

# **Early Childhood Development and Human Capital Formation: The Case of Turkey in Global Perspective**

**Dürdane Şirin Saracoğlu**

Department of Economics, Middle East Technical University, Ankara, Turkey

E-mail: [ssirin@metu.edu.tr](mailto:ssirin@metu.edu.tr)

Phone: + (90) 312 210 2058

**Deniz Karaoğlu**

Visiting Scholar, Department of Economics, Middle East Technical University,  
Ankara, Turkey

E-mail: [kadeniz@metu.edu.tr](mailto:kadeniz@metu.edu.tr)

Phone: + (90) 312 210 3069

# Early Childhood Development and Human Capital Formation: The Case of Turkey in Global Perspective

Dürdane Şirin Saracoğlu\* and Deniz Karaoğlan\*\*

## Abstract

Drawing on cognitive science, child psychology, and economics literature, this paper investigates the significance of early child development and the environmental factors that affect early child development. Earlier literature has established that the child's brain development is almost complete in the first three years of life, and this development is critically affected by the child's environment, including the family's socioeconomic status and the availability of early child education and care. The young child requires adequate psycho-stimulation for the optimal development of the brain in the first few years of life, which subsequently helps her accomplish at school and achieve in adulthood. It has been emphasized in the literature that in order for all young children start life at an equal footing, governments should provide equal opportunities for early childhood education and care where families are not able to provide. In this paper, we compare and contrast the current status of early child education in Turkey with that of selected developed countries, which have advanced far in early childhood education. Despite the striking evidence on the affirmative effects on the individual as well as the individual's contributions to social and economic development, early childhood education (particularly up to age three) is not considered to be a priority in the education system in Turkey.

**Keywords:** Early Childhood Development, Pre-Primary School Attendance, Government Policy, Turkey.

**JEL Codes:** I25, I26, I28, H52, O15

## 1 Introduction

Research in the last several decades in neuroscience, psychology and economics has shown that early childhood (infancy to toddler, or 0-36 months of age) is a period during which the individual experiences considerable advances in reasoning, language development, and problem solving. Brain development to a large extent is completed during the first few years of life.

---

\* Middle East Technical University, Department of Economics, 06800 Ankara, e-mail: ssirin@metu.edu.tr

\*\* Middle East Technical University, Department of Economics (Visiting Scholar), 06800 Ankara, e-mail: kadeniz@metu.edu.tr

Therefore, living in an environment that supports the young child's brain development along with proper nutrition is expected to have a substantial impact on the child's future.

During the early years of life when an individual's intelligence, personality and social conduct are taking shape, in order to support rapid brain development, it is essential that the young child receives adequate stimulation with appropriate education, care and family involvement. It has been well-established in the previous child development literature that children who benefit from early childhood education and care are relatively more school-ready and perform better at school, and in return, they have a higher incidence of attendance to higher education, are employed at jobs with higher statuses, have a lower incidence of unemployment, pay more taxes and contribute more to the economic and social development. In Turkey, earlier research has revealed that each 1 TL of investment to the pre-primary education (children 0-6 years of age) has about 6 to 7 TL of return to the society (Kaytaz 2005; Beşpınar and Aybars 2013).

Considering that it is almost impossible to compensate for the lack of early childhood education later in life, the significance of education during young ages becomes even more evident. However, in Turkey, the prevalence of early childhood education is very low compared to that in developed countries. Latest statistics from the World Bank show that only 28 percent of pre-primary-school-age children participate in pre-primary education in Turkey. In contrast, this rate is almost 100 per cent in a number of developed countries.

After establishing the significance of early child development (ECD) and the factors that affect ECD, this paper examines the current status of early childhood education in Turkey in comparison to selected developed economies, Norway, Sweden, Switzerland, Finland and Denmark. By such comparison, our objective is to show that early childhood education constitutes an integral part of the education system in developed countries, whereas it is considered only as an auxiliary in the Turkish education system. Therefore, we stress that early childhood education programs have a lot of room for improvement in Turkey and the government needs to put higher emphasis on early childhood education policies. This paper is differentiated from previous studies in Turkey on the effects of early child education and care such as Kağıtçıbaşı (2001), in the sense that we bring forward the economic theory perspective that exerts the importance of investment in early childhood development and education for the society's successful human capital accumulation.

Education and labor force statistics confirm that Turkey experiences lower returns regarding standardized test scores in teenage years, lower educational attainment and educational composition of the labor force compared to the developed countries. For instance, PISA 2012 statistics reveal that in the countries where early childhood education participation is relatively higher, students perform better than the students in the countries where it is lower (OECD 2014). Latest PISA outcomes show that Turkish students performed well below the OECD average, while among the group of countries we consider, highest scores were attained in Finland. The scores of students from Switzerland, where pre-primary education is compulsory in most of the cantons, are close to the scores of students from Finland.

According to the World Development Indicators by the World Bank, by the end of 2013, pre-primary school enrollment was 28 percent in Turkey, which is very low compared to a majority of developed countries. For instance, pre-primary school enrollment rate is recorded as 82 percent for the OECD members' average for the same period. This rate amounts to nearly 100 percent in North European countries such as Denmark, Norway, Sweden and Switzerland. In Turkey, years of average schooling is also quite low in comparison. While it was equal approximately to 3.5 years in 1980, it has increased to 6.5 years in 2010, most likely due to the enactment of a new law in 1997, which increased compulsory schooling to eight years. Despite the ongoing increase in years of average schooling, Turkey's gap in terms of years of schooling (as measured by difference between the average of the three best performing countries and Turkey) has been widening for the last 60 years (Yilmaz 2015). In Turkey, the prevalence of dropping out of school is also quite common. For instance, according to World Bank World Development Indicators, survival rate to fifth grade was 90 percent in 2011, which implies that ten percent of the children in the same cohort left school without completing the fifth grade. Similarly, 90 per cent of children have continued their education to attend middle school in 2012. This indicates that ten percent of children in the same cohort did not continue secondary education, while both primary school completion rates and progression to secondary school are almost 100 per cent in developed countries. These statistics clearly indicate that educational attainment in later ages is lower in Turkey relative to the developed countries where pre-primary education attendance is high.

In Turkey, we observe that more than half of the labor force consists of primary school graduates. According to the World Bank Development Indicators, in 2014, 60 percent of labor force is made up of primary school graduates in Turkey. The percentage of primary school graduates is relatively low in developed countries such as Norway, Denmark, Switzerland, Sweden and Finland where it varies between ten percent and 20 percent. Next, in Turkey, 20.3 percent of the labor force has a secondary school degree and only 19.8 percent has tertiary education, whereas in the developed countries in consideration the percentage of individuals with tertiary education in the labor force is more than 30 percent. These statistics indicate that, education level of the labor force is rather low in Turkey compared to that in developed countries. Regarding the unemployment by education level, we observe that in Turkey 56 percent of the unemployed has a primary school degree, 24 percent has a secondary school degree and 21 percent has a university or higher degree by 2014. In developed countries compared to Turkey, individuals with secondary school degree or tertiary school degree constitute a smaller the part of the unemployed. However, we should also note that the ratio of people out of labor force with higher education levels (for instance, discouraged workers) is higher in Turkey.

Both education and labor force statistics clearly indicate that educational attainment is much lower in Turkey compared to developed countries where participation to pre-primary education is widely observed. In addition, in Turkey the labor force mostly consists of lower educated individuals and what's more, more than half of the unemployed pool is made up of individuals with low education levels. Accordingly, bestowing higher importance to early childhood education may increase the individual's education level and hence improve the educational attainment and labor force composition in Turkey.

The rest of the paper is organized as follows: Section 2 discusses the significance of early childhood development. Section 3 reviews the factors that affect early childhood development and based on Cunha and Heckman (2007), presents a formal model of human capital formation and early childhood development dependent on these factors. Section 4 compares the early childhood education and care status in Turkey with that of selected developed countries, Norway, Sweden, Switzerland, Denmark and Finland, where participation to pre-primary education is among the highest. Section 5 concludes, and proposes policies and further research.

## **2 Why is Early Child Development Important?**

Behavioral or cognitive neurology research has established that the early years of life provide a foundation for cognitive, social and emotional capacities which play crucial roles in adult economic productivity, and during these early years, the individual has a heightened sensitivity to the impacts of both positive and negative experiences (Knudsen et al. 2006). Studies in neurobiology, neurodevelopment and early intervention show that experiences from conception to school age are critically important as they affect the development of neural circuits that determine the cognitive, linguistic, emotional and social capabilities (Knudsen et al. 2006; Maggi et al. 2010).

Recent research in brain development has shown that not only biology or genetics, but also environment plays an important role in growth and development of the brain and determines the outcome of human lives (Newberger 1997; Shonkoff and Phillips 2000; Balbernie 2001; Knudsen et al. 2006). As stated in Shonkoff and Phillips (2000), with contemporary research it has been well established that the development of children is a complex process that progresses with the continuous interaction of nature (i.e. genetics or heredity) and nurture (i.e. environment). Ingrained in the values, beliefs and practices of a given culture, the environment in which the children are taken care of, which consist of their home, extended family, child care facilities, community, and society profoundly affect the influence of nature, and determine how children react to their experiences. It is now recognized by many, including policymakers, that young children are affected by their environments (including early adversities which can have lifelong impacts on learning, behavior, and health) to a great extent, and they are not simply led by fixed genetic trajectories (Shonkoff and Levitt 2010). In fact, the brain is able to change its own structure in reaction to the environment, and this is known as ‘neuroplasticity’ (Balbernie 2001). As the developing brain of a fetus produces tens of millions neurons (brain cells) per week, by the time the baby is born, it has all the neurons it will ever have (Maggi et al. 2010). Although genetics or heredity determines the number of neurons the baby is born with (about 100 billion), these neurons are a random mass and are not initially part of functional networks, as they are in an adult brain (Balbernie 2001; Maggi et al. 2010).

In the first few years of life, the task of brain development is to form and then reinforce into permanence the necessary synapses (connections between neurons that enable them to

communicate and store information), and the environment of the child has a profound impact on how these synapses are formed (Newberger 1997; Balbernie 2001, Thompson 2001). During childhood prior to school age, there is a rapid process of ‘wiring’ or ‘sculpting’ of the brain during which these synapses are formed as some of the connections die out and some others are strengthened (Newberger 1997; Thompson 2001; Maggi et al. 2010). As the brain sculpts itself in response to a wide range of outside stimuli such as visual, verbal, emotional, physical, touch, smell and taste, positive interactions with caring adults stimulate a newborn’s brain deeply by causing synapses to grow and existing connections to be reinforced. The synapses in a baby’s brain which are used become permanent, while the ones which are not used tend to disappear. In that context, if a child receives little stimulation early on, synapses in the brain will not be activated or will not develop, and the brain will make few connections between neurons. Particularly during the *first three years of life*, synapses develop quickly in reaction to outside stimulation, and neuroplasticity affirms that early stimulation establishes the basis for how a child will continue to learn and interact with others in the rest of her life (Newberger 1997).

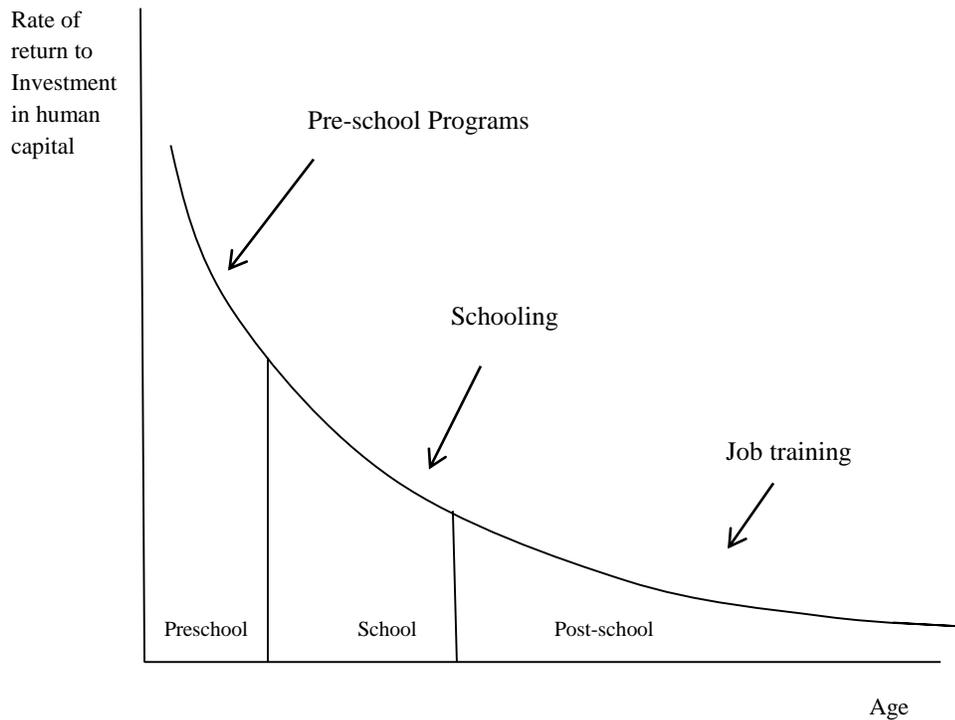
According to Balbernie (2001), during the first few years of life of a child, the brain forms 15.000 synapses for each neuron, and by the age of two, the toddler has as many synapses as an adult, and by age three, the synapses double to 1,000 trillion. These synapses are sustained until about age ten, when there is a gradual decline until late adolescence, and synapses are reduced by half to about 500 trillion at adulthood. However, with babies and children who are severely neglected or abused, there is a faster reduction in neural connections as stress-induced hormones like cortisol cause death of neurons (Newberger 1997; Balbernie 2001, Thompson 2001; Shonkoff and Levitt 2010). Furthermore, lack of stimulation or neglect may cause unused synapses in certain regions of the brain and lead to atrophy; unused or redundant synapses will be eliminated while the most frequently used ones are reinforced (Balbernie 2001). On the other hand, it has been confirmed that babies who have received warm and responsive care and established strong emotional bonds with their caregivers have consistently shown lower levels of cortisol in their brains as these babies were able to extinguish the stress-induced responses more quickly and efficiently (Newberger 1997).

Healthy brain development is supported by continuous stimulation through talking, singing, playing and reading to the child by the parents or other caregivers. These activities contribute

significantly to the young child's development especially if they accommodate the child's interests and are developmentally suitable to the child (Thompson 2001). In fact, studies have shown that there are critical "windows of opportunity" in a child's life when specific types of learning take place; for example an infant's constant exposure early on to words by parents and other caregivers who frequently speak to her undoubtedly helps her brain build neural circuitry that will make it possible for her to recognize, understand and learn more words later on. In that respect, a parent's or other caregiver's individual attention and responsive care during infancy are critical for subsequent language and intellectual development (Newberger 1997).

Corroborating the notion that a child's brain development responds to the environment and that early intervention is essential to the child's subsequent development, Knudsen et al. (2006) emphasize that "skill begets skill", i.e. acquisition of earlier capacities build a foundation for all subsequent capacities. According to Knudsen et al., the principle "skill begets skill" originates from two fundamental attributes of the process of learning: (i) early learning bestows a positive value on skills subsequently gained, which further incites the drive to learn more; (ii) early attainment of skills and competencies renders learning at later ages more efficient and thus easier and more likely to continue. Correspondingly, it is highly likely that the breadth of skills attained even before entering kindergarten positively impacts the extent of skill acquisition in early elementary school, and skills gained in adolescence in turn depend on mastery of these elementary skills (The White House Council of Economic Advisers 2015). Due to these factors, investment in children during early childhood becomes essential. In that respect, firstly it has been well-established in economic theory that the earlier the investment in a child is undertaken, the longer will be the period over which he or she can benefit from this early investment as returns on past investment are realized (Becker 1962; Ben-Porath 1967). Secondly, as depicted in Figure 1, studies show that the rate of return to investment in human capital as a function of age is highest when investment is made at younger ages and early investments improve the return on later investments (see for example Carneiro and Heckman 2003; Knudsen et al. 2006; Heckman and Masterov 2007; Conti and Heckman 2012). Such self-productivity feature of early investments favors more investment in young children. Lastly, early investment in a child lowers the cost of later investment, and any remedial investment in later years would be costly: for many skills and human capabilities, later intervention for earlier disadvantage may be possible, but much more costly than early intervention (Heckman 2007).

**Figure 1.** Returns to investment in human capital by stages of life-cycle



Source: Heckman and Masterov (2007)

### 3 Environmental Factors in Early Child Development

As pointed out in the previous section, first years of life are a critical period of time for child development as during this period rapid brain growth occurs with significant acquisition of motor, cognitive, linguistic, emotional and social skills and the events during this period prepare the infant for subsequent developmental skills and abilities. In related research, a child's social and economic environment stands out as one of the main factors affecting his/her developmental trajectory, together with individual characteristics regarding genetics, gender and anthropometric status (in relation to the child's nutritional status, birth weight, birth order, and breastfeeding). The impact of social environment on child development works in two levels: distal and proximal.

Social, historical and cultural factors are the distal ones that impact a child's development. On the other hand, a child's immediate physical and socioeconomic environment, including daily interactions with family, peers, and teachers constitute proximal environment factors. Verbal stimulation received by the child, quality of childcare, and family organization involving family's socioeconomic status, quality of home environment, adult-child interaction and emotional involvement are among the proximal environment factors affecting a child's development (dos Santos et al. 2008).

### *Family's Socioeconomic Status (SES)*

There is a large body of literature attempting to assess the impact of family's socioeconomic status on a child's motor, cognitive, linguistic, emotional, and social development (for example Hauser 1994; Duncan et al. 1994; Blau 1999; Bradley and Corwyn 2002, Taylor et al. 2004; Lima et al. 2004; Noble et al. 2005; dos Santos et al. 2008; Santos et al. 2008; Hackman and Farah 2008; Maggi et al. 2010). Family's material resources such as family purchasing power, family income, father's income, or the principal earner's income are considered to be the primary determinants of a family's socioeconomic status. Mother's educational attainment, mother's occupational status, family type (nuclear or extended), family size or density (number of persons per room), number of children in the family and parental cohabitation are among other critical factors taken into account in the literature to quantify the socioeconomic status of a family. Additionally, the family's physical environment in terms of household and neighborhood sanitary infrastructure (i.e. housing quality, water supply, sanitation, garbage disposal, sewage disposal, paving), is an essential indicator of a family's socioeconomic status (Lima et al. 2004; dos Santos et al. 2008; Santos et al. 2008). The general consensus in the early child development literature is that young children from low-socioeconomic backgrounds are relatively more at risk of not successfully developing the necessary skills to subsequently succeed at school compared to those from higher socioeconomic backgrounds (Burger 2010).

In a study exploring the effects of economic deprivation on child development, Duncan et al. (1994) find that family income is a more dominant factor in age-five IQ than other SES indicators such as maternal education, ethnicity and female headship.<sup>1</sup> Furthermore, they discover that the

---

<sup>1</sup> Taylor et al. (2004) corroborate these findings.

effects of persistent poverty are twice as large as the effects of transient poverty, suggesting that the effects of poverty are cumulative. However, the authors also warn that even if the family moves above the poverty line, but not far from it, the duration of poverty does not make much difference, since the family income has not risen high enough to make substantial changes, such as moving out of the neighborhood, accessing to high quality child care, or investing in a beneficial home-learning environment, which would produce measurable improvements in a child's development. Moreover, the income effects are more strongly correlated with the child's cognitive abilities and achievement-related outcomes than to emotional outcomes (Brooks-Gunn and Duncan 1997), and these effects are larger on measures of child cognitive development in early childhood (up to 36 months) than those for children over three years of age (Taylor et al. 2004). On the other hand, Blau (1999) establishes that the effect of current parental income on child's cognitive, social and emotional development is small, while the effect of permanent income is considerably larger; nevertheless, he finds that family background characteristics (such as mother's education and demographic structure of the household) play a more important role than income in determining child outcomes. In that context, Blau concludes that public provision of health and education services to young children may prove to be the most effective way to improve their cognitive, social and emotional development, rather than applying policies that affect family income which eventually will have little direct effect on child development, unless these policies result in large and permanent changes in income.

### *Home environment, parenting style and child's psychosocial stimulation*

Earlier studies on child development find a strong association between cognitive development and the quality of stimulation available in the child's home environment using a variety of environmental measures, a variety of cognitive outcome measures, and a variety of populations (for example Freeberg and Payne 1967; Honzik 1967; Elardo et al. 1975; Bradley and Caldwell 1976; Wachs 1978). In a more systematic fashion, Bradley and Caldwell (1980) investigate the extent to which environmental factors at six and 12 months of age predict future IQ, and how measures of environmental stimulation and measures of cognitive performance during infancy together relate to mental test scores at three years of age.<sup>2</sup> For the measures of home environment

---

<sup>2</sup> In an earlier study, Elardo et al. (1977) assess the impact of the HOME factors on the child's language development at age 3 and find that measures of environmental stimulation have a cumulative effect on language development;

and quality of stimulation, Bradley and Caldwell resort to the Home Observation for Measurement of the Environment (HOME) Inventory<sup>3</sup>, and for the cognitive performance of infants and toddlers, they use the Bayley Scales of Infant Development.<sup>4</sup> The results from this study show a substantial affirmative relationship between the home environment measures in the first year of life and IQ at age three. This result (among other notable studies) shows that children's early cognitive development is connected to various family environment factors such as the language stimulation available to the child, the responsiveness of parents, the emotional support provided by parents, the number of stimulation toys and objects available, the degree to which the home environment is organized and safe, and the variety of out-of-home experiences available to the child (Bradley and Caldwell 1984). Subsequent studies conducted with first grade children also find continued correlations between HOME scores and IQ and achievement, but interestingly, the variety of stimulation, particularly the availability of play materials at home exhibited the strongest correlation with first grade achievement (Bradley and Caldwell 1984).

Relatively more recent studies on child development often consider the interplay of the family's SES factors and the home environment. Bradley et al. (1989) demonstrate that the SES x HOME interaction effect is significant in mental test scores at age three, and the greatest gains in mental test scores came from children in middle-class families with high HOME scores, while low HOME scores were associated with decreasing mental test scores in all socioeconomic groups. Hoff (2003) on the other hand, explores the relationship between family's SES and child's vocabulary development via mother's involvement with the child. Hoff shows that two-year-old children from more advantaged homes have more advanced language skills than children of the same age from less advantaged homes, consistent with the notion that specific aspects of language development depend on specific features of language experience, and hence with the principle of environmental specificity. Furthermore, according to dos Santos et al. (2008), home environment is closely related to external environmental factors such as maternal education and family income. That is, socioeconomic factors indirectly affect children's cognitive development via the proximal environment, i.e. the availability of play materials and games and preschool

---

however the strength of the relationships among different home-environment variables and psycholinguistic abilities vary from one ability to another.

<sup>3</sup> Please see Appendix A for the Short Form Questionnaire regarding the HOME Inventory.

<sup>4</sup> The original study regarding the quantification of motor and mental abilities of children at 3 years old is by Nancy Bayley (Bayley 1936).

attendance. dos Santos et al. conclude that the lower the maternal education level and family income, the weaker the child's psychosocial stimulation, which negatively impacts the child's cognitive development. In a parallel study for Brazil, Santos et al. (2008) also determine that the negative effect of poor socioeconomic conditions on child's cognitive function at age five was mediated by poor psychosocial stimulation (as measured by the HOME score and preschool attendance) and lack of adequate sanitation conditions at home and in the neighborhood.

*The Economics of Human Capital Formation and Early Childhood Development*

Based on the genetic and environmental factors which may affect the early childhood development, Cunha and Heckman (2007) establish an overlapping generations model that focuses on the advantages of early investment in children. In the model, the authors assume that parents are altruistic, and therefore they are motivated to invest in their children. The technology of capability production when the child is  $t$  years old is given by the following function:

$$\theta_{t+1} = f_t(h, \theta_t, I_t) \tag{1}$$

In equation (1)  $I_t$  refers to the parental investments in child capabilities when the child is  $t$  years old where  $t \in \{1, 2, \dots, T\}$ . If the children in the household are very young (for instance, if the child is between 0-3 years old),  $I_t$  may be called as the *time investment* or the time spent taking care of the child. The variable  $h$  refers to the parental capabilities such as IQ, genes, education and income. Last, at each stage  $t$ ,  $\theta_t$  refers to the vector of capabilities. In addition, the model assumes that the capabilities function  $f_t$  is strictly increasing and strictly concave in investment  $I_t$  and twice continuously differentiable in all of its arguments.

If we rewrite Equation (1) by substituting for  $\theta_t, \theta_{t-1}$  recursively, then  $\theta_{t+1}$  can be written as a function of all past investments as follows:

$$\theta_{t+1} = m_t(h, \theta_1, I_1, I_2, \dots, I_t) \tag{2}$$

Hence, we can say that the child's production capability depends on the parental endowments, the technology of production capability at time 1 (it can be thought as the technology of production capability when the child is in utero, in relation to the child's IQ level) and all the past investments by his/her parents.

There are two major features of the model: Self-Productivity and Dynamic Complementarity. Self-Productivity implies that higher levels of capabilities in one period create higher levels of capabilities in the next period. Formally, it can be shown as  $\frac{\partial f_t(h, \theta_t, I_t)}{\partial \theta_t} > 0$ . Next, Dynamic Complementarity implies stocks of capabilities acquired in period  $t$  make the investment in period  $t+1$  more productive. Formally, it can be shown as  $\frac{\partial^2 f(h, \theta_t, I_t)}{\partial \theta_t \partial I_t} > 0$ . The joint effects of self-productivity and dynamic complementarity explain why the investment in disadvantaged young children (i.e. children with low  $h$ , or socioeconomic status) brings about high productivity, whereas the investment in disadvantaged adolescents brings about relatively lower returns.

In general, the model provides evidence for the importance of early childhood environments on adult productivity. Investment in the early years is important for the formation of adult cognitive skills. Stocks of skills facilitate the accumulation of human capital through self-regulation and choices.

Cunha et al. (2010) extend the previous model by including  $A$  years of adulthood in addition to  $T$  years of childhood.  $T$  years of childhood also include  $S$  years of development stages such that  $S \leq T$ . Unlike the previous model, the authors divide the vector of capabilities ( $\theta_t$ ) into two components: Cognitive and non-cognitive skills ( $\theta_C, \theta_N$ ). The authors believe that adult outcomes are affected from both cognitive and non-cognitive skills. They also include the vector of unobserved shocks and/or unobserved inputs that may affect the accumulation of both cognitive and non-cognitive skills into equation (2). The standard assumptions regarding the concavity and differentiability are same as the previous model.

Similar to the previous model, Cunha et al. suggest that it is better to invest early in children. Their model also implies that as rate of return gets greater, the optimal ratio of early to late investment will be smaller. In the limit, optimality requires that investment in two periods should be equal to each other if they strongly complement each other. Although the model stresses the importance of elasticity of substitution in determining the optimal investment levels, it is unrealistic to assume that elasticities of substitution are same across technologies and in the adult outcome.

Later on Conti and Heckman (2012) extend the original model in the sense that they define the individual's outcome  $k$  at age  $t$  ( $Y_t^k$ ) as a function of the individual's health capacity at time  $t$  ( $\theta_t^H$ ) and effort devoted to activity  $k$  ( $e_t^k$ ) as well as individual's cognitive and non-cognitive skills. In this model, the authors allow for the substitution of given skills with other factor to reach a certain level of outcome (for instance, earnings). For example, high levels of effort can compensate low levels of cognitive and non-cognitive skills. In that model, the authors also stress the importance of early childhood investment.

#### **4 The Turkish Experience in Early Childhood Education in Comparison to Developed Countries**

One of the key takeaways from the literature on early child development is that children from diverse socioeconomic backgrounds receive unequal social, linguistic and cognitive stimulation required for optimum development, and hence have unequal skill levels when they start school. For instance, DeGarmo et al. (1999) have established that each key SES indicator, such as income, parental education and occupation, was connected to better parenting such as involvement and investment in child's home skill-building activities, which in turn led to child's higher school achievement. Since children from low socioeconomic backgrounds develop fewer skills in their early years, their school readiness gap is greater compared to children from families with a higher socioeconomic status (Burger 2010). As children from disadvantaged socioeconomic backgrounds accumulate a lower amount of skills they need to be successful at school, they are more likely to repeat grades, develop special education needs, or drop out of school. In order to counteract the adverse effects of socioeconomic inequalities on young children, early education and care programs aim to ensure that all children, regardless of their social backgrounds, gain the prerequisites for a successful start at school (Siraj-Blatchford 2004). According to Burger (2010), with early intervention if children attain the prerequisites, it will be possible to compensate for the unfavorable learning environment they face in families that provide insufficient resources and opportunities for early learning and development.

When families cannot adequately provide for the resources or opportunities for their children to gain basic prerequisites to benefit from schooling, an economic case for the intervention of the

government in early childhood education can be made based upon equity (Currie 2001). Currie suggests that economic agents who start out with disadvantaged allocations (in terms of ability, environment, or opportunities) are highly likely to end up with unequal outcomes, and a government concerned with equity in the society would aim to compensate for the unequal outcomes, equalize initial endowments, or do both. However according to Currie, equalizing initial endowments through early childhood intervention programs or early child education and care may prove to be a preferable approach to overcome the equity problem since early intervention to equalize initial allocations may be a less costly way of enhancing equity than compensation of unequal outcomes at adulthood.<sup>5</sup> Additionally, Currie favors government involvement in early child education programs since the government is better equipped to cope up with the market failures in early child education, such as liquidity constraints, information failures, and externalities than private agents.

Notwithstanding the benefits of early childhood education in terms of formal school readiness and subsequent long-term gains, participation to early childhood education is quite low in Turkey compared to that in other OECD countries. Attendance to early childhood education and pre-primary schools is voluntary in Turkey. Children between 0-36 months of age may go to crèches or care centers and these institutions are under the supervision of the Ministry of Family and Social Policies. Children between 36-66 months of age may attend kindergartens, and those between 48-66 months of age may attend nursery classes (effective in 2012, compulsory schooling starts when the child turns 5.5 or 66 months of age, previously this age was six). Kindergartens and nursery classes are under the supervision of Ministry of National Education.

According to National Education Statistics-Formal Education by the Turkish Ministry of National Education (2015), in the 2015/16 academic year, the number of schools or institutions in the pre-primary education system in Turkey amounts to 27 793, and 83.2 percent of these schools are public. Out of the schools and institutions in the pre-primary education system, 6 788 are kindergartens, and 34.3 percent of these are public. Additionally, the total number of schools with nursery classes is 21 005 and 95 percent of these are public. Public nursery classes are embodied within public schools (primary, secondary or high school) and are designed to prepare

---

<sup>5</sup> It must be noted that in Turkey, in early 2000's, the share of public funds per capita appropriated to population aged 44 and over is about 2 ½ times greater than the share of public funds per capita appropriated to children ages 0-6 (Beşpınar and Aybars, 2013).

and acclimate children who are 48-66 months of age to formal school environment with kindergarten or pre-school education principles. Although the parents are exempt from paying enrollment fees at these public nursery classes, they are expected to bear the expenses of their children’s school supplies and in some cases nutrition, and also voluntarily contribute to pay for the common expenditures of these classes. Therefore, depending on the families’ socioeconomic status, monthly floor and ceiling fees for public nursery classes are determined by each province. There are also 1 385 crèches and care centers under the supervision of Ministry of Family and Social Policies, and there is only one crèche that was opened in an enterprise in accordance with the Labor Law. In total, 72 228 teachers are employed in pre-primary education, 75 percent of these teachers are employed in public institutions. Out of the total pre-primary schools and institutions in Turkey, 11.4 percent are located in Istanbul, 4.7 percent in Ankara, and 4.4 percent in Izmir, the three largest metropolitan areas where the incidence of working mothers is relatively higher than that in other regions in Turkey.

In this section, we also examine the early childhood development policies in selected OECD countries such as Denmark, Sweden, Switzerland and Norway, where enrollment in pre-primary education is almost 100 percent.<sup>6</sup> We include Finland to this group as well, where with considerable improvements in early childhood education in the last decade or so, pre-primary education participation rate has reached 81 percent. Table 1 below provides gross pre-primary school enrollment ratios for selected developed countries and Turkey for the period 2000-2013 and Table 2 demonstrates the early childhood education enrollment rates for three-year-old and four-year-old children for the years 2005 and 2013 for the countries in consideration.

**Table 1. Gross Pre-Primary School Enrollment Rates in Selected OECD Countries (%)**

<b>Country</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Denmark</b>	91	89	89	91	93	95	95	96	96	96	100	100	102	97
<b>Finland</b>	49	54	56	57	60	60	62	64	65	66	68	70	70	81
<b>Norway</b>	76	78	79	82	85	88	90	92	95	97	99	99	99	99
<b>Sweden</b>	74	74	75	82	91	94	94	98	97	95	95	95	95	95
<b>Switzerland</b>	92	92	93	94	95	98	100	100	100	102	99	100	99	-
<b>Turkey</b>	7	7	7	8	9	11	14	16	18	21	25	29	30	28

<sup>6</sup> For a comparative review of early child education and care policies in Europe, see Aysan and Özdoğru (2015).

<b>OECD average</b>	69	71	71	71	72	74	76	77	76	76	81	83	84	82
---------------------	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Source: World Bank, World Development Indicators.

**Table 2. Early Childhood Education Enrollment Rates in Selected OECD Countries (%)**

Country	<i>3-year-olds*</i>		<i>4-year-olds**</i>	
	2005	2013	2005	2013
<b>Denmark</b>	91	96	93	97
<b>Finland</b>	62	68	69	75
<b>Norway</b>	83	95	89	97
<b>Sweden</b>	84	93	89	94
<b>Switzerland</b>	9	3	39	41
<b>Turkey</b>	2	7	5	36
<b>OECD Average</b>	52	74	72	88

Source: OECD (2014; 2015)

\* in early childhood education

\*\* in early childhood and pre-primary education

Both tables above clearly show that Turkey has the lowest pre-primary school enrollment rates among the countries in examination. Even though currently the enrollment rates to pre-primary education are rather low in Turkey, nevertheless there is an increasing trend. Table 1 reveals that pre-primary school enrollment ratio was seven per cent, 18 per cent and 28 per cent in the years 1998, 2008 and 2013 respectively. This trend nonetheless shows a ten percentage point increase in enrollment rates during the last five years' time. Yet, this ratio is still very low compared to the OECD average which is 82 per cent in 2013. Furthermore, the share of three-year-old children who are enrolled in early childhood education was only two percent in 2005, and it has increased to seven percent in 2013<sup>7</sup>. These percentages are very low compared to the OECD average, which are 52 percent and 74 percent, respectively. The statistics reveal similar results for the enrollment ratios for four-year-old children. Although there is a significant increase between 2005 and 2013<sup>8</sup> (from five percent to 36 percent), these percentages are still meager compared to the OECD average (72 percent and 88 percent). Hence, we can conclude that early childhood and pre-

<sup>7</sup> According to statistics from the Ministry of National Education of Turkey, in the 2015/16 Academic year, the net schooling rates for three-year-olds is 11.7 percent.

<sup>8</sup> Based on statistics from Ministry of National Education of Turkey, in the 2015/16 Academic year, the net schooling rates for four-year-olds is 33.6 percent.

primary education is not considered to be a priority by the Turkish government, unlike in the other countries we examine. The expenditure data confirms our hypothesis: Turkey has the lowest share of public expenditures on pre-primary schooling in GDP (0.2 percent) along with Switzerland,<sup>9</sup> and she has the lowest share of public expenditures on pre-primary schooling in total public expenditures (0.4 percent). Table 3 provides the expenditure data for selected countries in 2011 and 2012.

**Table 3. Expenditures on Pre-Primary School in Selected OECD Countries by year 2011 and 2012**

<b>Country</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
<b>Denmark</b>	2.4	1.4 <sup>1</sup>	34
<b>Finland</b>	0.7	0.4 <sup>1</sup>	15
<b>Norway</b>	0.8	0.5 <sup>1</sup>	14
<b>Sweden</b>	1.4	0.7 <sup>1</sup>	17
<b>Switzerland</b>	0.6	0.2 <sup>1</sup>	10
<b>Turkey</b>	0.4	0.2	14
<b>OECD Average</b>	1.1	0.8 <sup>1</sup>	21

Source: OECD (2014; 2015)

<sup>1</sup>Year of reference is 2012.

Notes: Column (1) refers to public expenditures on pre-primary education as a percentage of public expenditures; column (2) refers to public expenditures on all early childhood education (early childhood educational development and pre-primary) as a percentage of GDP; column (3) refers to annual expenditure per student in pre-primary education (age 3 and older) relative to GDP per capita

The expenditure data shows that Denmark heavily invests in pre-primary education. The ratio of total pre-primary school expenditures per student to GDP per capita amounts to 34 percent in Denmark. Table 1 indicates that pre-primary school enrollment rate is almost 100 percent in 2012 and Table 2 demonstrates that early childhood education enrollment is well above the OECD average (90 percent for three-year-olds and 98 percent for four-year-olds). In Denmark, pre-primary education includes kindergartens and pre-school classes. The basic objective of pre-primary education is to familiarize young children with a school type environment before they start primary school. Apart from pre-primary education, day care facilities play an important role in early childhood development. Day-care facilities include crèches, family day care, nursery schools and age-integrated institutions. Danish government is expected to provide day care facility to all children from 26 weeks to school age (school starting age is six in Denmark). Applying to day-care facilities is voluntary. There are several ways to organize the day-care facilities, such as local authority child minding (child minders take care of children in private

<sup>9</sup> However here one must be cautious and point out that as of 2014, the share of young population (ages 0-14) in total population in Turkey was 26 percent, while in Switzerland, only 15 percent (World Bank Development Indicators).

homes), local-authority day care centers (crèches, nursery schools, age-integrated institutions), independent day care centers (owned by private individuals in agreement with the local authority, they receive subsidies from local authority), approved private day care centers (owned and operated privately and approved and subsidized by local authority), outsourced day care centers (operated by private suppliers), private child-minding (local authority subsidizes the private child minder). The local authority provides subsidy to the day-care facility; other costs are incurred by the parents. However, the amount paid by the parents is very low (at most 25 percent of the day care facility cost is paid by the parents, accordingly at least 75 percent gross operating costs is provided as subsidy by the local authority) (Ministry of Children, Education and Gender Equality of Denmark).

Sweden has the second highest expenditure ratios on pre-primary schooling following Denmark. Table 1 shows that pre-primary school enrollment rate is at 95 percent in Sweden in 2013. Table 2 indicates that enrollment in early childhood education programs is also relatively high in Sweden in comparison to the OECD average. In Sweden, municipalities are responsible for providing pre-school services to children who are between one and five years old. The municipalities provide subsidy to families for pre-school services. The amount of the subsidy depends on the child's age, the employment status of the parents and whether the parents are on parental leave for taking care of other children. Swedish pre-school system points out the importance of play in child's development. All children are guaranteed to attend to pre-school in the year when they turn to six (i.e. the year preceding the compulsory school starting age, seven). Pre-primary school is free of charge for the children who are six years old (European Commission 2014). Although attendance to primary schooling is voluntary, almost all the children in Sweden attend to pre-school (Government of Sweden).

Improvement in all levels of education, including pre-primary school education is one of the leading policies of the Finnish government. For instance, despite a five percentage point decrease in real GDP growth rate during the 2008-2009 global financial crisis, the Finnish government maintained considerable efforts to preserve adequate funds for education (OECD, 2013). 84 percent of individuals in Finland have at least upper secondary education degree, which is higher than the OECD average (75 percent). Therefore, we can state that Finland is one of the countries with the highest levels of education. Finland pays special attention to improvement in enrollment

in pre-primary school in recent decades, as well. There is also an increasing trend in the pre-primary school enrollment ratio in Finland. This ratio was 45 percent, 65 percent and 81 percent in years 1998, 2008 and 2013, respectively. Effective in August 2015, the Finnish government has enacted a law that renders pre-primary school education compulsory. Hence, it can be expected that pre-primary schooling enrollment ratios would reach 100 percent in the near future in Finland.

Finland devotes 15 percent of her GDP per capita to pre-primary school expenditures per student. The Finnish government pays particular attention to the development of the all levels of education, including the early childhood education, which is called as “Early Childhood Education and Care (ECEC)” in Finland’s education system. All children under primary school age have a right to participate in ECEC. The essential elements of ECEC are care, education and teaching. Therefore, ECEC is also described as “educare”. The fundamental feature of ECEC is “learning through play”. ECEC basically takes place in day-care centers and in family day-care. Other forms of ECEC include services provided by non-government organizations such as clubs run by the local churches or various forms of open early childhood education activities organized by the municipalities for children and their families. Families voluntarily decide whether the child will participate in ECEC or not, and may also choose publicly subsidized private ECEC facilities. Depending on family income and the number of children in the family, families are subject to a participation fee. However these fees in municipal ECEC cover only about 14 percent of the total costs. Effective August 2015, participation in pre-primary school in Finland became compulsory and free or charge and children are supposed to attend to pre-primary education one year before they start primary school (primary school starting age is seven in Finland), although almost all six-year-olds already enrolled in pre-primary education when it was voluntary. (Finnish National Board of Education).

Similar to Turkey, Norway spends 14 percent of her GDP per capita on pre-primary school expenditures per student. However, attendance to pre-primary school is much higher than in Turkey. In 2013, 99 percent of pre-primary school aged children were enrolled in schools. Enrollment in early childhood education is also considerably high in Norway (95 percent for three-year-olds and 97 percent for four-year-olds). In addition, the share of public expenditures devoted to pre-primary education is twice as high in Norway than in Turkey. The Norwegian

Government has all the responsibility for management and financing of the kindergartens, and quality development. In Norway, although attendance to kindergarten is voluntary for children who are under the compulsory schooling age (compulsory school starting age is six in Norway), almost all the children begin pre-primary school before they are five years old. OECD statistics reveal that 95 percent of three-year-old children attend early childhood education. This is a high ratio compared to OECD average of 74 percent. Similarly, 97 percent of four-year-old children attend early childhood education. This is again a considerably high ratio compared to the OECD average, which is 88 percent. In Norway, the county governments are supposed to supervise and guide the implementation of early childhood education policies by municipalities, While the kindergarten owners are expected to manage the kindergarten programs, parents together with the staff help shape the program contents and the curriculum. There are approximately 6 440 kindergartens (55 percent being private) in Norway. In Norway, kindergartens previously were under the supervision of the Ministry of Children and Family Affairs. Effective fall 2005, they were transferred to the Ministry of Education and Research in order to ensure the integration and continuity in the education. In addition to supervising and providing care, kindergartens provide substantial education to children. The main objective of the kindergartens is to provide a good and safe childhood and learning conditions for children. Kindergartens are expected to have high quality along with low prices (Norwegian Ministry of Education and Research).

The share of total expenditures per student in pre-primary schooling in GDP per capita is recorded as ten percent in Switzerland in 2011. Table 2 reveals that rate of attendance to early childhood education is also very low in Switzerland; it is only three percent for three-year-old children and 41 percent for four-year-old children. Although attendance to early childhood education at three- and four-year-olds is low, Table 1 reveals that gross pre-primary school enrollment rates are high in Switzerland (99 percent in 2012). In most cantons of Switzerland attendance to kindergarten is obligatory for two years; therefore almost all five year old children attend kindergartens. In some German-speaking cantons of Switzerland attendance to kindergarten is not obligatory or the obligation is just for one year. Nevertheless, the vast majority of children living in these cantons also attend to kindergartens for two years (the Swiss Conference of Cantonal Ministers of Education).

The countries that we examine, but Turkey, have all in common: The government plays an active role in the development, supervision and management of early childhood education programs. Unfortunately, in Turkey the policies regarding pre-primary school programs are relatively weak in comparison to those in developed countries. This is most probably due to the fact that in Turkey pre-primary schooling is considered as auxiliary to compulsory schooling rather than an integral part of an individual's education. In Turkey, apart from the public nursery classes, for the most part kindergartens are privately owned, and they are not adequately subsidized by the government as in the case of the developed countries. Therefore, especially the middle-income and low-income families do not prefer or have the means to send their children to pre-primary school or early childhood development activities due to their high cost.

## 5 Concluding Comments

Extensive evidence has demonstrated that countries which succeeded to raise their levels of human capital have been able to catch up with the relatively richer, developed countries, attain convergence in terms of their standards of living, and sustain long-term economic growth.<sup>10</sup> In addition to increasing the average years of schooling and advancing the quality of education, successful countries have acknowledged the significance of early childhood development as a precursor to enhancing their human capital formation. In that respect, in this paper we first determine the importance of early child development (ECD) and examine the factors that affect ECD. Then we investigate the current status of early childhood education in Turkey in comparison to selected developed economies, Norway, Sweden, Switzerland, Finland and Denmark.

Earlier research has emphasized the role of government in early childhood education on the grounds of equity among individuals: in order for all young children to be school-ready and start life at an equal footing, governments should provide equal opportunities for early childhood education where families are not able to provide. However, despite the recognized positive impact of early childhood education on the individual's well-being and the individual's subsequent positive contributions to social and economic development at adulthood, unlike in the

---

<sup>10</sup> A seminal article on the role of human capital accumulation in terms of convergence to relatively richer countries is by Mankiw et al. (1992).

developed countries, in Turkey the government has not undertaken a leading role in establishing significantly favorable policies regarding widespread early childhood education programs. We claim that in Turkey, existing policies are relatively weak in comparison to those in developed countries. In Turkey, for example 65.7 per cent of the kindergartens are privately owned, and they are not adequately subsidized by the government as in the case of most developed countries.<sup>11</sup> Therefore, sending their children to pre-primary school or early childhood education activities turns out to be very costly for low or middle income families. The government is expected to establish more public crèches, day-care facilities and kindergartens at low or no cost, or provide more subsidies to private institutions in order to decrease the tuition fees and increase the incidence of families sending their children to early childhood education institutions.

Even though the National Education Statistics reveal that 95 per cent of the nursery classes are public, we should underline the fact that public nursery classes are embodied within public schools (primary, secondary or high school) which do not necessarily have the age-appropriate infrastructure for early childhood education and care. Although the enrollment to nursery classes is free of charge, the parents are responsible for paying for their children's basic needs, such as school supplies and in most cases nutrition, and are required to pay a monthly fee (depending on their socioeconomic status). Therefore, sending their children to public nursery classes can still be very costly for low or middle income families. Additionally, these classes are held only for a few hours for half a day (either morning to noon or noon to afternoon), which, in turn, does not leave any opportunities for the mothers to work and be able to increase their standards of living. Hence, in order for the public nursery classes to be effective in rendering the children from all socioeconomic backgrounds school-ready, the government should aim to allocate more resources for these classes so that they are effectively free of charge to all families regardless of their socioeconomic status, increase their duration, and invest into the age-appropriate infrastructure in order to meet the needs of children. Still, we must stress that these classes are for children 48-66 months of age, hence does not include children 0-36 months of age, which is the crucial period of time when brain development is almost completed.

---

<sup>11</sup> In 2015, in order to encourage pre-school attendance, within the private school subsidization program, the Ministry of National Education included the children 48-66 months of age attending private kindergartens. About 20 000 children were expected to benefit from this subsidization in 2015/16 academic year, and the subsidy was 2 680 TL (about 1 000 USD) per child.

In conclusion, in order to increase the society's level of human capital and eventually catch up with and converge to the developed economies in terms of standards of living, Turkish policymakers are expected to recognize the significance of early childhood education and its short-term and long terms benefits to the individual and to the society in general. Since the current status of early childhood education is relatively backward in Turkey in comparison to developed economies, in order to catch up with them, Turkish policymakers need to make it a high priority to allocate resources to early childhood education programs at a degree higher than observed in developed economies.

## REFERENCES

Aysan, Mehmet F. and A. Asil Özdoğru. "Avrupa'da Erken Çocukluk Bakımı ve Eğitiminin Mukayeseli Analizi." *Sosyoloji Dergisi* 3 (2015): 167-194.

Balbernie, Robin. "Circuits and Circumstances: the Neurobiological Consequences of Early Relationship Experiences and how they shape later behaviour." *Journal of Child Psychotherapy* 27 (2001): 237-255.

Bayley, Nancy. "The Development of Motor Abilities during the First Three Years: A Study of Sixty-One Infants Tested Repeatedly." *Monographs of the Society for Research in Child Development* 1 (1936): 1-26.

Becker, Gary S. "Investment in Human Capital: A Theoretical Analysis." *Journal of Political Economy* 70 (1962): 9-49.

Ben-Porath, Yoram. "The Production of Human Capital and the Life Cycle of Earnings." *Journal of Political Economy* 75 (1967): 352-365.

Beşpınar, Fatma U. and A. İdil Aybars. *Erken Yaşlarda Çocuk Refahı ve Kadın İstihdamı Politika Belgesi*. Ankara: UNICEF, 2013.

Blau, David M. "The Effect of Income on Child Development." *The Review of Economics and Statistics* 81 (1999): 261-276.

Bradley, Robert H. and Bettye M. Caldwell. "The relation of infants' home environments to mental test performance at fifty-four months: a follow-up study." *Child Development* 47 (1976): 1172-1174.

Bradley, Robert H. and Bettye M. Caldwell. "The Relation of Home Environment, Cognitive Competence, and IQ among Males and Females." *Child Development* 51 (1980): 1140-1148.

Bradley, Robert H. and Bettye M. Caldwell. "The Relation of Infants' Home Environments to Achievement Test Performance in First Grade: A Follow-up Study." *Child Development* 55 (1984): 803-809.

Bradley, Robert H., Bettye M. Caldwell, Stephen L. Rock, Kathryn E. Barnard, Carol Gray, Mary A. Hammond, Sandra Mitchell, Linda Siegel, Craig T. Ramey, Allen W. Gottfried, and Dale L. Johnson. "Home Environment and Cognitive Development in the First 3 Years of Life: A Collaborative Study Involving Six Sites and Three Ethnic Groups in North America." *Developmental Psychology* 25 (1989): 217-235

Bradley, Robert H. and Robert F. Corwyn. "Socioeconomic Status and Child Development." *Annual Review of Psychology* 53 (2002): 371-399.

Brooks-Gunn, Jeanne and Greg J. Duncan. "The Effects of Poverty on Children." *The Future of Children* 7 (1997): 55-71.

Burger, Kaspar. "How does early childhood care and education affect cognitive development? An international review of the effects of early interventions for children from different social backgrounds." *Early Childhood Research Quarterly* 25 (2010): 140-165.

Carneiro, Pedro and James Heckman. *Human Capital Policy*. NBER Working Paper No. 9495, 2003.

Conti, Gabriella, and James J. Heckman. *The Economics of Child Well-Being*. IZA Discussion Paper No. 6930, 2012.

Cunha, Flavio, and James J. Heckman. "The Economics of Human Development: The Technology of Skill Formation." *The American Economic Review* 97 (2007): 31-47.

Cunha, Flavio, James J. Heckman, and Susanne M. Schennach. "Estimating the Technology of Cognitive and Noncognitive Skill Formation." *Econometrica* 78 (2010): 883-931.

Currie, Janet. "Early Childhood Education Programs." *Journal of Economic Perspectives* 15 (2001): 213-238.

DeGarmo, David S., Marion S. Forgatch, and Charles R. Martinez, Jr. "Parenting of Divorced Mothers as a Link between Social Status and Boys' Academic Outcomes: Unpacking the Effects of Socioeconomic Status." *Child Development* 70 (1999): 1231-1245.

Duncan, Greg J., Jeanne Brooks-Gunn and Pamela Kato Klebanov. "Economic Deprivation and Early Childhood Development." *Child Development* 65 (1994): 296-318.

Elardo, Richard, Robert H. Bradley and Bettye Caldwell. "The relation of infants' home environment to mental test performance from six to thirty-six months: a longitudinal analysis." *Child Development* 46 (1975): 71-76.

Elardo, Richard, Robert H. Bradley and Bettye Caldwell. "A Longitudinal Study of the Relation of Infants' Home Environments to Language Development at Age Three." *Child Development* 48 (1977): 595-603.

European Commission (EC) /EACEA/Eurydice/Eurostat. *Avrupa'da Erken Çocukluk Eğitimi ve Bakımına İlişkin Temel Veriler*. Report by Eurydice and Eurostat. Luxemburg: Publications Office of the European Union, 2014.

Finnish National Board of Education. "Early Childhood Education and Care." Accessed February 2016.

[http://www.oph.fi/english/education\\_system/early\\_childhood\\_education](http://www.oph.fi/english/education_system/early_childhood_education)

Freeberg, Norman E. and Donald T. Payne. "Parental influence on cognitive development in early childhood: a review." *Child Development* 38 (1967): 65-87.

Hackman, Daniel A. and Martha J. Farah. "Socioeconomic Status and the Developing Brain." *Trends in Cognitive Sciences* 13 (2008): 65-73.

Hauser, Robert M. "Measuring Socioeconomic Status in Studies of Child Development." *Child Development* 65 (1994): 1541-1545.

Heckman, James J. "The Economics, Technology, and the Neuroscience of Human Capability Formation." *Proceedings of the National Academy of Sciences (PNAS)* 104 (2007): 13250-13255.

Heckman, James J. and Dimitriy V. Masterov. "The Productivity Argument in Investing in Young Children." *Review of Agricultural Economics* 29 (2007): 446-493.

Hoff, Erika. "The Specificity of Environmental Influence: Socioeconomic Status Affects Early Vocabulary Development via Maternal Speech." *Child Development* 74 (2003): 1368-1378.

Honzik, Marjorie P. "Environmental correlates of mental growth: prediction from the family setting at twenty-one months." *Child Development* 38 (1967): 337-364.

Kağıtçıbaşı, Çiğdem, Diane Sunar, and Sevda Bekman. "Long-term effects of early intervention: Turkish low-income mothers and children." *Applied Developmental Psychology* 22 (2001): 333-361.

Kaytaz, Mehmet. *Türkiye'de Okulöncesi Eğitiminin Fayda-Maliyet Analizi*. İstanbul: AÇEV, 2005.

Knudsen, Eric I., James J. Heckman, Judy L. Cameron, and Jack P. Shonkoff. "Economic, Neurobiological, and Behavioral Perspectives on Building America's Future Workforce." *Proceedings of the National Academy of Sciences (PNAS)* 103 (2006): 10155-10162.

Lima, MC, SH Eickmann, ACV Lima, MQ Guerra, PIC Lira, SRA Huttly and A. Ashworth. "Determinants of Mental and Motor Development at 12 months in a Low Income Population: A Cohort Study in Northeast Brazil." *Acta Paediatr* 93 (2004): 969-975.

Maggi, Stefania, Lori J. Irwin, Arjumand Siddiqi and Clyde Hertzman. "The Social Determinants of Early Child Development: An Overview." *Journal of Paediatrics and Child Health* 46 (2010): 627-635.

Mankiw, N. Gregory, David Romer, and David N. Weil. "A Contribution to the Empirics of Economic Growth." *The Quarterly Journal of Economics*, 107 (1992): 407-437.

Ministry of Children, Education and Gender Equality of Denmark, "Education." Accessed February 2016.

<http://eng.uvm.dk/Education/>

The Ministry of Education of Turkey. “National Education Statistics: Formal Education (2015-16)”

National Longitudinal Surveys: A Program of the US BLS. “National Longitudinal Survey of Youth, Children and Young Adults, 1979.” Accessed April 2016.

<https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/codebook-supplement/appendix-home-sf-scales>

Newberger, Julee J. “New Brain Development Research – A Wonderful Window of Opportunity to Build Public Support for Early Childhood Education.” *Young Children* 52 (1997): 4-9.

Noble, Kimberly G., M. Frank Norman and Martha J. Farah. “Neurocognitive Correlates of Socioeconomic Status in Kindergarten Children.” *Developmental Science* 8 (2005): 74-87.

Norwegian Ministry of Education and Research. “Education-from Kindergarten to Adult Education.” Accessed February 2016.

[http://www.udir.no/Upload/Brosjyrer/5/Education\\_in\\_Norway.pdf?epslanguage=no](http://www.udir.no/Upload/Brosjyrer/5/Education_in_Norway.pdf?epslanguage=no)

OECD. *Education at a Glance 2013: OECD Indicators*. Paris: OECD Publishing, 2013.

<http://dx.doi.org/10.1787/eag-2013-en>

OECD. *Education at a Glance 2014: OECD Indicators*. Paris: OECD Publishing, 2014.

<http://dx.doi.org/10.1787/eag-2014-en>

OECD. *Education at a Glance 2015: OECD Indicators*. Paris: OECD Publishing, 2015.

<http://dx.doi.org/10.1787/eag-2015-en>

dos Santos, Leticia M., Darci N. dos Santos, Ana C.S. Bastos, Ana M.O. Assis, Matildes S. Prado and Mauricio L. Barreto. “Determinants of Early Cognitive Development: Hierarchical Analysis of a Longitudinal Study.” *Cad. Saude Publica, Rio de Janeiro* 24 (2008): 427-437.

Santos, Darci N., Ana M. O. Assis, Ana C. S. Bastos, Leticia M. Santos, Carlos A. ST Santos, Agostino Strina, Matildes S. Prado, Naomar M. Almeida-Filho, Laura C. Rodrigues and Mauricio L. Barreto. “Determinants of Early Cognitive Function in Childhood: A Cohort Study in a Middle Income Context.” *BioMed Central Public Health* 8 (2008). doi: 10.1186/1471-2458-8-202.

Shonkoff, Jack P., and Deborah A. Phillips, editors. *From Neurons to Neighborhoods: The Science of Early Child Development*. Washington D.C: National Academy Press, 2000.

Shonkoff, Jack P., and Pat Levitt. “Neuroscience and the Future of Early Childhood Policy: Moving from Why to What and How.” *Neuron* 67 (2010): 689-691.

Siraj-Blatchford, Iram. “Educational disadvantage in the early years: How do we overcome it? Some lessons from research.” *European Early Childhood Education Research Journal*, 12 (2004): 5-20.

Government of Sweden. “Education in Sweden.” Accessed February 2016.

<https://sweden.se/society/education-in-sweden/>

Taylor, Beck A., Eric Dearing and Kathleen McCartney. "Incomes and Outcomes in Early Childhood." *The Journal of Human Resources* 29 (2004): 980-1007.

Thompson, Ross A. "Development in the First Years of Life." *The Future of Children* 11 (2001): 20-33.

Wachs, Theodore D. "The relationship of infants' physical environment to their Binet performance at 2 1/2 years." *International Journal of Behavioral Development* 1 (1978): 51-65.

The Swiss Conference of Cantonal Ministers of Education. "The Swiss Education System." Accessed February 2016.

<http://www.edk.ch/dyn/16342.php>

The White House Council of Economic Advisers, *Report on the Economics of Early Childhood Investments*. Washington, D.C: Executive Office of the POTUS, 2015.

The World Bank. "World Bank Indicators". Accessed April 2016.

<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>

Yılmaz, Gökhan. "Turkish Middle Income Trap and Less Skilled Human Capital." *İktisat İşletme ve Finans* 30 (2015): 9-36.

Appendix A. NLSY79 Child HOME-SF (Short Form): Scale items by age and type of report

S = Mother Self-Report; O = Interviewer Observation

HOME-SF Item Description	Age Assessed	
	0-2 yrs	3-5 yrs
1. Child gets out of house 4 times a week or more	S	-
2. Child has 3 children's books (10 for ages 3-9 yrs; 20 for ages 10-14 yrs)	S	S
3. Mother reads to child 3 times a week or more	S	S
4. Child taken to grocery store (once/week or 2-3 times a month)	S	S
5. Child has one or more cuddly, soft or role-playing toys	S	-
6. Child has one or more push or pull toys	S	-
7. Mother believes parents should usually or always spend time teaching kids	S	-
8. Child eats meal with both mother and father(-figure) once a day or more	S	S
9. Mom often talks with child while working	S	-
10. Mom reports no more than 1 spank during past week	S	S
11. Mom spontaneously vocalize to/conversed with child at least twice	O	O
12. Mom responded verbally to child	O	-
13. Mom showed physical affection to child	O	O
14. Mom did not spank child	O	O
15. Mom did not interfere/restrict child more than 3 times	O	-
16. Mom provided appropriate toys/activities to child	O	-
17. Mom kept child in view	O	-
18. Play environment is safe (home or building for ages 36 mos +)	O	O
19. Family subscribes to at least one magazine	-	S
20. Child has use of record/CD player and at least 5 records/CDs/tapes	-	S
21. Child helped to learn numbers at home	-	S
22. Child helped to learn alphabet at home	-	S
23. Child helped to learn colors at home	-	S
24. Child helped to learn shapes and sizes at home	-	S
25. Child has some choice in foods for breakfast and lunch	-	S
26. TV is on in home less than 5 hours per day	-	S
27. Non-harsh discipline if child hits (or swears/speaks in anger ages 72mos+)	-	S
28. Child taken to museum in past year	-	S
.....		
48. Mom answered child's questions or requests verbally	-	O
49. Mom introduced interviewer to child by name	-	O
50. Mom's voice conveyed positive feeling about child	-	O
51. Home is not dark	-	O
52. Home is reasonably clean	-	O
53. Home is minimally cluttered	-	O

Source: <https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/codebook-supplement/appendix-home-sf-scales>