puntuación y mejores habilidades en lectura y matemáticas, mayor número de logros educacionales, mayor número de títulos universitarios y un menor número de problemas psicológicos y de salud mental. Por tanto, la investigación en programas tempranos de alta calidad proporciona múltiples ventajas en forma personal, así como para la sociedad en su conjunto. Activistas sociales, psicólogos y consejeros deberían hacer un mayor esfuerzo para modificar las políticas gubernamentales y la asignación de fondos.

Palabras clave: Desarrollo de la inteligencia; educación maternal; privaciones e inteligencia; niños desfavorecidos; niños en edad preescolar y desarrollo de la inteligencia.

Abstract: The intellectual development of socioeconomically disadvantaged preschool children is influenced by several factors. The development of intelligence is a multidimensional concept that is determined by biological, social, and environmental factors. In this literature review, however, only the social and environmental factors are discussed. Some of the factors that have profound effect on children's cognitive development are as follows: environmental stimulation, parental attitudes, maternal age, and education. Successful intervention and prevention programs aimed at enhancing children's cognitive development are also exemplified. It appears that early intervention programs in the second and third year of an infant's life have fundamental effects on the cognitive development of disadvantaged children.

It is clear that learning starts with birth. Longitudinal studies revealed that the most effective period for intervention is early childhood. Those who received early day-care and preschool intervention programs have sustained these gains in adolescence and adulthood. Those benefits include higher IQ scores, better achievement test scores, better reading and math skills, more educational attainment, more college degrees, and fewer psychosocial and mental health problems. Therefore, it appears that investing in early high-quality programs provide multiple advantages for individuals and society. Social activists, psychologists, and counsellors should make every effort to affect the allocation of governmental funds and policies.

Key words: Intelligence development; maternal education; deprivation and intelligence; disadvantaged children and intelligence; preschool children and intelligence development.

Problems Associated with Intellectual Development

The nature of intelligence and contributing factors has been long discussed in psychological, educational, and child development literature. Nevertheless, there is ongoing dispute about how intelligence develops and what affects this phenomenon. In the United States, early intervention programs have been in place since 1962 (Clarke & Clarke, 1989). In particular, this movement gained momentum after Bill Clinton's second presidential term, between 1996 and 2000. In addition to the United States, other advanced and developing countries are having difficulties providing appropriate, healthy, and intellectually stimulating educational settings for infants and preschoolers who live in poor living conditions.

An unknown number of children in industrialized countries live in malevolent environments and suboptimal conditions. These children grow up amidst poor psychological circumstances, and they lack intimacy, love, and parental stimulation (Clarke & Clarke, 1989). Some authorities argue that

22% of children are poor and 15% of all children are chronically poor. The United States tops the list of high child poverty rates among advanced Western countries (Wood, 2003). The problem was pointed out that approximately one-fourth of American children were being raised in poverty, and the percentage of impoverished children has increased in the last two decades (Cohen, 1993). The problem is even worse in developing countries in that children in the Third World live in large families with a lack of sanitation and clean water and lack of access to schools and health care. They are more exposed to infectious diseases and environmental pollution. In these living conditions, children experience multiple disadvantages, and the consequences are more severe than for children living in other countries. (Kippler et al., 2012; Fernald, Weber, Galasso & Ratsifandrihamanana, 2011). From a broad perspective, however, today's children are better off than they were in previous years. For instance, mothers' levels of education have improved, and families have higher income. Hence, children have more access to both physical as well as psychological health care. One out of ten children, though, still lives in extreme poverty (Nash, 1997).

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Nature of Problems Faced by Socioeconomically Disadvantaged Children

Generally speaking, poverty is associated with poor nutrition, poor medical care, low self-esteem, and low quality of educational and vocational opportunities (Ramey & Ramey, 1990; Kippler et al., 2012). Likewise, the more resources available to the parents, the more will be devoted to the child, in terms of either material or time. The more stressful the demands on a household's resources, the fewer of these resources will be spent on the child (Becker, 1981; Lazer & Michael, 1988; Zweig & Shultz, 1983).

Family income, socioeconomic level, and other economic elements act as direct and indirect contributors to the cognitive development of children. Without a doubt, having a low SES (SES) has an extremely detrimental effect on the entire family structure. Child development experts are now admitting the reciprocal influence of innate and environmental stimuli. The correlation between socioeconomic level and child intelligence has been frequently reported (Sattler, 1988). On the whole, it is frequently reported as an important predictor of the amount and type of cognitive stimulation (Bradley, Caldwell & Elardo, 1979). It is commonly believed that differing economic levels of children's neighbourhoods offer varied influences on the growth of intelligence (Wilson, 1984; Gassama, 2012). For example, in richer environments, there are more and better toys, more trips to museums and galleries, and mothers stay at home more often taking care of the babies. But this is not always the case. Abouzeid and Rosemary (1994) investigated upper-middle class private preschoolers attending a suburban day care center and metropolitan preschoolers in low-income neighbourhoods. Their findings showed that early literacy knowledge is not always directly related to family income.

Factors Associated with Urbanization

Family income is associated with the development of children's intelligence. Children who live in poor and segregated neighbourhoods are more likely to experience the detrimental effects of the conditions in which they live (Niles & Peck, 2008). Thus, poor families experience more risks than wealthy families. High-risk families may not have the ability to manage their lives very well, find good schools for children, provide stimulating settings, or provide consistent care giving (Klebanov & Brooks-Gunn, 2006). Inner-city and minority families more often lack opportunities for parents to make social networks, which eventually leads to stress and child abuse. Additionally, children who live in poor neighbourhoods are less likely to participate in sports and cultural and extracurricular activities (Woods, 2003). In a study in India, Choudhary et al. (2002) compared the IQ levels of children who live in shanty houses and permanent houses. The results revealed that children living in permanent houses had higher IQ scores than those living in living

in shanty houses. The National Center for Children in Poverty reported that 31% of children from impoverished families live in large cities. Likewise, parents and children in low-income metropolitan areas are likely to face parental exposure to drugs, AIDS, low infant birth weight, and poor nutrition. Similarly, poor parents are subject to exposure to more personal injuries and accidents because of the low quality of work atmosphere (Carta, 1991). Low SES sometimes has a direct impact on a child's mental well-being. Parents employed in battery, paint, or press factories may have neuro-behaviorally affected children (Robinson, 1996). But other investigators have not found significant correlations between parental exposure to workplace hazards and negative results on children (Kook, 1972). In a recent follow-up study, however, Melchior, Moffitt, Milne, Houlton, and Casper (2007) longitudinally investigated socioeconomically disadvantaged children from birth to age 32 and found that these children were more vulnerable to poor mental and physical health. As adults, a considerable number has experienced major depression, anxiety disorders, multiple health problems, and tobacco, alcohol, and drug dependencies. These factors are characteristics that influence parents' or children's life styles. Therefore, coming from low socioeconomic strata can put impoverished preschoolers at greater risk for cognitive, social, and emotional development. In another longitudinal study, Evans et al. (2012) investigated mothers' postnatal and antenatal depression and their children's intelligence scores. They followed a large number of infants and their mothers from pre-birth to age 8. Mothers were assessed 3 times for depression, and children were tested for intelligence development. The antenatal period was found a sensitive period for mothers' experience of depression and its effect on children's cognitive development, but the postnatal period was not a sensitive period. Furthermore, poverty is most likely associated with parental unemployment, homelessness or inadequate housing, high mobility, lack of educational facilities, dangerous neighbourhoods, malnutrition, poor medical care, exposure to toxins, low birth weight, and long hours of television watching (Gassama, 2012).

Parents as Contributing Factors

In addition to financial resources, parental approaches and attitudes towards child rearing practices have profound effects on intellectual development. Socioeconomically advantaged and disadvantaged families with children entering kindergarten have different beliefs and values concerning children's academic achievements (Ramey & Campbell, 1991). They remarked that low socioeconomic households had rigid and authoritarian attitudes towards child rearing and the education of their children, which had a negative effect on children's achievement levels in reading. Likewise, Datcher-Loury (1988) claimed that different family beliefs and attitudes have "long term and important effects on a child's academic performance." Likewise, freedom and a sense of security in home settings encourage children to en-

hance their talents and intellectual growth (Landaw & Weissler, 1990). Bradley and Caldwell (1976) found a significant correlation between a loving, non-restrictive atmosphere and intellectual development. In his words, "emotional security is one of the best predictors of academic achievement." Bea et al. (1971) in the US emphasized the relationship between parents' living conditions and the development of the child's intelligence. High stress levels and the absence of supportive attitudes were listed as risk factors. There is evidence that more intelligent, independent, individualistic, and assertive fathers have children with high IQs, whereas the opposite characteristics in the father result in lowered IQ scores. As for mothers, children who have high IQ also had mothers who were highly independent, consistent, and self-aware. Similarly, Shaffer (1977) showed significant negative correlation between maternal neglect, punishment, and boys' IQ scores.

Mass (1967) argued that the gender of female children affects mother-child interactions more often in a negative way. Bigros (1993) reported the reverse. According to Bigros, economic, maternal, and parental stress affects mother-son interactions eight times more often than it does mother-daughter interactions. In this study, stressed-out mothers were more distant, colder, and less attentive toward their sons than their daughters.

Maternal Interaction Pattern

Cognitive interaction has a powerful effect on the development of children's intelligence. Children who received more maternal affection during infancy achieved higher intelligence and arithmetic scores. These children also developed more positive self-esteem; their teachers reported fewer behavioural and emotional problems than with children who had constantly less responsive maternal interaction (Beckwith, Roding, & Cohen 1992). Additionally, Beckwith, Roding, and Cohen (1992) found that mothers who were more responsive to their infants tended to come from higher educational levels and social classes. This finding is consistent with other studies that found responsive relationships between parents and children are related to greater intellectual and academic achievement in children (e.g., Baumrind, 1991). Beckwith, Roding, and Cohen (1992) suggested that more responsive mothers perceived themselves as more comfortable, assertive, and competent in their social relationships. Correspondingly, Landaw and Weissler (1991) note that diversity in parents' interest areas, their personality traits, and their academic achievements are correlated with a child's IQ scores. Similarly, Vernon (1979) alleged that parents' interest lists and deep, rich cultural backgrounds are among the most powerful environmental factors affecting children's cognitive developments. Recently, breastfeeding became an important aspect of infants' cognitive and physical developments. In a longitudinal study, Tozzi et al. (2012) found that children breastfed in the first year of life scored higher in intelligence tests at the age of 12 years.

Parental Education

Bornstein (2002) wrote that highly educated parents talk more with their children, use less severe discipline methods, spend more time on teaching, and provide more stimulating environments, all of which brought about better cognitive test results. Similarly, Klebanov and Brooks-Gunn (2006) claimed that parental education was always the strongest predictor of children's cognitive and academic test scores, and this was valid from the childhood through the teenage years.

Similarly, Rahu, Rahu, Pullmann, and Allik (2010) investigated the effect of birth weight, mothers' education, and prenatal smoking on intelligence of school-age children. As birth weight increased 500 g, IQ scores also increased 0.7 point. A mother's smoking habit caused a 3.3-point deficit in children's intellectual abilities. Additionally, maternal marriage status and the mother's education had a positive contribution to children's intelligence level. In another study, de Souza et al. (2012) investigated the effect of low birth weights and children's developmental outcomes from an intensive care unit to the age of 1 and 2 years old. Results revealed a strong correlation between birth weight and cognitive development.

In a recent Swedish study, Lundberg et al. (2010) examined the association between maternal smoking during pregnancy and the risk of poor intellectual performance in young adult male offspring. The findings revealed that the risk for poor intellectual performance was increased more for the children of the smoking mothers than the non-smoking mothers. Similarly, Poehlmann et al. (2012) reported that early exposure of pregnant women to stress caused more critical parenting, and this consequently caused externalizing problems at 9 months. In the same fashion, Evans et al. (2011) also reported pre-birth period as an important time frame for maternal depression and its effect on children's cognitive developments.

Wilson (1984) also reported that children's IQ scores were significantly correlated with parental education and family income. He discovered from a longitudinal study that parental education and family status are increasingly correlated with childhood IQ measures. In his study, the father's education was the strongest predictor for a 6-year-old's IQ scores. Meanwhile, the mother's education and socioeconomic level were found to be significant supplementary predictors. Specifically, Bradley, Caldwell, and Elardo (1977) investigated contributing variables, of which parental educational level displayed the strongest relation to the child's IQ ($r = .52$). In the same study, paternal education showed the highest correlation with a male child's IQ, whereas maternal education was strongly related to a female child's IQ.

In another study, the educational level of the mother appears to have a strong positive influence on the girls' test scores, but not on the boys' scores (Desai, Chase-Lansdale, & Robert 1989). Consequently, it appears that mothers from low socioeconomic levels usually do not have the academic

skills and concepts necessary for cultivating a high IQ in their children. But Ramey and Haskins (1981) stated that a high-quality day-care experience reduced the magnitude of mother-child resemblance in IQ level. Moreover, in Wilson's 1984 study with twins, he found the education of the at-risk child's mother was significantly associated with recovery of children's IQ when they are 2-year-olds. That is, maternal intelligence plays a determining role in predicting the level of improvement.

Young (1996) demonstrated that upper socioeconomic-level mothers consider toys a means for their child to discover new things, but low socioeconomic-level mothers see toys as a means of keeping the child busy. Correspondingly, Lewis (1977) explained that upper-middle-class mothers read to and discussed more stories with their children. Additionally, upper-middle-class mothers helped the children comprehend problems and used appropriate language with their children.

Furthermore, parental attitudes toward a child's education are an important factor. For example, Clarke and Clarke (1989) argued that children whose parents cherish education are likely to score higher on cognitive tests. More importantly, Meisenberg, Lawless, Lambert, and Newton (2006) reported that every additional year in parental schooling adds approximately 2.7 points to a child's IQ scores, and every generation gains 10 points in IQ scores. It seems very obvious that formal education contributes to both parents' and the child's mental abilities. Therefore, schooling is imperative for improvement in cognitive development.

Maternal Employment

Some authors argue that social policy and governmental welfare programs cannot change poor living conditions. But Collin (1997) saw parental attitudes and strong marriage ties as a necessary and beneficial complement to governmental programs. He further suggested that children profited from their mothers staying home and taking care of them until 1 year of age. Employment may reduce the amount of time a mother spends with her children; therefore, employment may be detrimental to the child's development (Hill & Stafford, 1974). Conversely, additional maternal income may contribute to the home and other social expenses. Desai, Chase-Lansdale, and Robert (1989) noted that maternal employment affects children's development more adversely for high socioeconomic-level families than low socioeconomic-level families. The reason is that a highly educated mother has options and abilities to provide a more stimulating environment for the child than the normal day-care worker. Klebanov and Brooks-Gunn (2006) reported that the children of mothers who had previously received welfare and who had entered the workforce did not show any negative effects in their cognitive development. Similarly, Ramey and Campbell (1984) showed that children from very disadvantaged families may benefit from maternal employment if they are placed in a high-quality enrichment program. Forns

et al. (2012) examined the occupational social class of mothers. Mothers from low social-class jobs did not have a positive effect, but upper-class jobs had a positive impact on children's development as measured at 14 months old. Conversely, Fernald, Weber, Galasso, & Ratsifandrihamana (2011) found that, though wealth and maternal education has significantly and independently affects cognitive development, wealth has a more powerful effect than maternal education. Hoffman (1989) claimed that maternal employment is related to negative outcomes with boys, but to positive outcomes with girls. Later, Baydar and Brooks-Bunn (1991) demonstrated that children whose mothers worked part time during the first year had a lower IQ level at the age of 3 than the children of either workers or unemployed mothers. Desai, Chase-Lansdale, and Robert's 1989 findings proved that employment variables do not have a significant effect on boys' and girls' verbal intelligence capacity.

In addition to children's intelligence development, there is also the social dimension of growth. Children from a low SES whose mothers worked in the first year of infancy and who attended non-maternal day care have been rated by the teachers as the most difficult to discipline at school age.

Home Environment

Generally, during infancy, physiological and neurological development is important, and in toddlerhood, environment gains a more important role in enhancing or hindering the cognitive development of children (Mitchell, Croy, Spicer, Frankel, & Emde, 2011). Thus, children's cognitive developmental levels have been studied in terms of the quality of the home environment, including the characteristics of the mother, their households, and socioeconomic factors (Garrett et al., 1984). It was reported that children's developmental status was associated with the quality of the home environment. Financial difficulties diminish parents' ability to interact and socialize in a beneficial way with their children (Guo & Harris, 2000). Needless to say, children in high-income families are more likely to have exposure to new environmental stimuli, but more money is probably not the sole reason. Colmen et al. (1996) did not find any correlation between the amount of money spent on a child and intellectual improvements in IQ tests. So parent-child interactions and the quality of relationships gain more weight. Early childhood research emphasized the importance of stimulating environment throughout the preschool years. Encouraging attitudes for exploration; avoiding disapproval, teasing, and punishment; and introducing rich language and intellectual stimulation are desired environmental stimuli in terms of intellectual development. Additionally, wealthy families can provide better nutritional and health opportunities for children. In one study, Wang, Wang, Wang, and Chen (2006) investigated the effect of nutritional food supplements for poor children who live in rural areas. Their results reveal that a food supplement was effective for enhancing children's mental and gross motor development in the

first year of life. Fernald, Weber, Galasso, and Ratsifandrihamanana (2011) compared the nutrition, SES, and maternal education of disadvantaged and normal children. The mean score of intelligence development was two times higher in high SES, and the difference was highest at the age of 6 years. They also discussed the lack of nutrition and malnutrition for that particular population sample.

Contemporary studies call attention to the importance of parenting skills: spending the time to cuddle babies, talking with them as if they were adults, and providing them with stimulating exploration. The new findings have shed further light on early education and day care. Luster and Dubow (1992) found that both maternal intelligence and home environment contribute to individual differences in the verbal and cognitive intelligence of children at the age of 3. In their longitudinal study, the home environment was most influential during the preschool years and declined in effect when the children got older. These results show that the influence of the home environment is not constant throughout childhood.

Similarly, Miller, Maguire, and Macdonald (2012) reviewed home-based intervention programs for socially disadvantaged preschool children in a meta-analytic study. Even though it did not mention any adverse effect of home-based intervention, it also did not report any significant effect for improving developmental outcomes.

Day-Care and Preschool Experience

In more recent decades, as more women have started to work outside the home, child care has been an important theme for families and children (Claessens, 2012). Some working parents consider day-care center an important transition institution; however, this is not always the case. A study by Collins (1997) revealed that 40% of day-care centers provide activities utilizing less-than-minimal standards for preschoolers. Reasons for this were unresponsive caregivers, lack of appropriate toys, and so on. Additionally, poor day-care programs can inhibit the healthy development of any child. While a high-quality day care protects against serious behaviour problems, low-quality day care and low levels of cognitive stimulation at home can cause more serious externalizing problems. In fact, the quality of day care is more influential for children who experience high individual and contextual risks (Votruba-Drzal, Coley, & Chase-Lansdale, 2004). In a more recent Chinese study, Jiahui and Tao (2012) researched the effectiveness of kindergarten enrolment age for 4-year-old Chinese children and their home learning environment. The results revealed curvilinear effects of kindergarten enrolment on children's cognitive and behavioural outcomes. For children from a low home learning environment, early enrolment caused higher cognitive development but more behavioural problems. For children from a higher learning environment, a moderate enrolment age was proven most effective.

Many researchers believe that children's intelligence and

social skill development can be enhanced if the caregivers are trained. Therefore, it is important that child day-care providers should be seen as teachers for at-risk children and trained professionally so that the preschool years can be utilized functionally and effectively (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002). Authorities argued that attending a good quality day-care program before kindergarten is effective in overcoming some of the negative effects of poverty (Ramey & Campbell, 1987).

The connection between environmental quality and child intellectual capacity may also be related to the child's age (Johnson et al., 1992). There is a critical age at which a child can benefit to the maximum level from the environment. Thus, age is crucially important for early intervention programs. Mitchell, Croy, Spicer, Frankel, and Emde (2011) conducted a longitudinal study with disadvantaged American Indian children. In this study, while infants' intelligence scores were close to national norms at 6 months, the gap is widened when they are tested at 15 months and 36 months. It was observed that intelligence performance sharply declines in the first year of life, and a small drop-off continues until the third year. In a similar study, Burchinal et al. (2011) investigated the achievement gap among black and white low-income children. They followed children from birth to fifth grade. The achievement gap appeared as early as 3 years old and continued until the fifth grade. In the same way, some have debated whether environmental effects become clearer at a later developmental level. The value of early experiences has long been widely accepted by psychologists and educators as a given (Nash, 1997). The early experiences of children are important in predicting subsequent development (Hunt, 1961). More than 60% of the children in the US are experiencing non-parental care during the preschool years; therefore, professionals and parents are questioning the value and the quality of day-care programs (Scarr & Eisenberg, 1993). Clarke-Stewart (1989) discussed the importance of the first year of non-parental care. They provided empirical evidence that early non-parental care brought about poor social development, aggression towards peers, and disobedience to adults. But they also speculated that attendance at a high-quality day care positively correlated with preschoolers' intelligence scores. Furthermore, it has been reported that children who attend early day-care centers gain more confidence, independence, extroversion, and assertiveness later in life. Clarke-Stewart (1991) contended that part- or full-time day care-experienced children displayed more competence in verbal ability, cognition, social competence, and cooperation with peers than those who experienced home-based care.

Caughy, DiPietro, and Strabina (1994) found that, among children from less stimulating and responsive environments, day-care experiences within the first year of life were significantly associated with later reading achievement for children aged 5-6 years, but early day-care experiences negatively affected children from richer environments. The most critical time frame for cognitive development is con-

sidered to be from late in the first year through the second year, in which parental influence is the most important contributing factor. In the second year, the parent has the greatest impact on child's development by encouraging achievement and providing proper learning materials and toys (Bradley, Caldwell, & Elardo, 1979). They also further contend that mothers who converse with children and continually encourage them had more independent children. In the same way, Ramey and Haskins (1981) reported that high-quality early experiences have a substantial influence on intellectual development during the first three years of a child's life.

Burchinal, Lee, and Ramey (1989) demonstrated that the detrimental effects of low socioeconomic levels on a preschooler's cognitive development are substantially reduced if children have a chance to attend a quality day-care center. Moreover, other authors especially stressed the university-based intervention day-care center as an effective intervention and prevention measure (Lazar, Darlington, Murray, Royce, & Snipper, 1982; Ramey, Bryant, & Suarez, 1985).

Conversely, some children must go to other after-school care facilities after kindergarten hours. Claessens (2012) found that those care facilities are useful for small improvements in the academic area, but they have negative effects on problem behaviours and prosocial skills. Changing buildings and teachers causes considerable discomfort and more problems.

Early Intervention Programs

It seems the financial burden of helping low socioeconomic-level children is high, though the cost of not helping is higher in the long term (Renchler, 1993). Twenty-five percent of all impoverished people are under age 6 (Burchinal, Lee, & Ramey, 1986). Likewise, children are vulnerable to suffering direct and indirect results of child abuse or neglect. If necessary precautions are not taken by the age of 3, the effect can be long lasting, and the consequences will be unbearable. It becomes very clear why interventions are important for the future of any nation.

Jakes and DeBord (2010) investigated the environmental effect of family, school, and community effects on children and youth. They found that individual child and youth outcomes are strongly influenced by family involvement at a young age, but as age increases, this contribution becomes less prominent. Once this early family involvement is missed, family and community protective factors could not significantly improve children's individual development and intelligence in the following years. Thus, it seems that early intervention is a key issue here and has a positive effect on children's intelligence performance.

Advanced approaches and innovative programs are necessary in early education settings for children from low-socioeconomic strata (Zill, Moore, Smith, Steif, & Coiro, 1995). Therefore, different kinds of intervention programs have been designed and conducted successfully to offset the

profound difficulties of children from economically disadvantaged families. Some of these intervention and prevention programs go back as early as the 1960s.

In summary, it is widely accepted by researchers that high-quality, student-centred preschool education programs are proven methods in the progress of children's intellectual development.

Intervention programs are successful for children from low-income families who are disproportionately predicted to fail in school (Kolata, 1987); however, Wilson (1983) disagreed that most at-risk infants will overcome early shortcomings and improves toward a level commensurate with their potential capabilities. Without a doubt, when supportive conditions are provided, the child can make progress toward his potential capacities. Head Start's effects on cognitive development were proven in 72 studies. At the termination of preschool programs, 9 to 10 IQ points were gained (Clarke & Clarke, 1989). Also et al. (1982) agreed that the Head Start attendees were less likely to fail in an elementary school or to be placed in a special education class than non-attendees. Some research literature summaries (Ramey, Bryant, & Suarez, 1985) are consistent with each other in that well planned, continuous educational intervention programs enrich the intelligence development of highly at-risk children. Ramey and Ramey (1990) said, "A little intervention is better than none." They believe that intelligence capacity and academic performance can be advanced via intensive, long-term, academic, and child-oriented early intervention programs. They propose a stimulating, encouraging atmosphere for the benefit of cognitive development.

Long-Term Effects of Early Education and Schooling

Many intelligence researchers have reported that general intelligence levels, measured by IQ scores, can be enhanced by schooling (Pressly & McCormick, 1995). They have also emphasized the importance of school attendance in the development of intelligence. Researchers found strong correlation ($r = .80$) between the number of schooling years and IQ test scores. Furthermore, they also claimed that summer vacations led to a decline in intelligence test scores. It seems that intermittent school attendance is related to lower IQ levels.

Nevertheless, Clarke and Clarke (1989) argued that early psychological experiences may not affect later development. Short-term enrichment in early life, followed by poorly shaped years, produces only temporary gains. They emphasized the advantages of ongoing interventions and maintenance programs. Additionally, it was reported that Early Head Start had very little influence on changing parental attitudes toward the value of education. Even so, the Early Head Start programs have made a great contribution to improving the preparation of disadvantaged children for entry into school. Reviews of Head Start programs have shown that children attending Head Start have gained immediate

short-term benefits, including improved cognitive and social development and academic achievements (Renchler, 1993). On the other hand, some researchers believe that benefits concerning intelligence measures were temporary and disappeared after one or two years (Drazer & McCormick, 1983).

Another intervention program was studied by Ramey and Haskin (1981). In their study, children in the experimental group participated in a high-quality educational day-care program that was aimed at increasing intellectual enhancement. Participants in this study gained a considerably higher level of intellectual improvement. As predicted, attending an educational day-care program produced higher IQ gains in the experimental group. In contrast, the intelligence scores of children in the control group showed a relative decline in their intelligence scores.

There is a consensus among the Head Start researchers (Bronfenbrenner, 1975) that after completing the intervention programs, one or two years later, upon entry into public school, experimental children were no longer advanced in IQ and achievement test measurements. But a recent study by Klebanov and Brooks-Gunn (2006) investigated the effects of early intervention programs from birth to 3 years of age for children of low birth weight from poor families. This project, the Infant Health and Development Program (IHDP), tried to test the efficacy of early intervention. The children in the IHDP families were provided a full-time day-care education in the second year and weekly or bimonthly home visits during the third year of their lives. When treatment ended at 3 years of age, experimental children did better than the other groups. When they were tested again at 5 and 8 years of age to examine the sustained intervention effects, the benefits were greater than one standard deviation. The children who had received treatment had higher IQ and verbal test scores at two and five years after the program terminated. In another follow-up study, Black, Dubowitz, Krishnakumar, and Starr (2007) investigated the effects of early intervention programs when children were 8 years old. They provided interdisciplinary support to parents, including home visits designed to promote maternal sensitivity, parent-child relationships, and child development. Similarly, starting with the original Abecedarian study in 1972, Campbell et al. (2002) conducted a longitudinal study and tested the participants when they reached the age of 21. The group that received early, regular, high-quality day care did significantly better in IQ tests, had superior reading and math skills, attained more years of education, and were more likely to complete a 4-year-university degree when they were young adults.

In the Chicago Child Parent Center program, Smokowski, Mann, Reynolds, and Fraser (2004) also reported positive results among children who participated in early child-care: They demonstrated fewer problems in school dropout, adolescence, delinquency, and depression.

In another Abecedarian follow-up research, McLaughlin, Campbell, Pungello, and Skinner (2007) screened the subjects when they were 21 years old with the Brief Symptom

Inventory. They found that the experimental group, who received high-quality child care during the first 5 years of life, demonstrated fewer depressive symptoms. It becomes clear that high-quality early intervention reduces a depressive mood, gives a buffering effect, and protects individuals from mental health problems.

In review, many researchers have reported that early intervention programs attenuated some of the negative effects related to early developmental deficiencies. This would provide further evidence that quality day-care and early intervention programs have positive long-term effects.

Successful Programs

Child development experts suggest that there is an urgent need for high-quality preschool programs to boost brain development, especially among impoverished and inner-city children.

In the Graham Child Development Center, North Carolina, Campbell and Ramey (1977) longitudinally tested disadvantaged children during the 6th, 12th, and 18th months of development and compared them with children who did not receive intervention. By the middle of the second year, the treatment group did significantly better than the control group. In the 12th month, the experimental group had a 10-point advantage, and at 36 months, this advantage had grown to 15 points. The months between 12 and 24 seemed to be an important and critical period in intellectual development. Furthermore, the experimental-group children were reported as more cooperative, less anxious, and less withdrawn.

Fortunately, the growing research data indicates that well-designed preschool programs can help overcome early negative environmental experiences. For example, in a New York City infant day-care study, Golden and Biras (1983) investigated 400 socioeconomically disadvantaged children. The control group included only children raised exclusively at home, whereas the experimental group consisted of children raised by 31 service-oriented, licensed professional and family infant day-care programs. Results revealed that children who were raised in day care scored significantly higher on their IQ scores.

In another well-known study, the Carolina Abecedarian Project, investigators conducted experimental research. In the experimental group, subjects were provided medical, nutritional, and family counselling. In addition, they attended high-quality preschool programs all day during the year. Parental education meetings were held to teach parents how to stimulate child development and take advantage of community resources. This Abecedarian Program lasted four and a half years and brought about approximately an 8-12 point improvement in intelligence test scores (Ramey & Ramey, 1992). This study showed significant positive correlations between receiving intervention and increasing IQ levels. Later, in follow-ups, it was observed that the children who received intervention were less likely to fail in grade school.

In a critical analysis of 38 early intervention studies, Barnett (1998) concluded that the economic return from providing early education to children in poverty is far more than the cost. Long-term benefits of intervention produce lasting effects on children's achievement and academic success. Thus, Head Start or government funding for high-quality child day-care programs can improve cognitive development and school achievements in the long term. Besides day-care settings, Gamoran, Turley, Turner, and Fish (2012) mentioned Families and Schools Together (FAST) as an enrichment program in which parents and schools do organized activities so they are involved in school activities and increase social ties with schools. This program was proven effective for minority families who are isolated or have very limited social ties with schools.

Poverty is a well-known phenomenon, and experts working with children will encounter children who come from socioeconomically deprived backgrounds. They should not overlook the importance of their early years. They should realize that poverty and its culture that surrounds young children has significant, continuing effects on children's

health and social and cognitive development. Intervention programs should identify disadvantaged children at an early age and work on them. Children from the poorest socioeconomic level should be given the privilege to attend those programs (Fernald et al., 2011). Teachers, paediatricians, psychologists, and school counsellors should keep in mind the detrimental effects of poverty. They should be able to locate community resources to help deprived children and be able to provide information and counselling for their parents. Every professional who works with children must be knowledgeable about this issue and lobby for better educational opportunities for young children. They should try to document and report the effects to influence policy makers' decisions. They can also participate in conferences, seminars, pre-service teacher training, and TV and radio shows to educate the public about the nature of this problem. It is also essential that the whole community pay attention to the importance of utilizing day-care centers for the future of their children as well as for the well being of the whole of society.

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