THE IMPACT OF MATERNAL EDUCATION ON EARLY CHILDHOOD DEVELOPMENT: THE CASE OF TURKEY

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Abstract

In this paper we investigate the relationship between mother's education level and the development of young children in Turkey using representative microdata from the 2018 Turkey Demographic and Health Survey (TDHS). The data include detailed information about the developmental status of young children of 36-to-59 months old. We find that only when the mother has at least a high school level education, there is a positive impact on the child's developmental status as summarized the Early Childhood Development (ECD) index, which is an index constructed based on the child's four developmental domains. We also show that the household's wealth is also positively associated with the child's developmental status, particularly in the socio-emotional and the learning readiness domains.

JEL Classification codes: C5, I00, O15

Keywords: Early Childhood Development, Mother's education, Socioeconomic status, Turkey

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1   Introduction

The topic of early childhood development (ECD) and investment in ECD has attracted much attention in recent years, especially in the context of developing economies. ECD is determined as one of the 2030 Sustainable Development Goals (SDG) of the United Nations. In Turkey, in top policy documents, especially in the 2019-2023 Eleventh Development Plan, the policy objectives, targets and strategies concerning ECD have been defined in various contexts. Although the significance of ECD is widely recognized in education, neuroscience, psychology and health areas, only in the last 10 to 15 years has it begun to be noticed in economics with respect to its contribution to human capital accumulation. In the economics literature, the positive effect of human capital accumulation on economic growth has been established in theoretical and empirical studies (Lucas Jr, 1988; Mincer, 1984). Until recently, human capital has been associated with indicators such as schooling rates and higher education participation rates in the economics literature (Mankiw et al., 1992). However, recent studies have shown that human capital accumulation in fact starts in early childhood, before schooling, and the fastest development of human capital is in this early period. The return on investments in the cognitive, social, emotional and physical development of the individual in early childhood is higher than that made in other periods (primary, secondary, tertiary or on-the-job training) (Heckman, 2008). In this sense, the importance a country attaches to ECD, the investments made by families in this period for their children, how much the government supports these investments, and the alternative policies that the government develops for these supports are likely to play an important role in determining the long-term economic growth of that country.

This paper investigates the relationship between mother's education level and the development of young children in Turkey using representative microdata from the 2018 Turkey Demographic and Health Survey (TDHS), which include detailed information about the developmental status of young children of 36-to-59 months old. The theoretical background of the analyses is based on Cunha and Heckman (2007), who conclude that children from households with higher socio-economic status are able to have better early childhood investments. The effect of mother's education level on early childhood development needs special attention as the previous literature suggests that mother's education level is the most important determinant of both the child's health

and education level. (See for instance, Blau (1999), Augustine et al. (2009), Chen and Li (2009), Buis (2013)).

In the empirical analysis, we create five dummy variables to indicate the four development domains and the overall ECD index that take the value of 1 if the child is on track in the corresponding domain and zero, otherwise. Linear probability model (LPM) results suggest that if the mother has high school or above degree, the child is more likely to be developmentally on track. In addition, we find that household's wealth index is positively associated with child's developmental status. When we examine the four development domains separately, we find that the relationship is higher for socio-emotional and learning readiness domains. We implement additional LPM models where the dependent variable shows the child's kindergarten attendance and number of development activities with mother respectively. The results show that both kindergarten attendance and the number of development activities mothers carry out with their children increase when the mother has high school or above degree.

The paper is organized as follows. Section 2 discusses the relevant literature. Section 3 presents the data and empirical methodology. Section 4 introduces the descriptive statistics. Section 5 includes the results from the empirical model. Section 6 concludes.

2   Relevant Literature

A substantial body of literature links better child outcomes to higher level of maternal education and higher family wealth which are the two main indicators of socio-economic status. Maternal education has a positive impact on child's language development (Dollaghan et al., 1999; Magnuson et al., 2009), cognitive development (Carneiro et al., 2013; Gennetian et al., 2008), health indicator (Streatfield et al., 1990; Thomas et al., 1991; Victoria et al., 1992) and behavior (Hughes and Ensor, 2009; Nagin and Tremblay, 2001). It has been shown that education provides mothers with a range of human, social and cultural capital which influences how they manage and motivate their children's education (Davis-Kean, 2005; Useem, 1992) and enables them to manage their children's school readiness by choosing high quality early childcare in terms of type, quality and quantity (Augustine et al., 2009).

Studies investigating the effects of maternal education on child outcomes are generally conducted with data from high-income countries. Streatfield et al. (1990) finds that as the education level of

the mother increases, she uses preventive healthcare services more effectively such as following the immunization schedule. Sacerdote (2007) concludes that mother's education has an impact not only on the child's education, but also on the child's health and adult income. Plug (2004), on the other hand, shows that association between child's and parent's schooling disappears after controlling assortative mating and inherited ability. Björklund et al. (2006) using Swedish data show that mother's education is more effective for pre-natal factors than the post-natal environment. Currie and Moretti (2003) isolate the causal effect of maternal education on birth outcomes and find that a higher level of maternal education improves infant health, as measured by birth weight and gestational age. These positive outcomes arise because increased education has the following effects on married mothers' behavior: Reduced smoking and proper prenatal care. Carneiro et al. (2013) suggest that mother's education reduces the incidence of behavioral problems and grade repetition and improves the child's performance in both math and reading at ages 7-8, but these effects are smaller at ages 12-14. They also find maternal education also increases the availability of learning materials at home. However, they find no effect of maternal education on child's obesity.

There are limited studies on low- and middle-income countries that show effect of maternal education on child outcomes. Chen and Li (2009) show the impact of maternal education on the health of young children in China. After controlling for income, number of siblings, health environments, and other socioeconomic variables, the effect of maternal education on adopted children's health is positive and similar to the effects on own birth, suggesting that education increases the quality of post-natal care, which is more important than genetic characteristics. In a study for the case of Pakistan, Andrabi et al. (2012) find that children of mothers with some education spend more time in educational activities and have higher test scores compared to children of uneducated mothers. Similarly, Cuartas (2022) uses data from the 2016 Uganda DHS to show that an additional year of maternal schooling positively affects parenting practices and child's development. Considering the limited evidence from low- and middle-income countries, the present study aims to contribute to the literature on the causal effect of maternal education on their young children's development.

In this study we also investigate the effect of household wealth on child's early development. Studies from high income countries as well as from low- and middle-income countries show positive association between higher wealth and better child outcomes. Fernald et al. (2011) shows

that children from households in the top wealth quintile or those with mothers who have at least secondary education perform better across most of the cognitive measures and language development, and have better linear growth compared to children from households in the lowest wealth quintile or those with uneducated mothers. Rubio-Codina et al. (2015) also find similar results using Colombian data moreover they find that the gap increases substantially with age. Paxson and Schady (2007) find that while both household wealth and parental education are associated with children's cognitive development, the effect of the wealth gradient is larger. A recent study using data from 135 Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) between 2010 and 2018 in 94 low- and middle-income countries investigates the inequalities in early childhood care and development (Lu et al., 2020). Findings from this study show that in most countries, children living in urban areas or in the wealthiest households significantly better on the four developmental indicators compared to children from rural areas or in the poorest households. Mothers in the highest wealth quintile are also more likely to use prenatal, postnatal and child health care services than those in the poorest quintile (Amin et al., 2010). Wamani et al. (2004) shows that children of uneducated mothers are more likely to be stunted than children of mothers with at least primary education in Uganda. Their results also indicate that lower household wealth index is associated with higher incidence of stunting and that boys are more affected than girls are. Hong and Mishra (2006) using Cambodia DHS finds that children from poorest wealth quintile are twice as likely from stunting than their peers from richest wealth quintile. However, their analysis shows that maternal education has nevertheless a small effect on childhood stunting. Assaad et al. (2012) using DHS data from Arab countries and Turkey show that parental education and wealth have an effect on child's health outcomes, but they find that place of residence has a key role in determining the health and nutritional status of a child. They conclude that this result prevails in countries with high inequality of opportunity.

3   Data and Empirical Methodology

The data for this study come from the 2018 round of the Turkish Demographic and Health Survey (TDHS) of Hacettepe University Institute of Population Studies, which is conducted regularly every 5 years. The TDHS is nationally representative and collects rich information on women aged 15-49 and their children to primarily assess their health and well-being. For the first time in 2018, the TDHS included a set of questions with an aim to assess the early childhood development of

36- to 59-month-old children. We utilize these questions in understanding the factors that determine early childhood development with a particular focus on the effect of mother's schooling. Our operational sample consist of 1,072 children who can be linked to their mothers.

Whether a child is developmentally on track or not is determined by the answers that mothers provide to a set of 10 questions related to their children's literacy and numeracy skills (3 questions), physical development (2 questions), learning readiness (2 questions) and socio-emotional development (3 questions). The 10-item questionnaire is adopted from the Early Childhood Development module of UNICEF's Multiple Cluster Surveys (MICS). The child is considered developmentally 'on track' if he/she is on track in at least three of the four development domains (Loizillon et al., 2017). In the literacy-numeracy domain, being developmentally on track would require that the child can at least accomplish two of the following: (1) identify/name at least 10 letters of the alphabet, (2) read at least four simple popular words, or (3) name/recognize the symbol of all numbers from 1 to 10. The physical development of the child is assessed based on (1) whether he/she can pick up small objects with two fingers and (2) whether he/she is sometimes too sick to play. A child is deemed to be on track if a positive response is given to the first question or a negative response to the second one. In the learning readiness domain, a positive outcome to at least one of the following situations is expected: (1) the child can follow simple directions and (2) when given a task the child can do it independently. Finally, in the socio-emotional domain, the child is assessed to be on track if at least two positive outcomes are reported on (1) whether the child gets along well with other children, (2) whether the child kicks/bites/hits other children or adults, and (3) whether the child gets distracted easily (Loizillon et al., 2017, p.20).

We construct five dummy variables to reflect the four development domains and the overall ECD index that take the value of 1 if the child is on track in the respective domain and zero, otherwise. These five dummy variables constitute our main dependent variables.

As additional outcome variables we consider kindergarten participation of children, which is also a dummy variable (1 for participation and 0 for non-participation) and the number of development activities mothers do with their children. The latter variable is based on six possible activities that mothers can carry out with their children that include reading books to them, telling them stories, singing songs with them, taking them outside, playing with them and naming, counting or drawing with their children. We sum these activities to create a dependent variable that takes a value

between 0 and 6, which implicitly assumes that they of the same importance in supporting children's development.

As independent variables we consider child's age in months and sex, mother's age and schooling, household size, the birth order of the child and number of his/her siblings, household wealth (five quantiles), and the region (NUTS1 level) and type of residence (rural vs. urban). Household wealth is constructed on the basis of household assets and housing amenities (TDHS, 2019).

We estimate the following regression using a linear probability model:

$$ECD_i = \delta + \beta_1 S_i + X'\beta_2 + u_i \qquad (1)$$

where, ECD is the early childhood development status of child i, S is his/her mother's years of schooling, X is a vector of independent variables that include the variables listed above and u is the random error term, which is clustered at the mother level to account for the fact that there might be siblings in the data. The coefficient of interest is β_1, which shows the improvement in the ECD index when the mother's years of schooling increases by one year. Using a continuous measure of schooling assumes a constant marginal effect to an extra year of schooling regardless of the schooling stage at which it occurs, which may not be necessarily true. In an alternative specification, we replace mother's years of schooling with dummy variables showing the different stages of education she has completed. We use the same model to analyze the kindergarten attendance of children and the number of activities mothers do with children. We use sampling weights throughout the analysis.

An important concern with (1) is that β_1 may not be measuring the causal effect of mother's schooling on child's development due to some unobserved omitted variable such as genetic factors that determine both the mother's schooling and child's development. We have conducted formal tests, whose results are given in the appendix[1], that shows that mother's schooling is not endogenous to child's early development, at least in the way that the ECD index is measured. Therefore, we proceed with (1) in analyzing the relationship between mother's schooling and child's development. In other words, this paper examines the linear association between maternal education and the child's development, rather than estimating the causal effect between the two.

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[1] See Table A1 in appendix.

4   Descriptive Statistics

Table 1 shows the descriptive statistics for the key variables of interest for children aged 36- to 59-months. Girls constitute 48.4% of the sample. The average child is 47.8 months old. Totally, 74% of children are found to be on track in terms of the overall ECD index. Girls fare slightly better than boys; 78% of girls are estimated to be developmentally on track as compared to 70% of boys. When the four components of ECD are investigated separately, children are generally found to be on track in the domains of physical development (98.6%) and learning readiness (96.3%). However, in the socio-emotional domain 73.6% of children and in the literacy-numeracy domain only 14.6% of children are assessed to be on track. When girls and boys are compared, the only statistically significant difference is observed in the socio-emotional domain, where 78.2% of girls are assessed to be on track as compared to 69.5% of boys. The gender difference in the socio-emotional domain might be the result of the greater social acceptability when boys misbehave as compared to girls and therefore, the greater tolerance parents show towards boys than girls.

Table 1. Descriptive Statistics

Variables	Whole Sample	Male Children	Female Children
ECD index (1/0)	0.74	0.70	0.78
Physical development (1/0)	0.986	0.989	0.982
Learning readiness (1/0)	0.963	0.960	0.966
Literacy-numeracy (1/0)	0.146	0.148	0.143
Emotional development (1/0)	0.736	0.695	0.782
Kindergarten attendance (1/0)	0.113	0.112	0.114
N. of development activities with mother	3.392	3.402	3.381
	(1.906)	(1.886)	(1.929)
Read books (1/0)	0.424	0.399	0.452
Tell stories (1/0)	0.408	0.407	0.410
Sing songs (1/0)	0.589	0.576	0.603
Take outside (1/0)	0.771	0.782	0.759
Play (1/0)	0.627	0.641	0.612
Name/count/draw (1/0)	0.572	0.598	0.544
Female	0.477		

Age in months	47.797	47.731	47.869
	(6.698)	(6.809)	(6.579)
Mother's years education	7.512	7.562	7.457
	(4.446)	(4.546)	(4.338)
Educational attainment of mother			
No education	0.156	0.163	0.149
Primary school	0.303	0.289	0.318
Secondary school	0.232	0.229	0.234
High school or higher	0.310	0.319	0.299
Mother's age	31.58	31.48	31.70
	(5.737)	(5.613)	(5.874)
Household wealth quantile			
Bottom 20%	0.233	0.227	0.240
2nd 20%	0.218	0.211	0.226
3rd 20%	0.203	0.198	0.209
4th 20%	0.179	0.198	0.159
Top 20%	0.166	0.166	0.166
Birth order	2.320	2.245	2.403
	(1.432)	(1.312)	(1.549)
Number of siblings	2.640	2.558	2.730
	(1.385)	(1.274)	(1.494)
Household size	5.240	5.281	5.194
	(1.980)	(2.004)	(1.954)
Rural residence	0.255	0.226	0.286
Number of obs.	1072	553	519

Notes: Includes 36-to-59-month children. Standard errors for continuous variables are given in parentheses. Sampling weights are used.
Source: 2018 TDHS. Authors' calculations.

Only 11.3% of children attend kindergarten. The limited availability of affordable early childhood education programs for children of this age group is likely to be an important impediment for their kindergarten participation. Another impediment is likely to be the socially held belief that maternal care at early ages is superior to that of organized care. Indeed, kindergartens are often looked upon as day care centers and therefore, not much is expected from them in terms of early childhood education delivery. It is telling that only a 26.9% of children who attend kindergarten are on track in the literacy-numeracy domain, though this figure is still higher than for children who do not attend kindergarten (13%).

The number of development activities children do with their mothers' averages around 3.4 activities out of a maximum of 6. The most common activity that mothers do with their children is to take them outside (77.1%). This is followed by playing with children (62.7%), singing with them (58.9%), drawing (57.2%), reading (42.4%) and telling stories (40.8%) to them. We do not observe a gap between male and female children neither in terms of kindergarten attendance not the activities they carry out with their mothers.

Mothers of children are on average 31.6 years of age and have 7.5 years of schooling. Totally - 15.6% have no education, 30.3% have primary schooling, 23.2% have lower secondary schooling and 31% have high school education or more. In terms of wealth quantiles, because we are looking at households with young children, households are not evenly divided among the five quantiles. A larger proportion of households are concentrated in lower wealth quantiles suggesting that they are relatively less well-off than households without children or those with older children. The average household size is 5.2 and children have, on average, 2.6 siblings.

5   Results

5.1 The effect of mother's education on the ECD index and its components

The results for the overall ECD index given in Table 2 suggest that mother's schooling has a small positive effect: one more year of schooling increases the probability that the child is developmentally on track by 0.9 percentage points. Note that 74% of children are on track, which suggests only about a 1% increase in the probability that children are on track for an additional year of mother's schooling.

Table 2: ECD Index

VARIABLES	Whole Sample		Male Children		Female Children	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Female child	0.076**	0.076**				
	(0.031)	(0.031)				
Mother's years of schooling	0.009*		0.011		0.009	
	(0.005)		(0.007)		(0.006)	
Mother's schooling attainment (ref. Less than primary)						
Primary school		0.037		0.125		-0.030
		(0.055)		(0.078)		(0.069)

11

Secondary school		0.084		0.164*		0.047
		(0.059)		(0.085)		(0.079)
High school or higher		0.107*		0.160*		0.083
		(0.064)		(0.092)		(0.080)
Mother's age	0.000	0.001	-0.004	-0.003	0.002	0.004
	(0.003)	(0.003)	(0.005)	(0.005)	(0.004)	(0.005)
Household wealth quantile (Ref. Bottom 20%)						
2nd 20%	0.079*	0.076	0.060	0.053	0.104	0.103
	(0.048)	(0.049)	(0.070)	(0.071)	(0.067)	(0.067)
3rd 20%	0.175***	0.170***	0.123	0.110	0.254***	0.253***
	(0.052)	(0.054)	(0.077)	(0.079)	(0.071)	(0.073)
4th 20%	0.172***	0.171***	0.101	0.094	0.248***	0.246***
	(0.061)	(0.062)	(0.091)	(0.092)	(0.076)	(0.078)
Top 20%	0.223***	0.228***	0.238**	0.260**	0.222**	0.214**
	(0.071)	(0.072)	(0.110)	(0.110)	(0.096)	(0.098)
Birth order	-0.026	-0.028	-0.044	-0.049	0.004	0.003
	(0.027)	(0.027)	(0.041)	(0.042)	(0.037)	(0.037)
Number of siblings	0.054*	0.055*	0.093**	0.099**	0.020	0.018
	(0.029)	(0.029)	(0.044)	(0.045)	(0.039)	(0.039)
Household size	-0.019*	-0.019*	-0.006	-0.007	-0.035**	-0.035**
	(0.011)	(0.011)	(0.014)	(0.014)	(0.017)	(0.017)
Rural residence	0.069*	0.068*	0.006	0.001	0.131**	0.133***
	(0.039)	(0.039)	(0.061)	(0.062)	(0.051)	(0.051)
Month-of-age dummies	YES	YES	YES	YES	YES	YES
Region of residence dummies	YES	YES	YES	YES	YES	YES
Mean of Dependent Variable	0.74	0.74	0.703	0.703	0.78	0.78
Observations	1,072	1,072	553	553	519	519
Adj. R Squared	0.063	0.061	0.036	0.036	0.091	0.091

Notes: Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Source: 2018 TDHS. Authors' calculations.

The results of Model 2, where we use dummy variables for the different schooling levels of mothers suggest that only high school education and above matters for children's development. Children whose mothers have completed high school or a higher level of schooling have 10.7 percentage points higher likelihood of being developmentally on track as compared to children whose mothers have less than primary schooling. Interestingly, the coefficients of dummy variables for mother's primary and secondary education levels are not statistically significant at conventional levels though they are positive. Note also that the coefficient associated with mother's secondary education is sizeable though it lacks statistically significance.

To see whether mothers' schooling has a differential effect on boy's and girl's development, we estimate equation (1) separately for boys and girls. The likelihood that boys are developmentally on track - as measured by the overall ECD index – increases with mother's schooling level; the likelihood of being on track improves by 12.5 percentage points when the mother has at least primary education, 16.4 percentage points when she has secondary education and 16 percentage points when she has high school education or more as compared to boys whose mothers have less than primary schooling. For girls, mother's schooling does not seem to affect the overall ECD index.

When the components of the ECD index are analyzed separately, mother's education is found to be important in two domains: literacy-numeracy and physical development. The results are given in Tables 3, 4, 5 and 6 only for specification 2, where mother's schooling is used as a series of dummies showing the different levels of schooling. In the domain of literacy-numeracy, children that have mothers with high school education or more are 9 percentage points more likely to be developmentally on track than children whose mothers have less than primary education. This effect size is quite substantial given that only 14.6% of children are found to be on track in this domain.

Table 3: Literacy-Numeracy

	All	Male Children	Female Children
VARIABLES			
Female Child	0.001		
	(0.026)		
Mother's schooling attainment (ref. Less than primary)			
Primary School	0.028	0.063	-0.035
	(0.032)	(0.045)	(0.054)
Secondary school	0.026	0.079	-0.028
	(0.040)	(0.060)	(0.064)
High school or higher	0.090*	0.142**	0.025
	(0.049)	(0.063)	(0.079)
Mother's age	-0.001	0.002	-0.002
	(0.003)	(0.004)	(0.004)
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	-0.002	-0.034	0.035
	(0.030)	(0.046)	(0.040)
3rd 20%	0.008	0.009	0.008
	(0.041)	(0.064)	(0.054)
4th 20%	-0.028	-0.062	0.014
	(0.049)	(0.066)	(0.071)

Top 20%	0.098	0.073	0.102
	(0.061)	(0.083)	(0.087)
Birth order	-0.011	-0.004	-0.007
	(0.020)	(0.028)	(0.032)
Number of siblings	0.000	-0.028	0.013
	(0.023)	(0.031)	(0.037)
Household size	-0.003	0.010	-0.018
	(0.008)	(0.010)	(0.012)
Rural residence	-0.014	-0.028	0.007
	(0.028)	(0.041)	(0.040)
Month-of-age dummies	YES	YES	YES
Region of residence dummies	YES	YES	YES
Mean of Dependent Variable	0.146	0.148	0.143
Observations	1,072	553	519
Adjusted R-squared	0.102	0.128	0.077

Notes: Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Source: 2018 TDHS. Authors' calculations.

In the physical development domain, children with mothers that have at least primary education have a higher likelihood of being on track than children with mothers that have less than primary schooling. Although the effect size is slightly larger when the mother has at least high school education (5.6 percentage points) than when she has just primary schooling (4.4 percentage points), the difference is not statistically significant. As noted earlier, children are generally on track in the physical development domain (98.6%) so that the estimated effect sizes in relative terms are rather small.

Table 4: Physical Development

	All	Male Children	Female Children
VARIABLES			
Female Child	-0.007		
	(0.010)		
Mother's schooling attainment (ref. Less than primary)			
Primary School	0.044*	0.036	0.047
	(0.023)	(0.029)	(0.032)
Secondary school	0.033	0.039	0.026
	(0.022)	(0.032)	(0.034)
High school or higher	0.056**	0.044	0.066**
	(0.022)	(0.029)	(0.030)
Mother's age	-0.000	0.000	-0.002
	(0.001)	(0.001)	(0.002)
Household wealth quantile (Ref. Bottom 20%)			

2nd 20%	0.024*	0.014	0.026
	(0.013)	(0.012)	(0.023)
3rd 20%	0.022	-0.015	0.054*
	(0.019)	(0.023)	(0.030)
4th 20%	0.023	0.004	0.042
	(0.015)	(0.012)	(0.030)
Top 20%	0.004	0.001	0.005
	(0.027)	(0.025)	(0.051)
Birth order	-0.003	-0.008	-0.000
	(0.009)	(0.009)	(0.016)
Number of siblings	0.004	0.008	0.004
	(0.007)	(0.007)	(0.013)
Household size	0.003**	0.003	0.004
	(0.002)	(0.002)	(0.004)
Rural residence	0.005	-0.016*	0.023
	(0.010)	(0.009)	(0.020)
Month-of-age dummies	YES	YES	YES
Region of residence dummies	YES	YES	YES
Mean of Dependent Variable	0.986	0.989	0.982
Observations	1,072	553	519
Adjusted R-squared	0.036	0.032	0.034

Notes: Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Source: 2018 TDHS. Authors' calculations.

In addition, mother's education is found to be effective in improving boys' outcomes in the literacy-numeracy domain and the learning readiness domain. For the former outcome, mother's education matters if she has at least high school education, whereas for the latter outcome, all education levels including primary schooling has a positive impact. In terms of effect sizes, boys whose mothers have at least high school education have a 14.2 percentage point higher likelihood of being on track in the literacy-numeracy domain as compared to boys whose mothers have less than primary schooling. This is a substantial effect given that only 14.8% of boys are assessed to be on track in this domain.

In the learning readiness domain, the effect sizes are on the order of 7-9.2 percentage points for boys; the effect sizes are not found to be statistically different for primary, secondary and higher education levels. Given that 96% of boys are developmentally on track in this domain, the improvement in this domain is at a maximum of 10%. For girls, the only ECD component that mother's schooling has a statistically significant effect is on girls' physical development. Girls whose mothers have high school or higher education are 6.6 percentage points more likely to be

developmentally on track as compared to girls whose mothers have less than primary schooling. However, given the high achievement of girls in this domain (98.2%), the relative effect of mother's education can be judged as small.

Table 5: Learning Readiness

	All	Male Children	Female Children
VARIABLES			
Female Child	0.003		
	(0.014)		
Mother's schooling attainment (ref. Less than primary)			
Primary School	0.030	0.070*	-0.014
	(0.030)	(0.040)	(0.039)
Secondary school	0.029	0.092**	-0.014
	(0.030)	(0.046)	(0.038)
High school or higher	0.035	0.077*	-0.001
	(0.029)	(0.042)	(0.032)
Mother's age	0.001	0.002	0.000
	(0.002)	(0.003)	(0.002)
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	0.064***	0.052*	0.072**
	(0.023)	(0.031)	(0.034)
3rd 20%	0.048	0.038	0.052
	(0.030)	(0.042)	(0.041)
4th 20%	0.082***	0.074**	0.092***
	(0.025)	(0.035)	(0.035)
Top 20%	0.085***	0.097***	0.082**
	(0.027)	(0.036)	(0.041)
Birth order	0.008	-0.005	0.022
	(0.014)	(0.020)	(0.022)
Number of siblings	0.000	0.016	-0.018
	(0.016)	(0.019)	(0.027)
Household size	-0.006	-0.005	-0.003
	(0.005)	(0.007)	(0.008)
Rural residence	0.033*	0.045	0.021
	(0.019)	(0.034)	(0.020)
Month-of-age dummies	YES	YES	YES
Region of residence dummies	YES	YES	YES
Mean of Dependent Variable	0.963	0.960	0.966
Observations	1,072	553	519
Adjusted R-squared	0.025	0.059	0.029

Notes: Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used.
Source: 2018 TDHS. Authors' calculations.

Table 6: Socio-Emotional Development

VARIABLES	All	Male Children	Female Children
Female Child	0.086***		
	(0.031)		
Mother's scooling attainment (ref. Less than primary)			
Primary School	0.008	0.028	0.029
	(0.055)	(0.078)	(0.075)
Secondary school	0.030	0.036	0.072
	(0.061)	(0.090)	(0.084)
High school or higher	0.047	0.028	0.118
	(0.066)	(0.096)	(0.086)
Mother's age	-0.002	-0.007	0.002
	(0.003)	(0.005)	(0.005)
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	0.059	0.033	0.089
	(0.049)	(0.072)	(0.069)
3rd 20%	0.178***	0.120	0.241***
	(0.054)	(0.084)	(0.073)
4th 20%	0.171***	0.102	0.225***
	(0.064)	(0.098)	(0.079)
Top 20%	0.209***	0.208*	0.194**
	(0.074)	(0.115)	(0.098)
Birth order	-0.025	-0.029	-0.018
	(0.027)	(0.040)	(0.035)
Number of siblings	0.043	0.072*	0.026
	(0.029)	(0.043)	(0.038)
Household size	-0.016	-0.011	-0.024
	(0.012)	(0.014)	(0.020)
Rural residence	0.063	0.010	0.104**
	(0.040)	(0.061)	(0.053)
Month-of-age dummies	YES	YES	YES
Region of residence dummies	YES	YES	YES
Mean of Dependent Variable	0.736	0.695	0.782
Observations	1,072	553	519
Adjusted R-squared	0.040	0.004	0.067

Notes: Includes 36- to 59-month children. Standard errors are given in parantheses.Sampling weights are used.
Source: 2018 TDHS. Authors' calculations.

5.2 The effect of mother's education on the kindergarten attendance

The results for the kindergarten attendance of children are in line with the findings on the ECD index. Table 7 presents the results. The kindergarten attendance of children increases when the

mother has at least high school education. The effect size is 9.8 percentage points for all children, 6.8 percentage points for boys and 12.6 percentage points for girls. These are significant effects given that, on average, only 11.3% of children (without a significant effect by sex) attend kindergarten.

Table 7: Kindergarten Attendance

	All	Male Children	Female Children
VARIABLES			
Female Child	0.006		
	(0.022)		
Mother's schooling attainment (ref. Less than primary)			
Primary School	-0.017	-0.018	-0.019
	(0.022)	(0.029)	(0.035)
Secondary school	0.035	-0.008	0.066
	(0.028)	(0.040)	(0.040)
High school or higher	0.098***	0.068*	0.126**
	(0.032)	(0.041)	(0.053)
Mother's age	0.007***	0.009**	0.005
	(0.003)	(0.004)	(0.003)
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	-0.013	0.016	-0.079**
	(0.022)	(0.027)	(0.040)
3rd 20%	-0.035	-0.036	-0.033
	(0.031)	(0.035)	(0.052)
4th 20%	-0.008	0.006	-0.033
	(0.036)	(0.043)	(0.059)
Top 20%	0.185***	0.232***	0.123
	(0.053)	(0.067)	(0.079)
Birth order	0.002	0.011	0.000
	(0.015)	(0.019)	(0.023)
Number of siblings	-0.024	-0.055**	-0.004
	(0.018)	(0.023)	(0.030)
Household size	-0.002	0.001	-0.005
	(0.008)	(0.007)	(0.015)
Rural residence	0.002	0.020	-0.022
	(0.026)	(0.038)	(0.033)
Month-of-age dummies	YES	YES	YES
Region of residence dummies	YES	YES	YES
Mean of Dependent Variable	0.113	0.112	0.114
Observations	1,072	553	519
Adjusted R-squared	0.191	0.230	0.186

Notes: Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Source: 2018 TDHS. Authors' calculations.

5.3 The effect of mother's education on the development activities of children

Table 8 shows that children whose mothers have secondary schooling experience 0.4 more development activities than children whose mothers have less than primary schooling. This effect increases to 0.9 activities for children whose mothers have high school or more education. When the same model is estimated for boys and girls separately, only children whose mothers have at least high school education are found to experience more development activities than children whose mothers have less than primary schooling. For boys, the effect size is on the order of 0.6 activities, while for girls it is 1.1 activities.

Table 8: Number of Development Activities with Mother

	All	Male Children	Female Children
VARIABLES			
Female Child	0.076		
	(0.113)		
Mother's schooling attainment (ref. Less than primary)			
Primary School	-0.129	-0.237	-0.156
	(0.206)	(0.289)	(0.263)
Secondary school	0.428*	0.324	0.378
	(0.228)	(0.324)	(0.287)
High school or higher	0.854***	0.594*	1.068***
	(0.241)	(0.328)	(0.322)
Mother's age	0.022*	0.016	0.022
	(0.013)	(0.018)	(0.017)
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	0.437**	0.434*	0.348
	(0.172)	(0.255)	(0.214)
3rd 20%	0.643***	0.292	1.070***
	(0.193)	(0.281)	(0.251)
4th 20%	1.098***	1.162***	0.980***
	(0.207)	(0.297)	(0.297)
Top 20%	1.287***	1.267***	1.312***
	(0.237)	(0.325)	(0.325)
Birth order	-0.008	-0.038	-0.031
	(0.098)	(0.146)	(0.126)
Number of siblings	-0.247**	-0.300*	-0.102
	(0.116)	(0.158)	(0.160)
Household size	-0.085*	-0.045	-0.169***
	(0.046)	(0.059)	(0.053)
Rural residence	0.124	-0.130	0.362**

	(0.145)	(0.214)	(0.182)
Month-of-age dummies	YES	YES	YES
Region of residence dummies	YES	YES	YES
Mean of Dependent Variable	3.392	3.402	3.381
Observations	1,072	553	519
Adjusted R-squared	0.316	0.306	0.375

Notes: Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Source: 2018 TDHS. Authors' calculations.

5.4 Other correlates of early childhood development

5.4.1 Wealth

Household's wealth is positively associated with the ECD index and its components. Higher values of wealth are found to increase the child's likelihood of being developmentally on track. Children who are in the top 20% of the wealth distribution have 22.8 percentage points higher likelihood of being developmentally on track as compared to children in the bottom 20%. Children in the third and fourth quantiles also fare better, having about 17 percentage points higher likelihood of being on track as compared to children in the bottom 20%. Looking at the components of the ECD index, it appears that household wealth matters primarily in improving children's outcomes in the socio-emotional and the learning readiness domains. In the socio-emotional domain, children who are in the top 60% of the wealth distribution are 17-21 percentage points more likely to be on track as compared to children in the bottom quantile. These effects are substantial both absolutely and relatively, considering that, on average, 73.6% of children are on track in this domain. In learning readiness, the wealth effect is much smaller. As compared to the children in the bottom quantile, children in upper quantiles are 5-9 percentage points more likely to be on track. The mean value for this development domain is 96.3%.

Looking at boys, the overall ECD index is significantly higher in the top quantile as compared to the bottom quantile by nearly 26 percentage points. The effect mainly comes from the socio-emotional development domain; boys who are in the top 20% of the wealth distribution are 20.8 percentage points more likely to be developmentally on track as compared to the boys in the bottom 20%. In the learning-readiness domain, being in the top 40% matters, but the effect sizes are smaller at 7-10 percentage points.

Higher household wealth also positively affects girls' development. Unlike for boys, girls' likelihood of being developmentally on track is higher not just in the top quantile but the effect extends to the third quantile so that girls who are in the top 60% of the wealth distribution are 21-25 percentage points more likely to be developmentally on track. Similar to the case of boys, the two development domains that wealth has an effect on are socio-emotional and learning-readiness. In the case of the former, girls have 19-24 percentage points higher likelihood of being on track when they come from the top 60% of the wealth distribution. In the case of learning-readiness, not being in the bottom 20% increases the likelihood of being developmentally on track by 7-9 percentage points.

Higher wealth also increases children's kindergarten attendance and the number of development activities they do with their mothers. Children from the top 20% of the wealth distribution have an 18.5 percentage points higher likelihood of attending kindergarten as compared to children from the bottom quantile. The wealth effect is larger for boys than girls; being at the top 20% increases the likelihood that boys attend kindergarten by 23.2 percentage points as compared to 12.3 percentage points for girls. (The effect for girls is marginally statistically insignificant.)

The number of development activities children do with their mothers increases in wealth; children in the 2nd 20% of the wealth distribution experience 0.4 activities more than those at the bottom 20%. This effect increases to 0.6 activities for children in the 3rd 20%, to 1.1 activities for those in the 4th 20% and to 1.3 activities for those in the top 20%. Boys that come from the top 40% enjoy more development activities than the others, while the pattern observed for girls is more similar to the general patterns noted above. When the development activities mothers do with their children are examined separately by sex, household wealth is found to matter for reading, storytelling, singing, naming/counting/drawing, and taking the child outside but not for playing (results not shown).

5.4.2 Household characteristics

Aside from mother's education and household wealth, the number of siblings is found to affect the overall ECD index positively for boys but not girls. Among the ECD components, the only development domain that sibship size has an effect on is socio-emotional development; the probability that boys are developmentally on track increases by 7.2 percentage points with each sibling. Birth order and household size are not generally found to affect the development outcomes

of boys and girls. Neither do we find the age of the child to systematically affect the ECD index or its components. Interestingly controlling for regions, we find rural residence, where statistically significant, to impact favorably on the development of children (i.e. physical development for boys, overall ECD index and socio-emotional development for girls).

The number of siblings of the child is found to negatively affect boy's kindergarten attendance and the number of development activities done with the mother. The effect size is on the order of 5.5 percentage points for each additional sibling for the former and 0.3 fewer activities for each sibling for the latter. Similar to the ECD outcomes, children's ages in months, birth order or household size are not significant determinants of kindergarten attendance or development activities experienced. In the case of girls, although sibship size and birth do not affect their likelihood of kindergarten attendance or the number of development activities they do with their mother, household size decreases the latter. Increase in household size may increase the household chores of the mother leaving less time to engage in development activities with their daughters.

6   Conclusion

In this paper we investigate the relationship between mother's education level and the development of young children in Turkey using representative microdata from the 2018 Turkey Demographic and Health Survey (TDHS). The data include information about the developmental status of young children of 36-to-59 months old. Child's developmental status is related to whether the child is on track with respect to (i) literacy and numeracy skills, (ii) physical development, (iii) learning readiness and (iv) socio-emotional development. An ECD index for each child is constructed using these four developmental domains. Additionally, we examine the kindergarten attendance of children and the number of development activities mothers carry out with their children.

Our results show that only when the mother has a high school level or more education, the child's early development significantly increases compared to children with mothers with less than primary school education (uneducated or has not completed primary education). Interestingly, the result does not apply for children with mothers with primary level or secondary level education.

What only makes a difference whether the child is developmentally on track or not is that the mother's education has to be at least at high school level, other education levels are not found to be statistically associated with mother's schooling level. Similarly, kindergarten attendance and the number of development activities mothers carry out with their children increase when the mother has at least high school education. These results have important implications about the sustainability of human capital accumulation: Only at least high school-educated mothers are able to improve the developmental status of young children, which is a precursor of improved human capital in a country.

We find household wealth to be positively associated with the ECD index and its components. Higher values of wealth are found to increase the child's likelihood of being developmentally on track, that he/she attends kindergarten and the number of activities that they do with their mother. That improvements in child development outcomes are observed at all wealth quantiles as compared to the bottom 20% suggest that child development is very responsive to household income.

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Appendix

Table A1. Results of Endogeneity Test Statistics (Null Hypothesis: Dependent variable and mother's years of schooling are exogenous)

Dependent Variable	Durbin(score) chi2(1)	Wu-Hausman F(1,1025)	Robust-regression F(1,1030)
ECD-index (total)	0.025 (p-value=0.874)	0.024 (p-value=0.876)	0.024 (p-value=0.877)
Literacy-Numeracy	0.224 (p-value = 0.636)	0.214 (p-value = 0.643)	0.204 (p-value = 0.651)
Physical Development	1.212 (p-value = 0.271)	1.160 (p-value = 0.281)	1.240 (p-value = 0.265)
Learning Readiness	0.675 (p-value = 0.411)	0.645 (p-value= 0.421)	0.704 (p-value = 0.401)
Socio-Emotional Development	1.019 (p-value = 0.312)	0.976 (p-value = 0.323)	0.942 (p-value = 0.331)

Source: 2018 TDHS. Authors' calculations.