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RESEARCH PAPER

Mother's education and early childhood educational care

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Abstract

We analyze the impact of extending mandatory education from five to eight years on mothers' involvement in early childhood educational activities, using data from the Turkish Time Use Survey. The compulsory education reform substantially increased the likelihood of mothers completing at least middle school (eight years of schooling). However, it had no significant effect on mothers' time spent on early childhood educational activities, such as reading, playing, and talking to children. Instead, the reform increased mothers' total time with children, particularly through housework and social activities involving children. These findings suggest that studies linking maternal education to greater time investment in childcare may suffer from omitted variable bias, as unobserved factors like maternal intelligence and values influence both educational attainment and childcare behaviors. Our findings are critical given that nearly half of pre-primary-age children globally are not enrolled in formal education and primarily remain in home settings.

Keywords: child care; maternal education; time use

JEL classification: D01; J13

1. Introduction

A vast empirical literature in sociology, psychology, and economics has documented that early childhood care and education have a crucial impact on educational and labor market outcomes of children both in the short and long terms (Barnett & Masse, 2007; Heckman, 2006; Heckman & Karapakula, 2019; Heckman et al., 2010; Reynolds et al., 2011). Although many studies document the lifelong benefits of early childhood education and care, according to a UNICEF report (2019), in 2017, about half of all pre-primary-age children in the world, which is more than 175 million,

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are not enrolled in pre-primary education and spend their time at home, making parental time spent on their care an important factor in early childhood education.[1]

Recent literature has shown that not only early childhood education and care but also parental child care are key inputs for the development of human capital. In particular, the literature has documented the importance of parental child care in the development of children's cognitive and non-cognitive skills (Attanasio et al., 2020; Cunha & Heckman, 2008; Cunha et al., 2010; Fiorini & Keane, 2014; Hernández-Alava & Popli, 2017). It is also well known that parents' education levels are associated with a higher parental time investment in children. Existing studies use ordinary least-squares (OLS) regressions and establish a positive correlation (Altintas, 2016; Bianchi et al., 2006; Craig et al., 2014; Gauthier et al., 2004; Guryan et al., 2008; Hill & Stafford, 1980; Leibowitz, 1977; Salehi-Isfahani & Taghvatalab, 2019; Sayer et al., 2004a, 2004b); however, unobservable individual factors (such as intelligence, ability, and emotional intelligence) and unobservable family factors (such as social norms, values, and preferences) might affect both mother's education and child care behavior.

We, therefore, contribute to the existing literature by investigating the impact of the extension of mandatory education from 5 to 8 years in Turkey on activities that are considered to be primary components of early childhood education and care, namely time spent in reading to children, playing with children, and talking to children. Research has shown that reading and talking to children and playing with children are important factors for the cognitive and non-cognitive development of children in early childhood period (Bergen, 2002; Fiorini & Keane, 2014; Ginsberg, 2006; Hsin & Felfe, 2014; Kalb & van Ours, 2014; Mol & Bus, 2011; Weisleder & Fernald, 2013; Yogman et al., 2018). Some studies also indicate that not all forms of parental involvement in child care are beneficial for children; dedicating time to educational activities such as reading, talking with children, and playing is comparatively more effective than time spent in other child care activities (Fiorini & Keane, 2014; Hsin & Felfe, 2014). Hence, our primary outcome variable appears to be well-chosen to measure early childhood care and education provided by mothers.

We examine the impact of the compulsory schooling reform on maternal education because mothers are the main child care providers due to social and cultural norms and financial constraints in many countries, including Turkey (Caner et al., 2016). In fact, among the Organization for Economic Cooperation and Development (OECD) countries, Turkey has the lowest enrollment rates in pre-primary education for children aged 0–2 and 3–5; less than 1% of children aged 0–2 and 40% of children aged 3–5 are enrolled in pre-primary education in Turkey, much lower than the OECD average of 36% and 87%, respectively (OECD, 2020). In this study, we analyze the intent-to-treat effect of the reform that increased mothers' education levels on time spent in child care. We choose not to instrument mother's education with the education expansion reform because the reform as an instrument does not satisfy exclusion restrictions as more educated women tend to marry more educated men, and the reform can affect potential outcomes through other channels (see, also, Akyol & Kirdar, 2022; Akyol & Mocan, 2023; Kirdar et al., 2018).

[1]In high-income countries, in 2018, 83% of children were enrolled, while the corresponding enrolment rate in pre-primary education in low-income countries was only 22% (UNICEF, 2019). UNICEF calculates the enrolment ratio of pre-primary education for 2018 by using the data from the UIS global database in most recent years, 2010–2017.

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In the 1997–1998 academic year, the compulsory schooling law, which extended mandatory education from 5 to 8 years of schooling, was enacted in Turkey. In particular, the reform allowed individuals born before 1986 to drop out of school after they completed 5 years of primary school, whereas those born after 1986 had to complete 5 years of primary school as well as 3 years of middle school. Turkish compulsory schooling reform was exogenous to parental decision making and mostly driven by political factors, which leads to an exogenous increase in educational attainments of individuals born after 1986, but not for those born before 1986.

Using the 2014–2015 Turkish Time Use Survey (TUS), a nationally representative survey, we examine whether mother's exposure to Turkish compulsory schooling reform has any effect on time spent in early childhood care. First, we examine the effects of the compulsory schooling reform on mothers' schooling outcomes. Next, we investigate whether the reform has any impact on mothers' time spent in early childhood care, particularly time spent in reading to children, playing with children, and talking to children. More precisely, we estimate the impact of the compulsory schooling reform on time spent in early childhood care for mothers who have at least one child in the early childhood period, i.e., aged 0–5.

We document that the compulsory education reform increases mothers' completion of at least middle school, consistent with the existing literature which examines the impact of maternal education on the different outcomes by utilizing the same Turkish education reform (Dincer et al., 2014; Dursun et al., 2017; Güneş, 2015, 2016; Özer et al., 2018; Usta, 2020), while it does not affect the completion of at least high school. Our main results show that the reform does not have any significant effect on mothers' time spent in early childhood educational care. However, the reform rises mothers' total time spent with children. Specifically, the reform increases mothers' allocation of time to some daily activities such as eating, house cleaning, socializing with family, and doing handworks accompanied by children. Thus, our findings indicate that the education reform has no impact on the *quality* time spent with children, as time spent in reading to children, playing with children, talking to children, as well as time spent in educational activities accompanied by children, does not change.[2] Therefore, the positive association between time spent in early childhood care and mother's education found in the literature, which is also confirmed in our OLS estimation, is likely to result from omitted variables, as intelligence and values affect both mother's education and time spent in early childhood educational care.

We further investigate the factors that may affect time spent in early childhood care. In particular, we consider whether the education reform that increased mothers' educational attainment affects labor market outcomes and preferences for child care. For example, educated mothers may be more attached to the labor market, which might result in spending less time with their children. However, they may also choose to outsource household chores, allowing them to allocate more of their time to child care activities. Additionally, the higher the level of a woman's educational attainment, the fewer children she is likely to bear (Amin & Behrman, 2014; Breierova & Duflo, 2004; Cygan-Rehm & Maeder, 2013; Kirdar et al., 2018; Leon,

[2]Following Price (2008), we consider quality time as time spent in all activities in which either the child aged was primary focus (*time spent in reading to children, playing with children, and talking to children*) or in which there is reasonable amount of interaction with children (*educational activities accompanied by children*).

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2004; McCrary & Royer, 2011); and fewer children per woman and delayed marriage and childbearing could mean more time spent per child. Also, education may affect parental attitudes as more educated mothers might be better informed on the benefits of early childhood education. Assortative mating can result in individuals selecting partners who possess a greater understanding of the significance of educational activities. Hence, by contemplating the potentiality that highly educated mothers may have spouses who dedicate more time to caring for their young children,[3] we also investigate the effects of educational reform on partners' allocation of time in reading, playing with children, talking to children, and engaging in educational activities with their children.

Analysis of the labor market channel shows that the education reform increases working mothers' weekly hours worked but has no impact on their probability of being employed and earning high wages. We argue that the labor market channel may not play a crucial role in explaining our main findings as the share of employed mothers in our sample is rather small to drive an accurate conclusion for the sample of all mothers.[4] Additionally, we do not observe any significant impact of the education reform on marriage and fertility behavior. Examining the assortative-mating channel also reveals that there is no statistically significant effect of mothers' reform status on partners' time spent on educational activities.

Our paper is most closely related to Usta (2020), which examines the impact of Turkish education reform on early non-monetary investments of mothers in their last children (aged 0–5), including time spent with children using the Turkish Demographic Health Survey (TDHS). Although Usta (2020) argues that the education reform increases mothers' time spent with their children at home and outside, the measure of time spent with children is an indicator variable that is equal to one if the mother states that she devotes time to her child, and zero otherwise as TDHS does not include any information on total time spent with children and the composition of that time.[5] Hence, with our detailed data on the time use of mothers, we investigate the effects of the education reform on maternal child care at the intensive margin in addition to mothers' probability of spending time with children.[6] Furthermore, we also investigate the impact of the education reform on fathers' time allocated to early childhood education and care.

[3]For instance, Pleck (1997) shows that fathers devote more time to teaching and playing activities, whereas mothers allocate more time to routine child care activities.

[4]Twenty-four percent of mothers in our sample are employed.

[5]TDHS asks mothers who primarily spend time with children at the house and the outside of house. For this question, the possible answers are mother, father, and other people (daughter, son, woman's mother, husband's mother, nobody). By using the data derived from the respondents' answer, Usta (2020) generates an outcome variable, spending time with child, that takes value 1 if the mothers' answer to this question is mother, and 0 otherwise.

[6]The explanation for different results between our study and Usta's may be found in how mothers may interpret the binary question on time spent in child care in TDHS. Mothers may consider time spent in any activities with their child (such as watching TV, eating with children going to a cinema or park) as maternal child care time; although they may not allocate time to play with children or read and talk to children in their daily routine. We support this argument by constructing alternative child care measures and show that the impact of the reform depends on how we define maternal child care. See, section 7, in which we revisit Usta (2020) with Turkish TUS, for the detailed explanation of alternative child care measures. In particular, in section 7, we try to replicate the analysis sample of Usta (2020), and examine the impact of the education reform on our outcome variables as well as alternative child care measures at the extensive margin.

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We test the validity of our results by conducting a placebo analysis, replicating our estimations in a range of alternative estimation windows, generating alternative outcome variables, estimating our main model with quadratic time trends, as well as estimating our main model under alternative sample specifications. We also construct different model specifications for further validation.

In the realm of policy implications, although the extension of 3 years at the secondary level may not have a direct impact on the high quality of time spent with children, the significant increase in overall time spent accompanied by children presents a window of opportunity for positive outcomes. Recognizing the challenges in altering the high-quality time aspect, policymakers may consider investigating targeted interventions. These could include subsidized child care initiatives for low-income families and additional measures designed to specifically enhance the quality of parent–child interactions. Such measures may encompass programs centered around parenting skills, communication enhancement, and fostering emotional bonds.

The rest of the paper is organized as follows: the next section provides the necessary background information about Turkish Compulsory Schooling Reform. Section 3 describes the data. In section 4, we explain the identification strategy. Section 5 reports the descriptive statistics and the results. Section 6 shows the robustness checks. Section 7 revisits Usta (2020) with Turkish TUS. In section 8, we conclude.

2. Background: Turkish compulsory schooling reform

In 1997, Turkey's parliament passed a law mandating that compulsory education be extended from 5 to 8 years. Prior to this, Turkish basic education consisted of 5 mandatory years of primary school followed by an optional 3 years of middle school. After finishing the compulsory 5-year primary education, students had a choice to pursue further studies in general, vocational, or religious middle schools or to drop out of school. The new legislation, however, requires students to complete an extra 3 years of middle school before they can receive their primary education diploma (Akar et al., 2022).

The Turkish Compulsory Schooling Reform, enacted suddenly in 1997, was largely influenced by political factors and independent of parental decision-making. And, the exposure to the compulsory schooling law was determined by the school starting age: those born before 1986 could leave school after completing 5 years of primary education, while those born after 1986 were required to complete 8 years, including 3 years of middle school. This resulted in an exogenous increase in schooling years for individuals born after 1986, but not for those born earlier. In Turkey, children are eligible to start primary school in the fall if they are 6 years old (72 months) by the end of that year. The age requirement of 72 months for starting primary school is somewhat flexible; children close to this age threshold may also commence their primary education. Consequently, a child born in 1986 might have finished primary education by 1997 and be exempt from the new compulsory education law. However, a child born in 1986 who was only in the fourth grade in 1997 when the law took effect would be subject to the new schooling requirements. Thus, for children born in 1986, the impact of the law is ambiguous (Akar et al., 2022; Akyol & Mocan, 2023; Cesur & Mocan, 2018; Dursun & Cesur, 2016; Cesur et al., 2018; Kırdar et al., 2018).

The Turkish compulsory schooling reform did not alter the quality or curriculum of basic education. While education is free in public schools, where the majority of

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students attend, parents still bear certain costs, including school uniforms, transportation, meals, and school supplies, when sending their children to these schools. Full compliance with the Turkish compulsory schooling reform has not been accomplished due to its lax enforcement, despite the fact that parents face monetary fines for their children's non-attendance at compulsory schools.

3. Data

In this paper, we utilize the Turkish TUS, a nationally representative survey, conducted among 11,044 households (9,073 included in the survey), during the period of August 1, 2014–July 31, 2015. This survey was part of Harmonized European Time Use Study and utilized EUROSTAT (2000a, 2000b) activity classifications and coding as its basis.

The TUS is composed of four questionnaires: Household Questionnaire, Individual Questionnaire, Diaries, and Work Schedule. In our analysis, we merge three data sets derived from Household Questionnaire, the Diaries, and the Individual Questionnaire of the TUS. Household questionnaire provides information about the children under the age of 10 in the household who receive informal or formal child care from others. In the diary part of the TUS, individuals are asked to write down all of their daily activities for 24 h at 10-min intervals. The diaries collect information about primary activities that the individuals attend on weekdays and at weekends. Specifically, Turkish TUS categorizes the primary activities as personal care, employment, educational activities, household and family care, voluntary work and meetings, social life and entertainment, sports and outdoor activities, hobbies and computing, mass media, travel, and unspecified time use. Regarding these primary activities, the diaries gathered data about how much time individuals allocate to these primary activities, when and where individuals did these primary activities, and whether individuals were alone or not while doing these primary activities, if not, with whom (wife/husband, mother/father, a child less than 10 years old, other household member or someone else outside the household) they did these primary activities.

We generate one key outcome variable to measure mothers' time spent in early childhood care: *Time spent in playing games with children, reading to and talking to children*. It is worth noting that Turkish TUS does not provide any information on time spent in playing games with children, and time spent in reading to children, and time spent in talking to children individually. We also construct an alternative outcome variable to produce comparable estimates to the literature on this subject: *Time spent in educational activities accompanied by children*. We generate the outcome variable, *educational activities accompanied by children*, by using "with whom" questions in diaries, as in Guryan et al. (2008). In particular, to construct the outcome variable, *accompanied by children*, we use the data derived from respondents' answers to the following question: While you were doing this activity, was there any household member younger than 10 years old with you? *Educational activities accompanied by children* includes going to the cinema, theatre, exhibition, library, art-related activities, and reading books. Following previous literature, we also generate five outcome variables[7]: (i) physical child care, (ii) supervisory child care, (iii) traveling with child,

[7]*Physical child care* is time spent on the basic needs of children, including breast-feeding, feeding, changing diapers, rocking a child to sleep, bathing, looking at a child while playing, and so on. *Traveling with child* includes activities such as driving a child to school, to a cinema, to a music course,

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(iv) other child care, and (v) total child care. We converted minutes per day reports for one weekday and one weekend day to minutes per week by multiplying respondents' time response for a weekday by five and time response for a weekend day by two and summing up reproduced time responses, as in Hofferth and Sandberg (2001), Aguiar and Hurst (2007), Guryan et al. (2008), and Hsin and Felfe (2014).

The Individual Questionnaire of the TUS consists of detailed data on demographics (age, gender, region of residence, country of birth) as well as labor market outcomes of individuals. In particular, the survey gathers data about individuals' employment status, earnings, hours worked, occupations, side jobs, and full-time/part-time employment. However, the survey does not contain any information about respondents' actual wages, but it asks respondents to select one of the wage groups among five wage categories in the Individual Questionnaire. To investigate the impact of schooling on individuals' earnings, we therefore generate an outcome variable, *High Wage*, which is equal to 1 if the respondent's wage group is higher than the average minimum wage in Turkey in 2014 and 2015, and 0 otherwise.[8] We also explore the effects of schooling on mothers' employment by constructing a binary variable, *employment*, which takes the value 1 if the respondent worked for at least 1 h with or without pay during the last week, or if the respondent has been temporarily not at work in the last week.

Individuals' years of birth are used to identify individuals' exposure to the compulsory schooling reform, in contrast to a number of papers that utilize the same Turkish reform and implement a sharp regression discontinuity design by using individuals' birth month (see, for instance, Gulesci et al., 2020; Usta, 2020). In particular, we identify the impact of the education reform by using individuals' years of birth for several reasons.[9] First of all, as the school starting age is not strictly enforced in Turkey, we exclude those born in 1986 from our main analysis as the exposure to the reform is uncertain for the 1986 birth cohort (see, Akar & Okten, 2021; Akyol & Mocan, 2023; Cesur & Mocan, 2018; Kırdar et al., 2016; Torun, 2018). Second, information regarding individuals' months of birth in Turkish data sets is incomplete and noisy as the parents may delay the birth registration to official documents (Akyol & Mocan, 2023). In addition, misreporting of birth month is a common issue in Turkey, as about one in five Turkish birth certificates reports January as the month of birth (Akyol & Mocan, 2023). Finally, misreporting of the month of birth may lead to failure of the exclusion restriction assumption of the instrumental variable (IV) method (see, Akyol & Kirdar, 2022; Akyol & Mocan, 2023).[10] We should also note that the Turkish TUS does not collect information on

and to a doctor. *Supervisory child care* is time spent in accompanying a child while doing any activities. *The other child care* consists of the activities other than activities in physical, school-related, supervisory, traveling with child, and playing games with children, reading to, and talking to children. *Total child care* includes physical, playing games with children, reading to, and talking to children, traveling with child, supervisory, and the other child care activities.

[8]In the Individual Questionnaire, there are five wage groups that represents the wage of the respondent: wage group 1: 0–1,080 Turkish Liras (TL), wage group 2: 1,081–1,550 TL, wage group 3: 1,551–2,170 TL, wage group 4: 2,171–3,180 TL, and wage group 5: 3,181 TL and higher. Minimum wages in 2014 and 2015 are 891.04 TL and 1,000.55 TL, respectively. Higher than minimum wage group consists of wage groups 2–5. Lower or equal to minimum wage group is the lowest wage group, i.e., wage group 1.

[9]See Akyol and Mocan (2023) for detailed explanation why we should not use individuals' month of birth to identify the impact of Turkish compulsory schooling reform.

[10]Akyol and Kirdar (2022) document that the reform increases the survey response quality of individuals. In addition, Akyol and Mocan (2023) find that those who have a middle school diploma

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individuals' month of birth. We, thus, generate a binary variable, *Reform*, which is equal to 1 if individuals were born after 1986 and 0 otherwise.

The TUS does not include information on individuals' years of schooling; however, it contains information about individuals' most recent degrees they obtained. The survey categorizes individuals' most recent degree they obtained into five groups: (i) no degree, (ii) primary school degree, (iii) middle school/vocational middle school degree, (iv) high school/vocational high school degree, and (v) university/above (master's/Ph.D.). Therefore, we use the data on education status to construct a binary variable, *middle school*, that is equal to 1 if the individual completes at least middle school (middle school graduate or high school graduate or university/above), i.e., at least 8 years of schooling, 0 otherwise. We further investigate whether the reform generates a spillover effect beyond the compulsory schooling level by generating a binary variable, *high school*, which is equal to 1 if individual completes at least high school (high school graduate or university graduate or above), and 0 otherwise.

We focus on married mothers with at least one child aged between 0 and 5 in order to avoid sample selection to the primary schooling and reduce heterogeneity between treatment and control groups. As an alternative sample, we focus on non-college-graduated mothers who constitute a more homogenous sample in terms of time constraint, as college-graduated mothers are more likely to be attentive to their children but also they may be more attached to the labor market and not spend much time with their children. In section 5, we also show that neither of our samples suffers from sample selection bias.

Our main sample consists of married mothers aged between 21 and 36 (born between 1979 and 1992) who have at least one child aged between 0 and 5. Married mothers aged 21–28 (*born between 1987 and 1993*) are assigned to the treatment group, while married mothers aged 29–36 (*born between 1979 and 1985*) are assigned to the control group.[11] We exclude the 1986 birth cohort from our main analysis sample. We choose the optimal bandwidth, 7 years, around the cutoff birth year by implementing the optimal bandwidth selection method (Calonico et al., 2017).[12] To check the robustness of our results, we also estimate our model by narrowing and widening the estimation window from 5 years (the cohort of 1991–1981) to 9 years (the cohort of 1977–1995).

4. Identification

We first examine the impact of the educational reform on maternal education by estimating the following model:

$$\begin{aligned} Middle\ school_i = \gamma_0 &+ \gamma_1 Reform_i + \gamma_2 Year_{tre_i} \\ &+ \gamma_3 Year_{cont_i} + \gamma_4 FE_i + \mu_i \end{aligned} \tag{1}$$

and those who have at least a high school diploma are more likely to report their month of birth in comparison to those with less than middle school education.

[11]We also conduct a power analysis to show that the sizes of our analysis samples are high enough to have an adequate power to detect the statistically significant effects if such an effect exists. In particular, the estimated power for the sample of all mothers (non-college-graduated mothers) at the optimal bandwidth is 0.91 (0.97), which is higher than the acceptable power level 0.80.

[12]We estimate the optimal bandwidth by using the Stata command *rdrobust* for the variable, at least middle school.

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Middle school is a binary variable equal to 1 if the individual completes *at least* middle school, i.e., *at least eight years* of schooling, 0 otherwise.[13] *Reform* is equal to 1 if the individual was born after 1986, so that exposed to the education reform, and 0 otherwise.

We include split linear time trends before and after the cutoff birth year in our model to address the potential differential time trends in our outcome variables (Akar et al., 2022; Cesur & Mocan, 2018; Dursun & Cesur, 2016; Fort et al., 2016; Kirdar et al., 2018). We do not observe any non-linearities for our analysis samples (the samples of all married mothers and non-college-graduated mothers, with at least one child aged 0–5) before and after the reform, which is illustrated in Figs 1–3. Therefore, we contend that utilizing linear time trends adequately captures the trends in our outcome variables. However, to mitigate the risk of mis-specifying the functional form of time trends, we also estimate our model using the quadratic time trends across the broader estimation windows. In equation (1), $Year_{tre}$ controls for the linear time trends in the treatment group, while $Year_{cont}$ controls these trends in the control group.[14] In equation (1), FE_i includes the survey-month and survey-year fixed effects.

Abadie et al. (2023) suggest that clustering should be treated as a research design issue and that the standard errors should be clustered if the treatment assignment mechanism is clustered. In our context, the treatment assignment mechanism is clustered at the birth cohort level. Therefore, we choose to cluster standard errors at the birth-cohort level as individuals in the same cohort may be exposed to correlated idiosyncratic shocks that our treatment assignment does not control for. To address the problem of having too few clusters, we also estimate the p-values using wild cluster bootstrap, as suggested by Cameron et al. (2008).

Estimating the impact of maternal education on time spent in early childhood education and care activities using the OLS techniques may produce a biased estimate as an individual's educational attainment is endogenous. As in the previous literature, the exposure to the reform may be used as an instrument for educational attainment to generate exogenous variation in the level of schooling but not in early childhood care outcomes.[15] However, in our case, the IV approach is not applicable because the exclusion restriction condition is more likely to be violated. In particular, an increase in schooling level may influence women's propensity to marry with higher educated men by changing their preferences for marriage. These arguments are also made by recent studies which investigate the impact of the education reform on marriage and fertility outcomes of women, women's exposure to intimate partner violence, and consanguineous marriage (see Akyol & Kirdar, 2022; Akyol & Mocan, 2023; Kirdar et al., 2018). We confirm this finding by documenting that for mothers, the reform increases the probability of marrying a spouse who has at least a middle

[13]We also use having at least high school degree (*High school*) as a dependent variable which is a binary variable.

[14]$Year_{tre} = Reform_i \times (Yob_i - 1986)$ and $Year_{cont} = (1 - Reform_i) \times (Yob_i - 1986)$, where Yob_i is the year of birth of individual i.

[15]The Turkish compulsory schooling reform is used as an instrument for education to investigate the effect of education on individual level outcomes such as labor market outcomes (Aydemir & Kirdar, 2017; Mocan, 2014; Torun, 2018), drop-out decisions (Caner et al., 2016), political behavior outcomes (Cesur & Mocan, 2018), health outcomes (Cesur et al., 2018), subjective well-being (Dursun & Cesur, 2016), voluntary work outcomes (Akar et al., 2022), and leisure-time behavior (Akar, 2023).

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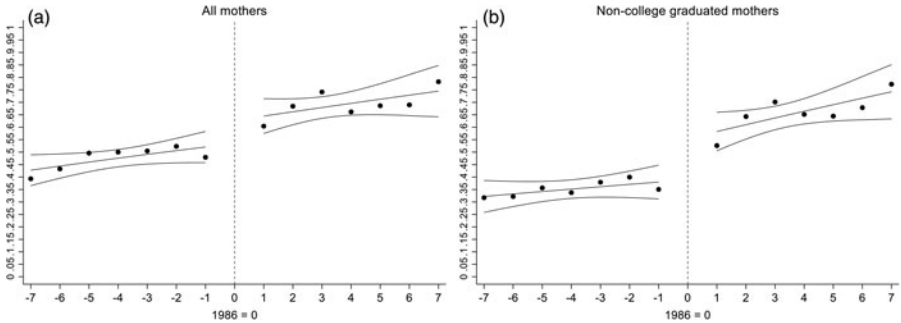

Figure 1. Proportion of mothers with at least middle school diploma in 2014–2015 by birth cohorts 1979 to 1993: (a) all mothers and (b) non-college-graduated mothers.

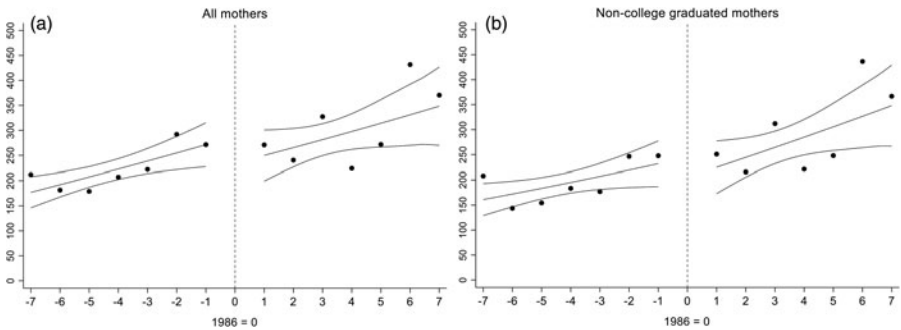

Figure 2. Average time spent in playing with children, reading and talking to children (in min per week) by birth cohorts 1979–1993: (a) all mothers and (b) non-college-graduated mothers.

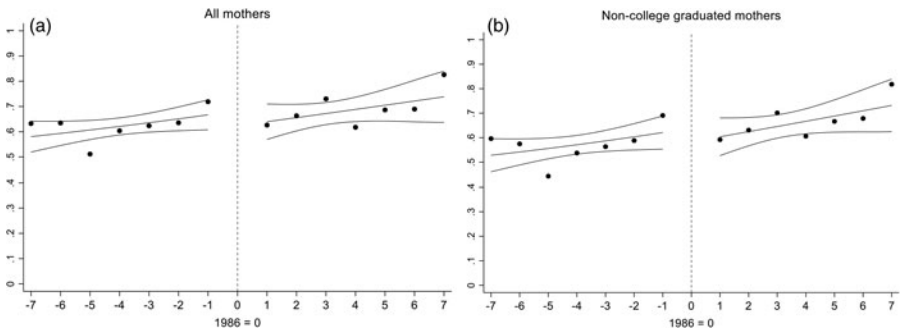

Figure 3. Average proportion of individuals playing with children, reading and talking to children by birth cohorts 1979–1993: (a) all mothers and (b) non-college-graduated mothers.

school diploma (see Table B.1 in the Appendix).[16] This result is consistent with the findings of Akyol and Kirdar (2022), which shows that Turkish compulsory

[16]Our results also report that the education reform has no impact on husbands' age, which is in line with Usta (2020) (see the last row of Table B.1 in the Appendix). We should also note that we do not find any impact of the education reform on the age gap between mothers and their husbands.

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schooling reform increases partners' middle school completion. We, therefore, estimate the reduced form effects of the compulsory schooling reform, which is equivalent to an "intent-to-treat" analysis by estimating the following regression equation using the OLS technique[17]:

$$CC_i = \delta_0 + \delta_1 Reform_i + \delta_2 Year_{tre_i} + \delta_3 Year_{cont_i} + \delta_4 FE_i + \delta_5 X_i + \varepsilon_i \quad (2)$$

where CC_i is the early childhood care outcome for individual i. Our key outcome variables are: time spent in reading to children, playing with children, and talking to children. We report these results as reduced form effects of the reform on time spent in early childhood care. In equation (2), FE_i represents a vector of dummy variables for survey-month fix effects, survey-year fixed effects, and the region of residence fixed effects (NUTS-1 level). These fixed effects aim to account for time and regional differences that may affect mothers' time allocation to children. We should also note that the education reform has no impact on mother's current region of residence (Table B.2 in the Appendix).[18] X_i is a vector of control variables, including the total number of children, the age of the first-born child, the age of the last-born child, and a dummy variable for mothers who have at least one child aged 0–2. These variables intend to capture the effects of the number of children and the age of the child on the allocation of mothers' time to early childhood care activities, as previous literature indicates that these variables are important factors that influence parents' time investment in children.[19] It is also important to note that we initially examine whether the education reform has any impact on these variables before incorporating them as control variables in our regression analysis. In the next section, we will delve into a detailed discussion of these results. In the estimation of equation (2), the standard errors are also clustered at the birth cohort level, and the p-values are estimated by using wild cluster bootstrap.

We also investigate whether the cohort effects confound our findings on the impact of maternal education on time spent in early childhood care activities. In particular, we widen and narrow the estimation windows as well as add the split quadratic time trends into regressions at wider bandwidth. Apart from this, we also carry out a placebo test by restricting the sample to those born between 1979 and 1985, who are in our control group and not exposed to the compulsory schooling reform, and examine the impact of the *placebo reform*, which takes the value 1 if individuals were born between 1983 and 1985, and takes the value 0 if individuals were born between 1979 and 1981, and the birth cohort 1982 is excluded. Details of the placebo test are provided in section 6.

[17]To account for too many zeros in time use survey data, we also run Tobit regressions for equation (2) and document that different model implementations do not change our main findings.

[18]To examine the impact of the education reform on the current region that mothers live, we divide Turkey into five regions: West, East, Center, North, and South, and generate a dummy variable for each of these regions, taking the value 1 if the woman is currently living in that region, and 0 otherwise. Columns (1)–(5) of Table B.2 in the Appendix show that the reform has no significant effect on the mother's region of residence.

[19]See, for instance, Zick and Bryant (1996), which shows that the age of the youngest child is the important determinant of mothers' time spent with children. In addition, Price (2008) also documents that the birth order matters for the parent–child quality time, as a first-born child receives more quality of time with parents than a second-born child.

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5. Results

5.1. Descriptive statistics

Table 1 presents the descriptive statistics for the sample of mothers and all women born between 1979 and 1993 by their exposure to the reform status. As reported in panel A, we observe that the average age of mothers in our analysis sample is around 30 years old. Around 55% of all mothers and 46% of non-college-graduated mothers have at least a middle school degree, with at least a high school completion rate of about 37% and 24%, respectively. On average, 16% of mothers also hold at least a university degree. Notably, the fraction of mothers with at least a university degree is higher in the control group (19%) than in the treatment group (11%), indicating that excluding college-graduated mothers from the analysis sample results in a more homogeneous sample in terms of mothers' time constraint. Panel B shows that nearly 24% of mothers (18% of non-college-graduated mothers) are either employed or temporarily not at work.

In panel C, the descriptive statistics for time spent in early childhood care show that, on average, mothers (non-college-graduated mothers) spend 245 (223) minutes per week engaging in activities such as playing with children, reading to their children, and talking to children. Panel D provides descriptive statistics for children's background characteristics and reports that for all mothers (non-college-graduated mothers), the average age of the first-born child is around 6.7 (7.29), whereas the average age of the last-born child is around 2.34 (2.39). On average, mothers (non-college-graduated mothers) have about 2.15 (2.30) children, while 1.3 children aged 0–5. Considering that mothers in the treatment group are younger than those in the control group, there may be differences in the total number of children and the ages of the first- and last-born children. In our analysis, we will account for the effects of maternal age differences on time spent in child care activities.

5.2. Preliminary checks: impact of reform on sample selection and fertility

Before we present our main results, we assess whether the reform has any effect on the sample selection, as we restrict our sample to married mothers with at least one child aged 0–5 and non-college-graduated mothers with at least one child aged 0–5. Panels A and B of Table 2 show the impact of the exposure to the education reform on the sample selection for all mothers and non-college-graduated mothers, respectively. In particular, we generate two dummy variables for each sample to test whether these samples suffer from the sample selection issue.[20] Then, we investigate the impact of education reform on these two dummy variables. Thus, Table 2 shows that neither of our analysis samples suffers from sample selection bias. We should also mention that our results are consistent with Güleşçi and Meyersson (2013), Kirdar et al. (2018), and Usta (2020), which examine the impact of the same Turkish education reform on marriage outcomes and fertility of women. In particular, Kirdar et al. (2018) indicate that Turkish compulsory schooling reform reduces the probability of marriage and first birth in the teenage years, and these effects vanish after age 18.[21]

[20]For the first sample, this variable takes a value of 1 if a woman is married and has at least one child aged 0–5; otherwise, it is 0. For the second sample, it takes a value of 1 if the woman is non-college graduate, married, and has at least one child aged 0–5; otherwise, it takes a value of 0.

[21]Using the data from TDHS, Güleşçi and Meyersson (2013) show that the compulsory schooling reform has no impact on the timing of either marriage or birth, nor on the number of children. On the other hand,

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Table 1. Descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All mothers			Non-college-graduated mothers			All women*		
Variables	All	Treatment	Control	All	Treatment	Control	All	Treatment	Control
Panel A: Background information									
Age	30.04	25.46	32.61	29.89	25.39	32.68	29.05	24.62	32.74
	(3.957)	(1.768)	(2.067)	(4.060)	(1.782)	(2.089)	(4.528)	(2.027)	(2.046)
Middle school	0.550	0.682	0.475	0.463	0.643	0.351	0.622	0.779	0.491
	(0.498)	(0.466)	(0.500)	(0.499)	(0.480)	(0.478)	(0.485)	(0.415)	(0.500)
High school	0.365	0.343	0.377	0.243	0.264	0.229	0.445	0.530	0.374
	(0.482)	(0.475)	(0.485)	(0.429)	(0.441)	(0.421)	(0.497)	(0.499)	(0.484)
College	0.161	0.108	0.192	–	–	–	0.223	0.267	0.187
	(0.368)	(0.310)	(0.394)	–	–	–	(0.416)	(0.442)	(0.390)
Panel B: Labor market outcomes									
Employment	0.239	0.175	0.275	0.175	0.141	0.197	0.350	0.333	0.364
	(0.427)	(0.380)	(0.447)	(0.380)	(0.348)	(0.398)	(0.477)	(0.471)	0.481
Weekly hours worked**	39.92	41.96	39.29	39.74	42.07	38.86	45.50	47.14	44.16
	(13.12)	(13.20)	(13.07)	(15.66)	(15.80)	(15.62)	(12.94)	(12.01)	(13.53)
High wage**	0.610	0.580	0.620	0.302	0.379	0.273	0.515	0.473	0.549
	(0.489)	(0.499)	(0.487)	(0.461)	(0.494)	(0.448)	(0.500)	(0.500)	(0.498)
Panel C: Early childhood care activities									
Time spent (*in min per week*)	245.2	284.3	223.2	223.3	269.5	194.6	130.1	120.7	138.0

(*Continued*)

Table 1. (*Continued.*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All mothers			Non-college-graduated mothers			All women*		
Variables	All	Treatment	Control	All	Treatment	Control	All	Treatment	Control
	(317.6)	(345.8)	(298.6)	(304.3)	(335.2)	(279.8)	(255.6)	(260.3)	(251.4)
Participation (*per week*)	0.641	0.675	0.622	0.602	0.651	0.571	0.373	0.316	0.420
	(0.480)	(0.469)	(0.485)	(0.490)	(0.477)	(0.495)	(0.484)	(0.465)	(0.494)
Panel D: Children's background information									
Number of total children	2.153	1.758	2.376	2.295	1.827	2.585	2.097	1.755	2.226
	(1.187)	(0.929)	(1.257)	(1.220)	(0.948)	(1.279)	(1.117)	(0.922)	(1.157)
Number of children aged 0–5	1.280	1.361	1.235	1.303	1.384	1.253	1.282	1.361	1.238
	(0.539)	(0.598)	(0.498)	(0.560)	(0.611)	(0.520)	(0.540)	(0.598)	(0.501)
Mothers with child aged 0–2	0.547	0.650	0.489	0.530	0.628	0.470	0.217	0.204	0.228
	(0.498)	(0.477)	(0.500)	(0.499)	(0.484)	(0.499)	(0.412)	(0.403)	(0.419)
Age of first-born child	6.713	4.137	8.163	7.287	4.455	9.045	8.229	4.491	9.643
	(4.435)	(2.858)	(4.508)	(4.409)	(2.813)	(4.306)	(4.796)	(3.027)	(4.578)
Age of last-born child	2.338	1.904	2.583	2.386	2	2.626	4.242	2.321	4.968
	(1.630)	(1.532)	(1.633)	(1.631)	(1.550)	(1.636)	(3.556)	(2.006)	(3.740)
Observations	1,239	446	793	1,039	398	641	3,128	1,424	1,704

Source: 2014–2015 Turkish Time Use Survey, TURKSTAT.
Notes: Table shows the mean, standard deviation, and the number of observations from 2014 to 2015 Turkish TUS data. The treatment group consists of those born between 1987 and 1993, and the control group consists of those born between 1980 and 1985. The 1986 cohort is excluded. *Middle School/High School/College* is a binary variable equal to 1 if the mother completes at least middle school/high school/college, respectively, and 0 otherwise. Standard deviations are in the parenthesis.
* All women, in the panel D, refer to the sample of all mothers with a child of any age.
** *Weekly Hours Worked* and *High Wage* are calculated for employed mothers.

Table 2. Impact of exposure to the education reform on sample selection

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Time trend	Linear time trend					Quadratic time trend	
Bandwidth (*years*)	5	6	7	8	9	8	9
Panel A: Being a mother with at least one child aged 0–5							
Reform	0.027	0.028	0.031	0.012	−0.016	0.003	0.045
	(0.048)	(0.045)	(0.038)	(0.035)	(0.033)	(0.056)	(0.062)
	[0.689]	[0.637]	[0.492]	[0.779]	[0.703]	[0.972]	[0.584]
Mean	0.437	0.411	0.396	0.374	0.356	0.374	0.356
Panel B: Being a non-college-graduated mother with at least one child aged 0–5							
Reform	0.040	0.057	0.075	0.060	0.037	0.008	0.058
	(0.052)	(0.047)	(0.044)	(0.040)	(0.035)	(0.056)	(0.063)
	[0.581]	[0.365]	[0.146]	[0.199]	[0.361]	[0.913]	[0.472]
Mean	0.361	0.341	0.332	0.314	0.300	0.314	0.300
No. of Obs.	2,213	2,674	3,128	3,583	4,021	3,583	4,021

Source: 2014–2015 Turkish Time Use Survey, TURKSTAT.
Notes: *Reform* is a binary variable equal to 1 if the individual was born after 1986, and 0 otherwise. The 1986 cohort is excluded. Dependent variable in panel A/B, *sample selected 1*(*2*), is a binary variable which takes the value 1 if a woman is married and has at least one child aged 0–5 (non-college-graduated, married, and has at least one child aged 0–5), and 0 otherwise, respectively. The control variables include split linear and quadratic time trends, the survey-month fixed effects, and the survey-year fixed effects. Standard errors are clustered at the birth cohort level, and *p*-values are estimated using wild-cluster bootstrap. The *p*-values related to bootstrapped standard errors are given in brackets.
***, **, * indicate significance at 1%, 5%, and 10%, respectively.

The findings of Kirdar et al. (2018) support our main findings in Table 2 as we focus on mothers aged between 21 and 36 in our analysis.

As we discussed in section 4, we include the number of children as well as the age of the children as control variables in our analysis as these variables are important determinants of mothers' time investment in children (see also Price, 2008; Zick & Bryant, 1996). Before adding them as a control variable in our regressions, we also check whether the education reform has any effect on these variables for our analysis samples. Table B.2 in the Appendix shows that the reform does not have any significant impact on the number of children (column (6)), the probability of being a mother with at least one child aged 0–2 (column (7)), the age of the first-born and the age of the last-born child (columns (8) and (9), respectively). These results are in line with Usta (2020).

5.3. Main results

5.3.1. Schooling outcomes

Table 3 reports the estimation results of equation (1) for all mothers, non-college-graduated mothers, and all women in panels A, B, and C, respectively. Columns (1)–(5) show the results of the model with the linear time trend at bandwidth from 5 to 9, and columns (6) and (7) present the results of the model with the quadratic time trend at bandwidths 8 and 9, respectively.

We first document that the educational reform significantly increases the educational attainment of mothers. In particular, depending on the estimation window, we find that the impact of the reform on at least a middle school completion rate ranges from 8.6 to 13.6 ppt for all mothers (11.6–17.9 ppt for non-college-graduated mothers), whereas the corresponding effects for all women range from 12.8 to 16.1 ppt.

A number of studies also investigate the impact of the compulsory education reform on post-compulsory schooling level, and show that the reform rises educational attainment beyond the compulsory level, especially high school attainment of women (Akyol & Mocan, 2023; Aydemir & Kirdar, 2017; Kırdar et al., 2016; Torun, 2018). We, therefore, examine the effects of the education reform on at least high school completion of all mothers, non-college-graduated mothers, and all women; and find that there is no significant impact of the reform on the probability of completing high school for all bandwidth (panel A/B/C of Table B.3 in the Appendix, respectively). As a result, we conclude that the education reform does not generate spillover effects beyond the compulsory schooling level.

5.3.2. Time spent on early childhood care

Table 4 reports the reduced form effects of the compulsory schooling reform on early childhood care outcomes at the intensive margin, namely time spent in reading to children, playing with children, talking to children for all mothers and non-college-graduated mothers in panels A and B, respectively. Results derived from

utilizing the same data and the same education reform, Dincer et al. (2014) and Güneş (2015) document that the reform reduces women's fertility and increases women's age at first marriage and age at first birth. Along the same line, Güneş (2016) reports that this reform reduces teenage fertility. More recently, Kirdar et al. (2018) show that the education reform has negative and robust effects on teenage marriage and fertility, but up to a certain age. However, consistent with Güleşçi and Meyersson (2013), Kirdar et al. (2018) also find that the effects of the reform vanish after a couple of years, when individuals has a right to leave school.

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Table 3. Impact of exposure to the education reform on at least middle school completion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Time trend	Linear time trend					Quadratic time trend	
Bandwidth (*years*)	5	6	7	8	9	8	9
Panel A: All mothers							
Reform	0.136***	0.125***	0.087*	0.092**	0.106**	0.107**	0.086**
	(0.030)	(0.035)	(0.041)	(0.042)	(0.047)	(0.038)	(0.033)
	[0.029]	[0.021]	[0.140]	[0.088]	[0.067]	[0.119]	[0.112]
Mean	0.571	0.561	0.550	0.540	0.531	0.540	0.531
No. of Obs.	966	1,099	1,239	1,341	1,431	1,341	1,431
Panel B: Non-college-graduated mothers							
Reform	0.170***	0.179***	0.159***	0.162***	0.179***	0.124**	0.116***
	(0.044)	(0.043)	(0.043)	(0.047)	(0.053)	(0.044)	(0.039)
	[0.034]	[0.007]	[0.009]	[0.009]	[0.003]	[0.093]	[0.065]
Mean	0.481	0.472	0.463	0.452	0.443	0.452	0.443
No. of Obs.	798	913	1,039	1,126	1,205	1,126	1,205
Panel C: All women							
Reform	0.161***	0.132***	0.128***	0.134***	0.130***	0.149***	0.148***
	(0.029)	(0.033)	(0.030)	(0.026)	(0.026)	(0.036)	(0.032)
	[0.042]	[0.061]	[0.029]	[0.012]	[0.006]	[0.094]	[0.071]
Mean	0.632	0.627	0.622	0.624	0.625	0.624	0.625
No. of Obs.	2,213	2,674	3,128	3,583	4,021	3,583	4,021

Source: 2014–2015 Turkish Time Use Survey, TURKSTAT.
Notes: *Reform* is a binary variable equal to 1 if the mother was born after 1986, and 0 otherwise. The 1986 cohort is excluded. The dependent variable, *Middle School*, is a binary variable equal to 1 if the mother completes *at least middle school*, and 0 otherwise. The control variables include split linear and quadratic time trends, survey-month fixed effects, and the survey-year fixed effects. Standard errors are clustered at the birth cohort level, and *p*-values are estimated using wild-cluster bootstrap. The *p*-values related to bootstrapped standard errors are given in brackets.
***, **, * indicate significance at 1%, 5%, and 10%, respectively.

Table 4. Impact of exposure to the education reform on time spent in early childhood care activities (in min per week)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Time trend	Linear time trend					Quadratic time trend	
Bandwidth (*years*)	5	6	7	8	9	8	9
Panel A: All mothers							
Reform	−26.575	−45.369	−44.088	−42.012*	−22.022	−27.707	−69.855*
	(21.402)	(31.087)	(26.564)	(23.816)	(24.685)	(29.568)	(36.344)
	[0.309]	[0.208]	[0.139]	[0.099]	[0.430]	[0.380]	[0.086]
Mean	247.5	246.1	245.2	241	238.9	241	238.9
No. of Obs.	966	1,099	1,239	1,341	1,431	1,341	1,431
Panel B: Non-college-graduated mothers							
Reform	−10.932	−40.431	−36.011	−34.814	−10.086	−15.206	−65.858
	(27.445)	(36.954)	(31.780)	(29.142)	(30.886)	(35.660)	(43.979)
	[0.696]	[0.381]	[0.345]	[0.308]	[0.780]	[0.692]	[0.160]
Mean	222.6	221.6	223.3	219.1	218	219.1	218
No. of Obs.	798	913	1,039	1,126	1,205	1,126	1,205

Source: 2014–2015 Turkish Time Use Survey, TURKSTAT.
Notes: *Reform* is a binary variable equal to 1 if the mother was born after 1986, and 0 otherwise. The 1986 cohort is excluded. The control variables include split linear and quadratic time trends, the survey-month fixed effects, the survey-year fixed effects, the region of residence fixed effects, total number of children, the age of the first-born child, and the age of last-born child, a dummy variable for mothers who have at least one child aged 0–2. Standard errors are clustered at the birth cohort level, and *p*-values are estimated using wild-cluster bootstrap. The *p*-values related to bootstrapped standard errors are given in brackets.
***, **, * indicate significance at 1%, 5%, and 10%, respectively.

our main analysis sample are shown in column (3) of Table 4. We also examine whether our results are due to the across the board age effect, we estimate our model by narrowing the estimation window to 6 years (the cohorts of 1992–1980) and 5 years (the cohorts of 1991–1981). Then, we widen the estimation window to 8 years (the cohorts of 1994–1978) and 9 years (the cohorts of 1995–1977). Considering the likelihood of mis-specifying the functional form of time trend, we also add split quadratic time trends around the cutoff into regressions for bandwidths 8 and 9. In all regressions reported in Table 4, we include the total number of children, the age of the first-born, the age of the last-born child, and a dummy variable indicating whether a mother has at least one child aged 0–2, as control variables.[22] We show in Table B.10.b in the Appendix that excluding these variables from our analysis does not change our findings, which will be discussed in detail in section 6. As a result, as seen in panels A and B of Table 4, we do not find any significant impact of the compulsory schooling reform on time spent in early childhood care for all mothers as well as non-college-graduated mothers, respectively. In particular, our reduced form estimates for the impact of the education reform are negative but insignificant for all estimation windows.[23] It is important to highlight that we observe a positive and significant association between maternal education and time allocated to early childhood care activities, a finding that aligns with prior correlational studies (Table B.4 in the Appendix).

To generate a more homogeneous sample in terms of mothers' time constraints, we also restrict the sample to stay-at-home mothers, i.e., non-working mothers, and investigate whether the education reform has any impact on early childhood care.[24] In order to ensure that this sample does not suffer from the sample selection problem, we show that the exposure to the compulsory schooling reform has no impact on the employment probability of mothers (Table B.5 in the Appendix).[25] We present the results for stay-at-home mothers in Table B.6 in the Appendix, which are consistent with our main findings.

Although we do not find any impact of the reform on the working hours of mothers by using the data from Individual Questionnaire, when we estimate the effects of the reform on mothers' working hours by utilizing the data from Diaries, we observe that the reform increases the working hours of employed mothers. Previous studies also show that the education reform increases women's earnings in Turkey, with no significant impact on female labor force participation (Aydemir & Kirdar, 2017; Mocan, 2014; Torun, 2018). Due to the limited data on earnings, we examine the impact of the reform on the likelihood of earning higher than minimum wage rather than the actual wage of mothers, and show that there is no significant impact of the

[22]We show in Table B.2 in the Appendix that the exposure to educational reform has no significant effect on these control variables.

[23]We should also note that for the sample of all mothers, we observe a negative significant impact of the reform on time spent in early childhood care activities for the specification with the linear time trend at bandwidth, 8 years, and the specification with the quadratic time trends at bandwidth, 9 years (columns (4) and (7) of panel A in Table B.4 in the Appendix). These results may be due to the high proportion of employed college-graduated mothers in the control group compared to the treatment group as the significant negative effects at the corresponding bandwidths are disappeared when we restrict the sample to non-college-graduated mothers.

[24]Female labor force participation rate is about 30% in Turkey (24% of mothers are employed in our sample, possibly due to our requirement that women have at least one child aged 0–5), working women is rather a select sample.

[25]This result is also in line with Dincer et al. (2014), Güneş (2015), and Usta (2020), which use data from TDHS to investigate the impact of education reform on mothers' employment.

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reform on this outcome variable (see Table B.5 in the Appendix). The relatively small proportion of employed women in our sample limits our ability to draw definitive conclusions. Consequently, our analysis indicates that the reform leads to an increase in the time employed mothers spend at work. This may contribute to a potential reduction in the time devoted to early childhood care activities.

As mentioned in the previous section, the reform increases mothers' probability of marrying a spouse with at least a middle school diploma. Considering the possibility that more educated husbands may spend more time with children, we estimate the effects of mother's exposure to the education reform on husband's time devoted to reading to children, playing with children, and talking to children as well as educational activities accompanied by children. Results in Table B.7.a in the Appendix report that the education reform has no impact on husband's early childhood care time.[26] Analyzing the impact of the reform on husband's labor market outcomes also shows that the education reform has no impact on the husband's probability of being employed/paid employed as well as working hours (Table B.7.b in the Appendix). For the sample of all mothers, we find a marginally significant positive impact of the reform on husband's probability of earning higher than minimum wages (Table B.7.b in the Appendix). Thus, we conclude that the labor market effects of the reform are not likely to explain our results.

Although our main analysis focuses on the effects of maternal education on time spent in reading to children, playing with children, and talking to children, we also examine the impact of the education reform on time spent in other child care measures such as time spent in physical, supervisory child care activities, and traveling with child, which may depend on a child's specific needs.[27] Table B.8 in the Appendix displays the impact of the exposure to reform on other child care measures. As shown in column (2) of Table B.8, the education reform leads to a rise in mother's time devoted to physical child care activities. However, we find no evidence of the reform effect on time spent in supervisory child care activities, traveling with children, and other child care activities (columns (3), (4), and (5) of Table B.8, respectively). Additionally, we show that the reform has no impact on the total time spent in child care activities (column (6) of Table B.8). Hence, the reform seems to have made mothers more responsive to their young children's physical needs, such as food, bath, sleep, and clothing. In the next section, we investigate the effects of the reform on time spent in activities with children.

5.4. Time spent in activities accompanied by children

In this section, we focus on time spent in activities accompanied by children. We have generated an alternative outcome variable, *time spent in educational activities accompanied by children*, including going to the cinema, theatre, exhibition, library, art-related activities, and reading books. We also examine whether the compulsory

[26]We should also note that at wider bandwidth, 9 years, for the sample of all mothers, the exposure to the education reform reduces husband's time allocation to early childhood care activities, but this result is not robust to the alternative estimation windows and formulation of time trends.

[27]Traveling with child can be endogenous, as it depends on the location where a child lives. Specifically, more educated mothers may have a house that is close to the city center, where most of the activities are more likely to be held. We also argue that mothers' allocation of time in physical child care do not necessarily help children to develop their cognitive skills. Hence, in some sense time spent in these activities is determined by both demand (from the child) and supply (from the mother) side factors.

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schooling reform affects time spent in other daily activities accompanied by children. Motivation for this analysis is three fold: first, since we find insignificant results for time spent in early childhood care, we would like to examine whether the extension of 3 years at the secondary school level was too little to have any effect on any type of time use.[28] Second, Usta (2020) finds that mothers exposed to the reform are more likely to state that they devote time to their children, which seems to contradict our results. However, if mothers perceive time spent on educational and other activities with children as time devoted to their children, this can reconcile the two seemingly different findings. Third, time spent accompanied by children can arguably have positive effects on children as mothers may interact with their children as they are doing their primary activities. These results are presented in Table 5.

Column (1) of Table 5 shows that the education reform has no impact on time spent in educational activities accompanied by children for all mothers and non-college-graduated mothers, which is in line with our main findings presented earlier. However, Table 5 also reports that there is a positive and significant impact of the reform on time spent in eating, house cleaning, socializing with family, and doing handworks *accompanied by children* (columns (2), (3), (4), and (5), respectively). In addition, we also show that the reform significantly increases the time mothers spend in all activities *accompanied by children* (column (6)).

An underlying mechanism explaining the positive impact of the education reform on mothers' time spent in such activities with children may be that as the reform has no significant impact on mothers' probability of being employed and earning higher wages, mothers may not outsource household care activities. As women are the main providers of household care in Turkey, mothers may do household care activities themselves and allocate a high proportion of their time to these activities. For this reason, although educated mothers are more aware of the benefits of early childhood activities to children's development, they may not increase their high-quality time with children due to the limited remaining time for child care. Still, they increase their low-quality time with children, including their children as a companion while primarily engaging in other household and family care activities. Arguably, it might be better for a child to be included as a companion in these activities, which might involve some interaction instead of being left alone with screens, devoid of social engagement. Our results are consistent with studies showing that parents' education positively correlates with low-quality time with children (Kalenkoski & Foster, 2008; Kalenkoski et al., 2005, 2007). In conclusion, extending compulsory schooling by 3 years at the secondary level may not be a highly effective intervention in altering mother's behavior regarding the high quality of time spent with their children. However, these policies seem to have a notable impact on increasing the overall time mothers dedicate to daily activities in the company of their children.

6. Robustness check

We examine the validity of our main results by implementing several robustness checks. First, to test whether the cohort effects drive our results, we conduct a placebo test by restricting the sample to those born between 1979 and 1985, who are in our control

[28]See, also, Akar and Okten (2021) who show that for females, increased education due to the change in the mandatory years of schooling in Turkey has a negative and significant causal impact on time spent in religious activities.

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Table 5. Impact of exposure to the education reform on time spent in activities accompanied by children (in min per week)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variables:	Educational activities	Eating	House cleaning	Socializing with family	Handwork	All activities
Panel A: All mothers						
Reform	−4.280	61.279*	26.576***	23.282***	13.133**	275.166*
	(3.868)	(28.496)	(7.476)	(6.328)	(4.909)	(150.945)
	[0.482]	[0.015]	[0.011]	[0.033]	[0.011]	[0.095]
Mean	5.964	343	18.89	23.91	4.964	2,116
No. of Obs.			1,239			
Panel B: Non-college-graduated mothers						
Reform	1.249	72.526**	28.971***	27.933***	14.830**	404.564**
	(3.209)	(33.180)	(7.571)	(5.766)	(6.252)	(181.275)
	[0.740]	[0.012]	[0.013]	[0.014]	[0.047]	[0.049]
Mean	4.524	353.3	19.03	24.38	5.775	2,071
No. of Obs.			1,039			

Source: 2014–2015 Turkish Time Use Survey, TURKSTAT.
Notes: *Reform* is a binary variable equal to 1 if the mother was born after 1986, and 0 otherwise. The 1986 cohort is excluded. The results presented in each column are derived from running regressions at the optimal bandwidth, 7 years before and after the cut off. The sample defined for the 7-year bandwidths includes married mothers born between 1979 and 1993. The 1986 cohort is excluded. The control variables include split linear time trends, the survey-month fixed effects, the survey-year fixed effects, the region of residence fixed effects, total number of children, the age of the first-born child, the age of last-born child, and a dummy variable for mothers who have at least one child aged 0–2. Standard errors are clustered at the birth cohort level, and *p*-values are estimated using wild-cluster bootstrap. The *p*-values related to bootstrapped standard errors are given in brackets.
***, **, * indicate significance at 1%, 5%, and 10%, respectively.

group and not exposed to the compulsory schooling reform, and examine the impact of the *placebo reform* which takes the value 1 if individuals were born between 1983 and 1985, and takes the value 0 if individuals were born between 1979 and 1981. The placebo cutoff birth year, 1982, is excluded from our analysis. As a result, as seen in panels A and B of Table B.9, we show that our results are due to the change in the compulsory years of schooling in 1997 in Turkey, as placebo reform has no impact on time spent in early child care activities for both all mothers and non-college-graduated mothers.

Second, we also test the sensitivity of our results to the alternative sample specifications. Table B.10.a in the Appendix shows the impact of the reform on time spent in early childhood care activities under different sample specifications. Specifically, as discussed in previous sections, the 1986 birth cohort is excluded from our main analysis due to the uncertainty of this cohort's exposure to compulsory schooling reform. As a robustness check, we include those born in 1986 in our analysis by considering that the 1986 birth cohort is affected by the reform, and then conduct our main analysis (column (1)). Furthermore, instead of excluding the 1986 birth cohort, we assign the exogenous variable, *Reform*, to the value of 0.50 (column (2)) and 0.33 for the birth cohort 1986 (column (3)). These specifications also confirm our main findings. Then, we explore whether including married mothers receiving child care from others in our sample leads to our main results. We, therefore, restrict our sample to those not receiving external child care and show that for this sample restriction, there is no significant impact of the exposure to the educational reform on time spent in early childhood care activities (see column (4)). We further investigate whether our results are influenced by mothers in our sample who have older children who can assist in child care activities. For this purpose, we limit our sample to those who have at least one child aged 0–5 but do not have a child older than the age of 10. Our main results are also valid under this sample specification (column (5)). Our sample includes mothers with children of younger ages as well as older ages, and maternal time spent heavily depends on children's age. We restrict our sample to mothers with at least one child aged 0–2 to show the fact that mothers with younger children spend more time in basic child care activities rather than educational activities does not drive our results. This sample specification also shows the robustness of our main findings (column (6)).

Third, we examine the robustness of our results by implementing alternative model specifications. Table B.10.b in the Appendix shows the results. In particular, we run our baseline model by including the split linear time trends and control variables such as the survey-month and survey-year fixed effects, the region of residence fixed, the total number of children, the ages of first- and last-born children, and a dummy variable indicating whether the mothers has at least one child aged 0–2. We will investigate whether our results are sensitive to the exclusion or inclusion of these covariates by constructing several alternative model specifications. Therefore, we first exclude all covariates (column (2) of Table B.10.b). Then, in column (3), we include the survey-month and survey-year fixed effects. We further conduct our analysis by including the region of residence fixed effects (column (3)). We also limit our analysis sample to ever-married mothers and estimate the impact of the education reform on early childhood care activities by employing the baseline model with the control variable for marital status (column (5)). As a result, we show that our main findings are insensitive to the alternative model specifications as we observe small deviations from the baseline estimates for the early childhood care activities. Finally,

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we estimate our baseline model by clustering the standard errors at the region of residence by the birth cohort level (column (6)) as well as using robust standard errors (column (7)); and show that our results are also robust to these modifications.

Finally, we examine the validity of our main results by generating alternative outcome variables. Table B.10.c in the Appendix presents the results. We first examine the effects of the education reform on early childhood care activities by generating an outcome variable, *activity participation*, which takes the value 1 if time spent in playing with children, reading and talking to children per week is greater than 0, and 0 otherwise. Panel A of Table B.10.c shows that our findings at the extensive margin also indicate that there is no evidence of reform effects on the probability of time spent in early childhood care. We also construct alternative outcome variables by taking logarithm/*z*-scores of time spent in playing with children, reading and talking to children. Investigating the impact of the reform on these outcome variables also documents that there is no significant impact of the reform on early childhood care activities (panel B/C of Table B.10.c). Thus, we conclude that our main findings are robust to the construction of alternative outcome variables.

7. Revisiting Usta (2020) with Turkish TUS

In this section, we revisit Usta (2020) with Turkish TUS to compare our results. Usta (2020) focuses on ever-married mothers who gave birth at most 5 years before the survey year by using TDHS, which collects the data for mothers' investment in their last child. Therefore, Usta (2020) shows the impact of the reform on mothers' likelihood of time allocation to the *last* child aged 0–5, unlike in our paper, in which we estimate the impact of the reform on time devoted to *all* children, at least one of them aged 0–5. To replicate her findings, we restrict our sample to ever-married mothers and non-college-graduated ever-married mothers, whose last child is aged between 0 and 5, and examine the reduced form effect of the reform on child care outcomes (Table B.11 in the Appendix). As in Usta (2020), we also limit the sample of mothers to those born in 1982–1991 as well as 1981–1992. However, in contrast to Usta (2020),[29] we do not find any evidence for the effect of the reform on the probability of time spent in our main outcome variable by using the data from Turkish TUS (column (1)). The reason might be that TDHS data do not have any information on activities carried out by mothers or the amount of time spent with children. In particular, the TDHS survey asks mothers who primarily spend time with children at home and out of home. And therefore, mothers may consider the time spent in any activities with their child (such as watching TV, eating with children, and going to a cinema or park) as maternal child care time. However, they may not allocate time to play with children, read, and talk to children in their daily routines. Our findings presented in Table B.11 in the Appendix also support our argument as we find evidence of the effect of the reform on the likelihood of time spent in different child care measures. More precisely, we generate six alternative child care measures to show that the impact of the reform depends on how we define maternal child care time. Table B.12 in the Appendix presents the

[29]The reduced form regression results of Usta (2020) document that the reform increases mothers' likelihood of time spent with children by 6.1–7.9 ppt, depending on bandwidth sizes.

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composition of these child care measures.[30] As seen in column (3), we first show that the reform increases the probability of time allocated to total child care activities (excluding time spent in our main outcome variables), i.e., child care measure 1. However, it has no impact on the probability of time spent in total child care activities including our main outcome variables (column (2)). When we include eating accompanied by children in total child care activities (excluding time spent in our main outcome variables), we observe that the education reform increases mothers' probability of time spent in child care measure 2 (column (4)). Then, including leisure activities accompanied by children such as listening to music, doing social activities, sports and outdoor activities, and computer-based activities with children as maternal child care time, we document that the education reform rises the likelihood of time spent in child care measure 3 by 4.1 (4.4) ppt for all mothers (non-college-graduated mothers) (column (5)). We further include watching TV/video/DVD accompanied by children in child care measure 3. Column (6) reports that the reform increases the likelihood of time spent in child care measure 4 by 2.4 (2.3) ppt. Finally, as reported in column (7) of Table B.11, including time spent in household care activities accompanied by children in time spent child care activities (measure 3) also leads to a 4.4 (4.7) ppt increase in the probability of time spent in child care measure 5 for all mothers (non-college-graduated mothers). Adding time spent in watching TV/video/DVD accompanied by children in child care measure 5 also does not change this result (column (8)). Note that although the reform increases time spent in all activities accompanied by children (column (6) of Table 5), we do not find any impact of the reform on the probability of time spent in all activities with children (column (9) of Table B.11).

Overall, we conclude that although we do not find any impact of the compulsory schooling reform on the probability of time spent in playing with children, talking, and reading to children (our main outcome variables), we provide evidence on the positive impact of the reform on the probability of time spent in alternative definitions of maternal child care. We conjecture that the nonspecific definition of child care in TDHS data used in Usta (2020) may explain differences in our results. In contrast, Turkish TUS provides detailed and activity-based data by asking mothers to report their daily time use at 10-min intervals for one weekday and one weekend. Therefore, we can provide detailed evidence on the effects of the reform on time spent on specific activities.

8. Conclusion

Although many studies document the lifelong benefits of early childhood education and care, about half of all pre-primary-age children in the world, which is more than 175

[30] *Child Care measure 1* excludes time spent in playing with children, and talking and reading to children from time spent in total child care activities. *Child Care measure 2* includes time spent in total child care (excludes time spent in playing with children, reading and talking to children) as well as eating accompanied by children. *Child Care Measure 3* includes time spent in child care measure 2 as well as leisure activities accompanied by children (listening to music, sports and outdoor activities, social activities, art and hobby, computer-based activities). *Child Care Measure 4* includes time spent in child care measure 3 as well as time spent in watching TV/video/DVD accompanied by children. *Child Care Measure 5* includes time spent in child care measure 3 as well as household care activities accompanied by children. *Child Care Measure 6* includes time spent in child care measure 5 as well as time spent in watching TV/video/DVD accompanied by children.

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million, are not enrolled in pre-primary education (UNICEF, 2019). Since mothers are generally primary caregivers of young children, it is reasonable to assume that these children spend most of their time at home with their mothers, making mothers' child care behavior an important policy question. Existing literature establishes a positive association between mothers' schooling and time investment in children (Guryan et al., 2008; Hill & Stafford, 1980; Price, 2008; Sayer et al., 2004a, 2004b) using the OLS method. However, omitted variables such as mother's intelligence, values, and social norms may affect both her education level and child care behavior.

In this paper, we investigate the impact of the extension of compulsory schooling in Turkey on mothers' time spent in reading to children, playing with children, and talking to children using the 2014–2015 Turkish TUS. We document that the compulsory education reform increased mothers' completion of at least a middle school (at least 8 years of schooling). However, when we examine the effect of the reform on mothers' time use, we find that the reform has no significant effect on time spent in reading to children, playing with children, and talking to children, despite the fact that the exposure to the educational reform leads to an increase in time spent in housework and social activities accompanied by children. Since our estimates for intent-to-treat effect of the reform are insignificant, we suggest that the results of OLS studies may be influenced by the omitted variable bias such as mother's ability and social norms affecting both maternal education and child care behavior. Furthermore, the 3 year extension at the secondary level might not be a highly effective intervention in altering mother's behavior regarding the high quality of time spent with their children. However, these policies seem to have a notable impact, on increasing the overall time that mothers dedicate to daily activities in the company of their children.

Our results have important policy implications, as many children, especially from low-income families, are not enrolled in pre-primary education and spend their time at home. Although the extension of compulsory schooling by 3 years at the secondary level may not have a direct impact on the high quality of time spent with children, the significant increase in the overall time spent accompanied by children presents a window of opportunity for positive outcomes. Recognizing the challenges in altering the high-quality time aspect, policymakers may consider investigating targeted interventions. These could include subsidized child care initiatives for low-income families and additional measures designed to specifically enhance the quality of parent–child interactions. Such measures may encompass programs centered around parenting skills, communication enhancement, and fostering emotional bonds.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/dem.2025.1.

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