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Identifying the Causal Effects of Parental Education on Adolescent Well-Being: Evidence from Turkey Using a Regression Discontinuity Design

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Identifying the Causal Effects of Parental Education on Adolescent Well-Being: Evidence from Turkey Using a Regression Discontinuity Design

Abstract

The existing literature on the causal relationship between parental education and child well-being is limited to infancy and early childhood and employs one-dimensional indicators of well-being. This study, departing from existing literature, focuses on adolescents, the 13-17 age group, and utilizes multidimensional well-being indicators, namely health, education, material deprivation, family conditions, and safety & risk. The 2022 Turkish Child Survey presents plentiful information about these dimensions. Additionally, the 1997 Turkish Compulsory Schooling Reform as a natural experiment setting allows the Regression Discontinuity Design to estimate the causal effects of parental education on both general well-being and on each of its dimension and their sub-components.

The findings show that adolescents of more educated parents have better access to supportive and secure environments and declining incidence of child labor. The evidence indicates a heterogenous parental effect in a way that maternal education is more influential on cultural and extracurricular engagement, child labor reduction, and disciplinary practices, while paternal education is on neighborhood quality, child health, and peer safety (non-bullying) dimensions. Differential findings present peculiar causal evidence of the generated intergenerational effects of parental education on different aspects of adolescent well-being.

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Introduction

Adolescents, the age group between 13 and 17, constitute more than one-fourth of the world's child population and represent the last critical stage of skill formation before adulthood (UN, 2022; Cunha and Heckman, 2007; World Bank, 2018). This age group is exposed to genuine risks compared to younger age groups. The adolescents are disproportionately concentrated in hazardous work, with a share of 57%, and 60% of children in this group cannot continue their education (ILO & UNICEF, 2025). More than 150 million adolescents face peer violence, and 1.3 billion school-aged children do not have internet access (UNICEF, 2018; UNICEF and ITU, 2020; Holly et al., 2023; UNESCO, 2024). Despite the prevalence of these risks, there is a gap in the literature on the causal determinants of multidimensional adolescent well-being.

Since adolescents, like other children, do not have both legal and economic independence, their well-being is mostly shaped by the parental decisions and resources (Davis-Kean, 2005; Steinmayr et al., 2010). However, empirical literature mostly consists of correlational methods and focuses on single aspects of child well-being, such as academic achievement, school attendance, and health (Useem, 1992; Ashbourne and Andres, 2015; Awada and Shelleby, 2021). As for the limited causal empirical studies, they have focused on narrow indicators of well-being, such as grade retention, school dropout, and vaccination (Oreopoulos et al., 2006; Currie, 2009). Compulsory schooling reforms feature in causal inferences as a widely used instrumental variable, and Turkey provides a particular example with the 1997 Compulsory Schooling Reform, which generated an exogenous variation in parental education. The limited studies on the intergenerational effects of the reform are confined to infant health and early childhood development (Dursun et al., 2022; Baltagi et al., 2019; Özer et al., 2018; Akgündüz et al., 2024). Consequently, the effect of parental education on adolescent well-being has not yet been examined within a causal identification framework and a multidimensional concept of well-being in any country-case study.

The main reason for the theoretical gap was the limited data that represent the multidimensional child well-being on a national scale. In 2022, Turkish Statistical Institute (TURKSTAT), in collaboration with UNICEF, provided a child survey that exceeded data constraints by then. The 2022 Turkish Child Survey consists of parent-reported data in various domains such as health, education, cultural and social participation and security. Additionally, the survey presents detailed information about parents, which provides the opportunity for an investigation into the gendered intergenerational causal effects of parental education on adolescent well-being in a multidimensional context. The detailed information about the various aspects of child well-being and about parents in the survey facilitate both aggregated and disaggregated analyses. In the aggregated analysis, a composite well-being index and in the disaggregated one each well-being domain and their dimensions are employed as a dependent variable. In both analyses the causal effect of parental education on child well-being is estimated through Regression Discontinuity Design (RDD).

This study fills the gap in the child well-being literature by estimating the causal effect of parental education on adolescent well-being as it combines the natural experiment setting of the 1997 Compulsory Schooling Reform and the multidimensional data that the Child Survey provides. The existing literature solely deals with the effect of parental education on child well-being mostly through maternal education. However, this study shows the gender asymmetry in intergenerational effects of maternal and paternal education.

This study is organized as follows. The following section presents the historical background of the 1997 Compulsory Schooling Reform, parental education, and the child population profile in Turkey. The third section presents the dataset information, descriptive statistics and the econometric model. The fourth section reports empirical findings and discusses the results. The last section reports the conclusion, limitations of the study, and the related policy implications.

2. The 1997 Compulsory Schooling Reform, Parental Education, and Conditions of Adolescents

The 1997 Basic Education Reform in Turkey mandated eight years of schooling which was previously five years. Before the reform, five-year compulsory primary school was followed by three-year consecutive noncompulsory secondary and high school education. The reform integrated the primary and secondary schools under elementary education and mandated students who had not yet graduated from the first tier before 1997. Therefore, the cohorts born in January 1987 or later were exposed to the reform. This birth-cohort cut-off point forms the basis of the RDD model. Before the reform, dropout rates after the fifth grade were quite high. According to findings of Kırdar et al. (2016), the reform increased the graduation rate by 30 to 40%, and the years of schooling at age 17 increased approximately 1.3 years and 0.8 years among women and men, respectively.

As post-reform cohorts became parents, the transmission mechanism between increased parental education and child well-being became empirically possible. The reform was influential on both mothers and fathers; however, the mode of transmission mechanism from each parent's education to child well-being cannot be identical. Since mothers bear the primary burden of caregiving in patriarchal societies, their education level is an important

determinant of the interaction with their children, and the time and resources devoted to them. Additionally, positive assortative mating is also evident, as more educated women have a greater chance of having a marriage with an educated partner (Breierova and Duflo, 2004). Despite achievements in female education, the labor force participation of women remained stagnant in the presence of patriarchal gender norms, care burden, and limited childcare support (Dayıoğlu and Kırdar, 2010; Başlevent and Onaran, 2003; İlkkaracan, 2012). On the other hand, an increase in paternal education directly alleviates the household income and more educated males tend to mate with spouses having a close educational background, which is namely positive assortative mating. These effects of paternal education have certain implications on the child well-being as distinct from maternal education. However, these generic implications of paternal education have not been examined in Turkey, despite the evidence drawn from high-income country samples (Grossman, 2006; Yu, 2015).

The magnitude of the well-being index, constructed in this study, is associated with the specific conditions faced by children in Turkey. The share of children in the total population is 24.8% and equals 21.4 million individuals (TURKSTAT, 2025a). The net enrollment rate to middle school has reached the level of 82.9% in 2024 from 58.6% in 2007 (TURKSTAT, 2024). Despite the notable improvements in the total enrollment rate, it remains unequally distributed at dimensions of child poverty and labor. Child poverty still stands as a permanent issue, as the share of children in low-income households is 31.3%, which equals 7.03 million (TURKSTAT, 2025b). However, conditions that prevent or even improve the negative health consequences of poverty have improved. The infant mortality decreased from 150 per thousand in 1970 to 9 per thousand in 2024 (TURKSTAT, 2025c; 2025d). The share of those experience visual problems among 7-14 age group children, declined from 13.3% in 2010 to 8.8% in 2022, while mental health problems fell from 23.9% to 11.2%. Similar patterns are observed in other domains that are dental, skin, hearing, nutritional and musculoskeletal issues and overall indicates notable progress in child health (TURKSTAT, 2010–2022).

*** INSERT TABLE 1 ***

As another aspect of child well-being, material deprivation in the home environment is also significant. The share of children in households that afford adequate heating rose from 55.3% in 2006 to 80.5% in 2024; however, it retreated to 76.7% by 2025, which shows the vulnerability of a remarkable segment of the population. Another important indicator is the share of children among the households without any employed members, which decreased to 8.5% by 2024 from 16.6% in 2009. However, the absolute magnitude remains substantial at approximately 976,000 in 2024 (TURKSTAT, 2025e).

Child labor continues to be a principal issue. In 2009, 4.4% of the children in the 5-17 age group engaged in economic activity, and this ratio retreated from 5.9% in 2006. However, in absolute value, this equals 720,000 children who are employed in the agricultural sector. Despite a decline from 24.9% in 2004, 10.8% of the age group 15-17 are neither in employment nor education in 2024 (TURKSTAT, 2025e).

In addition to traditional material deprivation, children's access to cultural and recreational resources presents a similar mixed picture. The number of child-targeted plays performed in public venues grew from approximately 1.7 million in 2010 to 2.4 million in 2024. However, the opposite development is recorded in access to portable computing devices among children aged 11-15, which declined from 29.4% in 2013 to 16.0% in 2024 (TURKSTAT, 2025e). This raises the concern of digital deprivation, which is a disadvantage for adolescents at the period of higher educational dependence on digital infrastructure. This trend in Turkey coincides with the global problem of digital deprivation, as approximately 1.3 million school students suffer from a similar problem globally.

Taking together, these indicators exhibit an irregular manner. Despite notable improvements in schooling, child poverty and health, other domains remain relatively less improved such as absolute poverty, digital deprivation, and preventable childhood conditions. Due to this irregular behavior among alternative well-being indicators, a single indicator is not sufficient to make robust conclusions on child well-being.

3. Data, Empirical Strategy, and Descriptive Statistics

This study analyzes the effect of the 1997 compulsory education reform on adolescents (age group between 13 and 17) well-being by using the 2022 Turkish Child Survey conducted by Turkish Statistical Institute (TURKSTAT)[1]. Microdata is assembled through a survey in the period between October and December 2022. This survey includes a wide range of indicators, namely gender, age, educational status, living conditions, early childhood development, health, disability, child functioning, school life quality, parental involvement, breastfeeding and nutrition, social and cultural participation, and child discipline practices. The sample of the survey consists of 9,010 households with at least one child. Additionally, the survey conducts an age-group-specific questionnaire that provides detailed information about generic conditions of the age group. In consonance with this, the survey is conducted of 4,072

[1] This study is not a clinical trial so clinical trial number is not applicable.

children in the 13-17 age group. In addition to child well-being indicators, the survey also includes data at the household level, including housing characteristics, income, receipt of social assistance, proximity to facilities and institutions within walking distance in the residential neighborhood, and parents' socioeconomic characteristics such as income, age, and employment status.

A sharp birth cohort threshold generated by the 1997 reform and inclusion of parents' birth dates in the 2022 Turkish Child Survey builds a regression discontinuity design framework for a causal inference. The study employs a Sharp Regression Discontinuity Design (RDD), as the cut-off rule exogenously determines the treatment assignment (Imbens and Lemieux, 2008). In the Sharp RDD context, cohorts beyond the cut-off point belong to the treatment group and the others to control group. While the fundamental analyses depend on Sharp RDD estimation, Fuzzy RDD estimations are also obtained as robustness checks. In a fuzzy design, the cut-off point determines the possibility of being in the treatment group, and the assumption of perfect alignment does not hold. Thus, cut-off points become instrumental variables[2]. The identification strategy rests upon birth month-year cut-off points, as the eight-year compulsory education was mandated for individuals who were born after January 1987. Parents from these post-reform cohorts are the treatment group, while those from pre-reform cohorts are the control group. Thus, January 1987 is considered as the cut-off point in regression discontinuity design. By using this threshold, the difference between the well-being of children whose parents are mandated to the eight-year education and those not.

This study investigates the effect of the 1997 reform on adolescent well-being through a composite index, its five components, and single indicators that form each domain, which represent health, education, material deprivation, family conditions, and safety risk. The analysis further decomposes effects on each domain into the single indicators. In addition, the study conducts differential effects of maternal and paternal education, and thus treatment and control groups are formed in January 1987 for each parent. For instance, in the sample that represents the exposure of mothers to the reform, post-cohort mothers who were born in January 1987 are assigned to the treatment group, while those who were born earlier are assigned to the control group. The same procedure is also valid for fathers.

Once the treatment and control groups have been established, the critical inquiry is about the width of the comparison window around the cut-off point. In 2022, the individuals who were first exposed to the reform are approximately 35 years old. The Sharp RDD framework assumes that units around the cut-off point are similar on average in terms of observed or unobserved socio-economic features. The RDD approach defines causal effects through the similarity of units in a narrow band (Imbens and Lemieux, 2008; Imbens and Kalyanaraman, 2012). In line with this principle, the analysis is conducted separately through 60-month and 96-month bandwidths. 60-month narrow bandwidth maximizes the strength of local comparison but limits the number of observations. 96-month wide bandwidth increases the estimation power by crowded sample; on the other hand, it loosens the local continuity assumption. The results for each bandwidth are jointly presented for the robustness of estimation results against the bandwidth choice.

$$Y_i = \beta_0 + \beta_1(X_i - X_0) + \beta_2 T_i(X_i - X_0) + \beta_{RDD} Ti + u_i \quad (1)$$

A typical Sharp RDD estimation model is represented by Equation (1). Y_i represents the dependent variables that are multidimensional adolescent well-being index, specific indices for each domain of well-being, and sub-dimensions. They all are measured following suggested well-being domains of UNICEF (2014). A multidimensional adolescent well-being index is constructed encompassing five domains; (i) health, (ii) education, (iii) material deprivation, (iv) family circumstances, and (v) safety and environmental risk, each further disaggregated into sub-dimensions as shown in Table 2-Table 6 in details. The estimation procedure is repeated for each dependent variable which are the general index, domain indices and sub-dimensions. X_i, X_0 and T_i represent the assignment variable of parents' birth month-year, the January 1987 cut-off point, and treatment variable (1 for treatment groups and 0 for control groups). Lastly, β_{RDD} coefficient captures the causal effect of the 1997 compulsory education reform.

Tables 2 to 6 present descriptive statistics for domain-specific indices and their components (sub-dimensions) as dependent variables, which are derived from the 13-17 age group sample.

Table 2 presents descriptive statistics of the education index and its sub-dimensions. The first dimension is school attendance and consists of daily school hours, weekday, and weekend hours in supplementary education. Adolescents spent 7.17 hours in school and participated in 5.17 hours of additional education on average during weekdays. However, high standard deviation among these indicators indicates a strong heterogeneity. Despite a strong daily effort for school, cultural, and extracurricular learning activities remain limited. Only 40.6% of the

[2] All analyses are conducted through STATA 18.

adolescents in the sample went to a movie or a play, 24.75% visited a museum, and 20.8% attended a sports activity. Only 11% had spent time on a hobby, which indicates the absence of a hobby rather than a lack of time.

*** INSERT TABLE 2 ***

The share of those reporting high satisfaction differs across components of the third dimension, namely school experience and satisfaction. While 42.8% of adolescents reported high satisfaction with their teachers, only 20.1% are highly satisfied with their grades. Classmate or peer satisfaction is around 31%, while general satisfaction remains at 23% in general. Low levels of satisfaction, despite significant levels of school attendance, indicate that the education system demands a high portion of adolescents' daily time but provides limited individual benefits. These descriptive data suggest that academic pressure systematically excludes the activities that are associated with adolescent welfare and their identity building (Eccles et al., 2003; Silbereisen, 2001; Freire, 2013).

The education index illustrates the conditions of adolescents that shape their experiences from attending educational and cultural activities (Goldfarb et al., 2017). Creating a supportive family environment can significantly enhance adolescents' school satisfaction, as it fosters emotional safety and encourages participation in educational activities (Garces et al., 2020; Mondal & Bhowmick, 2024).

Table 3 summarizes the sub-dimensions of the family index. According to the table, the average size of a household is around 5.03 people, and the average number of siblings is 1.36. The share of those who hold at least an upper secondary degree is 32.82% for mothers and 41.78% for fathers. Residential conditions provided for adolescents do not differ from each other, as 73.7% and 79.0% of adolescents have a study desk and a quiet study place, respectively. The family index also indicates the behavioral and protective environment of children, such as the financial dependence of the family on social assistance and family discipline practices. The social assistance dimension illustrates that 97.6% of adolescents are from families who are not social assistance recipients. A more contradictory pattern is presented at the discipline dimension, as an exceptionally low share of parents reported incidence of disciplinary action as forms of physical and psychological maltreatment. Yet, verbal discipline practices are frequent, as half of the parents stated that they shouted at kids. Components that form the sub-dimension of child-parent interaction posit an asymmetrical pattern. 83.2% and 69.5% of adolescents have meals and engage in daily conversation with their parents, while an exceptionally low share, 2.1%, can engage in cognitively stimulating activities with parents, such as visiting a library or a bookstore.

*** INSERT TABLE 3 ***

Table 4 presents components of the health index. The first dimension represents the habitual hygienic behavior of adolescents, and summary statistics indicate high frequency in all activities, except daily baths. The table indicates a gap between access to health centers and annual average visits, as 81.4% of adolescents live close to a health center; however, 36% of those whose parents reported at least one visit to a dentist. The variables under the nutrition dimension also follow a similar pattern between the availability and variety of nutritional ingredients. The frequent consumption of grain and dairy products contrasts with limited flesh food and legume consumption. The psychological dimension stands as the most striking outcome due to a lower share of adolescents who reported no symptoms of anxiety or depression. Overall, health indicators suggest that adolescents are physically protected but psychologically fragile and nutritionally restricted.

*** INSERT TABLE 4 ***

Beyond physical and mental health, the material conditions of the household determine the resources that adolescents can utilize for their capabilities (Jones et al., 2025). This study covers material conditions beyond household income, namely parental participation in the labor force, poverty, perceived income adequacy, and digital access. Thus, this study employs deprivation in its broadest sense. Table 5 summarizes these dimensions. The most striking pattern is the gendered parental labor force participation, as 82.1% of fathers and only 25.2% of mothers. 89.5% of the households are above the poverty line, and 22.5% hardly meet their needs. In the case of digital deprivation, while around 79% of adolescents possess mobile phones, the ownership of computers and tablets remains 47.5% and 26.4%, respectively. This asymmetry in the possession of computers/tablets and mobile phones is referred to in the literature as the device divide, which reflects a qualitative differentiation between the uses of computers and mobile devices. Productive and educational uses such as homework, research, and content creation remain tied to computers, while mobile devices provide limited, consumption-oriented uses such as messaging, social media, and video streaming (Pearce & Rice, 2013).

*** INSERT TABLE 5 ***

The last component of multidimensional adolescent well-being is the safety and risk index, which is of crucial importance in measuring the domestic environment that protects adolescents from or exposes them to risks of early employment and excessive burden of caregiving. Table 6 presents the components of the safety and risk index. 56% of adolescents do not have their own rooms, and almost one-fourth of them give care to their siblings, which

is an invisible form of domestic labor that penetrates the school and leisure time. The early burden of transferred responsibilities from parents is also valid at child labor indicators, as 14% of adolescents work in the agricultural sector and almost 10% are employed as family workers. The average working time of those employed adolescents is 11.4 hours. However, the evidence of parental support is quite limited, as only 5.5% of parents help their children with their homework and 2% accompany children to a library or a bookstore (Table 3). The opportunities available to adolescents and the risks they face are not only constrained by the available intra-household resources but also by conditions of the neighborhood. Basic facilities for education, basic needs, and daily use, are widely accessible. The shares of adolescents who live in a neighborhood near a middle school, playground, and supermarket are 83.1%, 80.6%, and 89.7%, respectively. Despite the wide accessibility to basic facilities, the access to those that stimulate cognitive development remains limited in that only 34% of adolescents' permanent residences are close to a library, 25.7% and 16.5% are close to a youth center and a cinema or a theater, respectively. Environmental risks are quite limited, as indicated by noise, pollution, and crime reports. Peer safety risk components exhibit a similar pattern as serious forms of victimization incidences are frequently reported, while subtle ones such as exclusion and ridicule are reported more frequently than serious forms. Thus, adolescents seem embedded in secure and supportive environments; however these are enclosed with scarce resources and low-frequence peer risks.

*** INSERT TABLE 6 ***

4. Empirical Findings

Sub-sections 4.1 and 4.2 discuss the empirical findings regarding separate effects of maternal and paternal education on adolescent well-being, and estimation results are presented at Tables 7 and 8.

4.1 Effects of Maternal Education on Adolescent Well-Being

Table 7 reports the RDD estimation results regarding maternal education and puts forward a significant and robust alleviation in the Safety and Risk Index across 60- and 96-month bandwidths. Two subcomponents direct this result in a way that mothers from the post-reform cohort reside near basic educational, recreational, and social facilities, and their children are exposed to fewer risks associated with child labor and its overburden. The first effect indicates a residential sorting mechanism, whereby educated mothers can provide a resourceful environment for child development. To the best of current knowledge, no prior study has examined this channel through a causal identification strategy, and this finding presents a spatial contribution to the intergenerational effects of education literature. The second finding of fewer risks of child labor is also consistent with the quasi-experimental evidence from Brazil and Turkey (Emerson & Souza, 2007; Dayıoğlu-Tayfur & Kırdar, 2020).

*** INSERT TABLE 7***

The graphical patterns follow along with reported estimation results. Figures 1(a) and 1(b) provide visible evidence on the effect of maternal education on adolescents' access to safe and supportive environments, and composite safety and risk index, respectively. In both figures, the local fitted lines shift upwards after the cut-off point and decrease afterward. Such an upward shift is consistent with the relevant estimation coefficients of the maternal education regression and offers a sound intuition for the residential sorting mechanism. According to the figures, both pre- and post-cohort samples have sufficient observations that decrease the possibility of reflecting misinterpretation due to scarce data or outliers. Figure 1(c) shows an upward shift in the local fitted lines after the cut-off point, and each line displays the same behavior, which shows that adolescents of post-reform cohort mothers experience the risk of being employed and the excessive workload to a lesser degree.

INSERT

Figure 1(a) (Access to safe, supportive environments

Figure 1(b) Safety and risk index,

Figure 1(c) Child labor and workload risks

Regarding the effect on the education index, post-reform cohort mothers' children are more likely to participate in cultural and extracurricular learning activities, and this effect is robust for each bandwidth. On the other hand, as is illustrated in Table 7 at the second dimension of the education index, the same cohort spends less time on school or complementary activities such as private courses, preparatory courses, and self-directed study. These findings indicate that post-reform mothers spare more time and resources for extracurricular activities and are consistent with previous evidence that maternal education transforms both the level and composition of the educational activities of the children (Kaushal vd., 2011). Figure 2(a) pertains to the school participation dimension of the education index, and the fitted line exhibits a downward shift after the cut-off point and indicates that post-reform mothers' children have less time in school and other complementary academic activities. Figure 2(b) illustrates the attendance in cultural and extracurricular learning. Before the cut-off point, the local fitted line is slightly

downward-sloping, and it shifts upward right at the cut-off point, which is consistent with the positive estimation coefficient.

INSERT

Figure 2(a) School participation (mother sample, 60-month bandwidth)

Figure 2(b) Cultural and extracurricular learning (mother sample, 60-month bandwidth)

Regarding the third index which is Family Index, the second dimension (maternal education) has positive coefficient estimate which reflects the effect of compulsory schooling on mothers' educational attainment. The family discipline dimension was negatively influenced by the reform, indicating gentler disciplinary practices of more educated mothers. This finding is in line with the evidence from the parenting literature on the association between educational attainment and more cognitively stimulating parent–child interactions (Davis-Kean, 2005; Benasich & Brooks-Gunn, 1996). Figures 3(a) and 3(b) illustrate the effect of compulsory schooling law on maternal education and family discipline dimensions, respectively. The maternal education plot displays a clear downward sloped pre-cutoff trend and an upward intercept shift at the cutoff. The family discipline index fitted line displays a slightly upward-sloping pre-cutoff trend followed by a downward shift at the cutoff, consistent with the significant negative coefficient.

INSERT

Figure 3(a) Maternal education (mother sample, 60-month bandwidth)

Figure 3(b) Family discipline (mother sample, 60-month bandwidth)

The material deprivation index is not statistically significant; on the other hand, maternal economic participation is significantly negative and robust across bandwidths. Since higher levels of the indicator reflect higher participation, evidence strongly suggests that the post-reform sample of mothers has a lower chance of being employed. Figure 3(c) illustrates this fact through a downward shift of the local fitted line. It shows that increased education may have reinforced the specialized domestic care work of women rather than their labor market attachment. The fact is consistent with the broader context of the Turkish labor market, as limited access to childcare services, gender norms assigning the primary caregiving role, the prevailing wage gender gap, and the unfavorable working conditions constitute structural obstacles (Dayıoğlu & Kırdar, 2010; Tunalı & Başlevent, 2006). In this context, these conditions render formal employment unattractive for women with limited education (Başlevent ve Onaran, 2003; İlkkaracan, 2012).

Figure 3(c) Maternal economic participation (mother sample, 60-month bandwidth)

The effect of the reform on the composite health index and on the other 6 components is estimated to be insignificant, except the health status component capturing general self-assessed health, chronic illness, and recent health complaints. The effect on the health status is significant only at the 60-month bandwidth but not robust to alternative bandwidth choices and has an indicative value rather than a precise estimation. However, this evidence is consonant with the existing adolescent health literature, since the effect of maternal education on child health tends to decrease across child age groups, and is therefore weakest in adolescence (Gakidou vd., 2010; Desai ve Alva, 1998).

4.2 Effects of Paternal Education on Adolescent Well-Being

Table 8 shows the effects of Paternal Education on Adolescent Well-Being. Similar to Table 7, the effect of the paternal education is investigated on 5 different domains (safety and risk, family, education, health, material deprivation) and their dimensions.

*** INSERT TABLE 8 ***

The most consistent evidence for paternal education is also found for maternal education, specifically for the composite safety and risk index, whose estimated coefficient is statistically significant, positive, and robust to the 90-month bandwidth. Two dimensions direct this pattern, namely access to safe and supportive environments and child peer safety risk. Firstly, as in the case of mothers, more educated fathers tend to reside at a close distance to facilities that provide educational, cultural, and social activities for their children. This finding holds for each parent, which substantiates the interpretation of residential sorting as a genuine causal channel through which parental education shapes children's well-being independently from household income. Secondly, children of more educated fathers are less likely to experience peer victimization in the forms of social exclusion, ridicule, threats, and physical assault. Figures 4(a), 4(b) and 4(c) present a similar pattern in a sample of fathers. The fitted line in both graphs exhibits almost a horizontal course before the cutoff; however, the line shifts upward after the cutoff point and declines with a higher slope. These upward shifts are consistent with the related estimation results of

coefficients. The steeper lines after the cutoff point should be cautiously evaluated, since the sample of post-reform fathers is relatively small compared to the pre-reform sample.

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Figures 4(a) Safety and risk index — composite (father sample, 60-month bandwidth)

Figure 4(b) Access to safe, supportive (father sample, 60-month bandwidth)

Figure 4(c) Child peer safety risk (father sample, 60-month bandwidth)

Considering the compulsory schooling effects on the dimensions of family index in Table 8, the family structure dimension records the largest and most precisely estimated coefficient among all the paternal results and is highly significant across both bandwidths. This dimension is the composite of household size and the number of siblings, in that it reflects the demographic structure of the household that the adolescent belongs to. The estimate is consistent with empirical evidence that more educated fathers are associated with smaller families as the result of assortative mating and educational attainment on fertility (Breierova & Duflo, 2004).

INSERT

Figure 5. Family structure (father sample, 60-month bandwidth)

In the material deprivation domain, only the paternal economic participation dimension is significantly and positively affected by the compulsory education reform under both bandwidths. This finding seemingly contradicts that for mothers, where more educated mothers are less likely to participate in the labor force. However, these two facts are complementary in the sense of assortative mating and consistent with the well-documented pattern of the educational attainments of men in Turkey (Tansel, 1997). Figure 6 shows the upward shift after the cut-off point, which is consistent with the estimation results.

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Figure 6. Parental economic participation (father sample, 60-month bandwidth)

Regarding dimensions of Health Index, the disability is the only dimension that is significant and robust to both bandwidths. Higher values of the disability sub-index indicate a lower rate of officially documented disability, which implies that children of more educated fathers are less likely to hold a formal disability certificate. This fact would be the outcome of genuine health improvements, better access to preventative care, or differential uptake of diagnostic services. Besides the disability dimension, the reform improved nutrition, and clean water & personal hygiene dimensions significantly through paternal education, but these facts are not robust to bandwidth choice. Thus, these dimensions should be treated as suggestive findings consistent with prior evidence (Sarwar et al., 2024; Kunwar & Pillai, 2002). Figure 8 presents the RDD graph of the disability index and fitted lines around the cut-off point. Since most of the observations clustered at the top of the scale, the shift in the local fitted line around the cutoff point is barely discernible. However, the estimated coefficients reported in Table 8 are significant and robust.

INSERT

Figure 7 Disability (father sample, 60-month bandwidth)

Finally, there is no statistically significant relationship between paternal education and the composite education index or any of its dimensions under either bandwidth. This evidence contradicts that for mothers. It supports the argument that mothers have a determinant role in shaping children' educational and cultural attainments (Willekens & Lievens, 2014).

4.3 Robustness Checks: Manipulation and Falsification (Placebo) Tests

Regression discontinuity design rests on the assumption that the running variable is discontinuous at the cutoff point, and the local polynomial density test was implemented (Cattaneo et al., 2020). The discontinuity around the cutoff indicates that units cannot be clustered at one side of the cutoff point. Regarding the manipulation test results shown in Table 9, no evidence of discontinuity is detected for the mother sample, as p-values are between 0.41 and 0.45 across all bandwidths. On the other hand, a marginal discontinuity is observed in the father sample, with

a robust p-value of 0.075 across alternative bandwidth specifications. The estimates are at most marginally significant at 10% level, and limited caution in interpretation is needed.

INSERT TABLE 9

A placebo test was conducted through a predetermined characteristic that is not possible to be predicted by the reform, such as sex of child. On the condition that the identifying assumptions hold, a genuine running variable cannot produce a shift around cutoff point. As shown in Table 10, the falsification test reveals no statistically significant discontinuity at the cutoff for either the mother or the father sample under both bandwidths, with the estimated coefficients remaining close to zero and the p-values lying above 0.68.

Figures 8(a) and 8(b) provide graphical evidence that supports the absence of discontinuity. The fathers' density plots exhibit an uneven distribution of observations around the cutoff, due to the small number of treated observations beyond the threshold. On the other hand, distribution of observations associated with mothers appears substantially smoother around the cutoff. Overall, the manipulation tests suggest that the identifying assumptions of the RDD are considerably stronger in the maternal specifications than in the paternal specifications.

INSERT

Figure 8(a) Manipulation Testing Plot (mother sample, 96 months)

Figure 8(b) Manipulation Testing Plot (father sample, 96 months)

This imbalance among the fathers, however, is not likely stem from manipulation, since the date of birth of parents is predetermined, and it would not be possible to manipulate the sample according to the reform. Instead, it is due to sample characteristics rather than any type of sorting. Rather, this is derived from the nature of the population characteristics among the parental cohorts in question. Consequently, while the test of manipulation suggests that the identifying assumptions will generally hold stronger in the maternal regressions compared to the paternal regressions, the empirical findings should not be affected by such issues of credibility.

5. Conclusion

This study provides strong evidence on the causal effect of parental education on multidimensional adolescent well-being in Turkey. The 1997 Compulsory Education Reform generated an external transformation of the educational composition of the parents. The reform serves as a credible and relevant instrument for parental educational attainment, in that it induces a discontinuity in completed schooling, is as good as randomly assigned in the neighborhood of the threshold and plausibly affects adolescent well-being only through parental education. This identification strategy is applied to the 2022 Child Survey of the Turkish Statistical Institution, which provides the opportunity to match the education levels of parents and multidimensional well-being indicators of adolescents. Thus, the survey provides the opportunity for distinct estimation of maternal and paternal education effects on adolescent well-being represented by five composite well-being indices and their sub-dimensions, namely education, safety and risk, material deprivation, and health, that are constructed using the dimension and variable classification of UNICEF (2014).

The estimation results of sharp RDD indicate a differential pattern of intergenerational effects that vary by parental gender, welfare domain, and level of aggregation and show the predominance of maternal effects on many domains. The most robust and unique results are in the safety and risk domain. The increased maternal education by the reform alleviates the composite index through sub-dimensions of access to safe and supportive environments and child labor. The access to a safe and supportive environment improves with each parent's education level, which indicates residential inequalities can be improved not only through the income levels of households. The second prominent result is the decrease in the risks of child labor, which indicates that educational attainments of mothers secure their children from the exploitative labor force participation. In the domain of education, more educated mothers direct their children to cultural and extracurricular activities rather than to academic preparation. This substitution represents the shift of educational participation from narrow academic activities to expanded forms of learning environments. Finally, more educated mothers resort less frequently to punitive discipline. These maternal effects of the reform provide sufficient grounds for preventative measures to eliminate permanent factors preventing full participation of girls in education, such as gender norms assigning girls domestic duties, early marriage, and economic pressures.

The paternal result of the reform is limited due to sample constraints but presents distinct mechanisms at economic participation and health indicators, besides the access to safe and supportive environments. In the health domain, the results indicate that children of more educated fathers exhibit lower rates of certified disability. The ineffectiveness of paternal education on educational well-being stresses the importance of maternal education among the channels that reinforce the commitment of children to education and cultural participation. The gender inequality features in the labor market outcomes. Higher maternal education does not necessarily increase labor force participation of women. However, paternal education is associated with higher participation. This divergence suggests that the compulsory schooling reform is not a sufficient condition for closing gender gaps, and complementary policies, such as subsidized childcare and flexible work arrangements, are necessary conditions for the transmission of educational attainments to economic gains of women.

The findings are constrained by three factors which are external validity, statistical power and regional disaggregation. Firstly, the identification relies on the sharp discontinuity at the single birth-month in which the local average treatment effect is captured. Therefore, the external validity of the estimates diminishes for cohorts farther from the cutoff. Secondly, the relatively small sample size of the fathers to ones of mothers limits the statistical power and the robustness of estimations across the bandwidths. Lastly, lack of regional information in the data set does not allow comparative regional analysis between least and most developed regions.

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Tables

Table 1. Aggregated Indicators for Children in Turkey

Indicator	Starting Year	Value	Most recent	Value	Trend
Infant mortality rate (%)	1970	150	2024	9.0	Sharply declining
Child poverty rate (%)	2006	34.6	2025	31.3	Slowly declining
Primary school net enrolment (%)	2007	97.4	2024	95.4	Stable, high
Secondary school net enrolment (%)	2007	58.6	2024	82.9	Major improvement
NEET rate – ages 15–17 (%)	2004	24.9	2024	10.8	Declining
Child employment rate – ages 5–17 (%)	2006	5.9	2019	4.4	Declining
Households with no worker – children (%)	2009	16.6	2024	8.5	Declining
Adequate home heating – children (%)	2006	55.3	2024	80.5	Major improvement
Theatre attendance – children (000s)	2010	1,7	2024	2,4	Increasing
Laptop/tablet access – ages 11–15 (%)	2013	29.4	2024	16.0	Declining

Source: TURKSTAT (2024a, 2025a-2025e) Child Statistics Databases.

Table 2. Summary Statistics for Variables Constructing Education Index for Adolescents Aged 13–17

EDUCATION INDEX

Dimension 1: Daily school hours	Obs.	Mean	Std. dev.	Min	Max
Daily school hours	3284	7.172	2.007	0	15
Weekday hours in supplementary education	3284	5.172	7.173	0	120
Weekend hours in supplementary education	3284	2.903	3.896	0	20
Dimension 2: Cultural and Extracurricular Learning	**Freq**	**Percent**	**Cum**		
Cinema/theatre attendance (Yes)	1,442	40.56	100.00		
Museum attendance (Yes)	880	24.75	100.00		
Sports activity (Yes)	740	20.82	100.00		
Hobby activity frequency (Every day)	387	11.10	100.00		
Dimension 3: School Experience and Satisfaction	**Freq**	**Percent**	**Cum**		
School satisfaction (very satisfied)	761	23.17	100.00		
School learning satisfaction (very satisfied)	1,089	33.16	100.00		
Classmate/peer satisfaction (very satisfied)	1,030	31.36	100.00		
School grades satisfaction (very satisfied)	660	20.10	100.00		
Teacher relationship satisfaction (very satisfied)	1,406	42.81	100.00		

Note: Related index is constructed using the dimension and variable classification of UNICEF (2014, p:50).

Table 3: Summary Statistics for Variables Constructing Family Index for Adolescents Aged 13 –17

FAMILY INDEX					
Dimension 1: Family Structure	**Obs.**	**Mean**	**Std. dev.**	**Min**	**Max**
Household size	3555	5.030	1.652	3	24
Number of siblings	3555	1.359	1.298	0	13
Dimension 2: Parental Educational Capital	**Freq**	**Percent**	**Cum**		
Mother's educational level (At least upper secondary school)	1,072	32.82	100.00		
Father's educational level (At least upper secondary school)	1,421	41.78	100.00		
Dimension 3: Housing Conditions	**Freq**	**Percent**	**Cum**		
Study desk available (Yes)	2,421	73.72	100.00		
Quiet study place (Yes)	2,593	78.96	100.00		
Dimension 4: Household Social Assistance Receipt	**Freq**	**Percent**	**Cum**		
Received social and economic support (No)	3,469	97.58	100.00		
Received family assistance (No)	2,911	81.88	100.00		
Received shelter and food assistance (No)	3,276	92.15	100.00		
Received health assistance (No)	3,307	93.02	100.00		
Received disabled-elderly roofs (No)	3,396	95.53	100.00		
Received educational assistance (No)	3,196	94.39	100.00		
Received other assistance (No)	3,432	96.54	100.00		
Dimension 5: Family Discipline	**Freq**	**Percent**	**Cum**		
Grabbed or shook child (No)	3,356	94.40	100.00		
Shouted at child (No)	1,811	50.94	100.00		
Gave alternative task to child (No)	3,214	90.41	100.00		
Threatened child with withdrawal of love (No)	3,459	97.30	100.00		
Spanked or slapped child with bare hand (No)	3,465	97.47	100.00		
Hit child with object (No)	3,499	98.42	100.00		
Called child offensive names (No)	3,323	93.47	100.00		
Hit pulled or slapped child on face head or ears (No)	3,500	98.45	100.00		
Hit or slapped child on hand arm or leg (No)	3,492	98.23	100.00		
Violently beat children (No)	3,537	99.49	100.00		
Insulted or humiliated child (No)	3,484	98.00	100.00		
Ignored child (No)	3,043	85.60	100.00		
Preventing children from seeing friends (No)	3,200	90.01	100.00		
Withheld child allowance or desired items (No)	3,292	93.39	100.00		
Dimension 6: Time Spent with Parent(s) (Every day)	**Freq**	**Percent**	**Cum**		
Frequency of talking with children	2,470	69.48	100.00		
Frequency of discussing books movies and TV with children	620	17.44	100.00		
Frequency of discussing school with children	1,623	45.65	100.00		
Frequency of eating together with children	2,959	83.23	100.00		
Frequency of going to library or bookstore with children	73	2.05	100.00		
Frequency of helping children with homework	180	5.48	100.00		
Frequency of discussing national events with children	376	10.58	100.00		

Note: The related index is constructed using the dimension and variable classification of UNICEF (2014, p:50).

Tablo 4: Summary Statistics for Variables Constructing Health Index for Adolescents Aged 13–17

HEALTH INDEX			
Dimension 1: Clean Water and Personal Hygiene	**Freq**	**Percent**	**Cum**
Handwashing in the morning (Yes)	3,465	97.58	100.00
Handwashing after returning home (Yes)	3,466	97.61	100.00
Handwashing before meals (Yes)	3,333	93.86	100.00
Handwashing after meals (Yes)	3,375	95.04	100.00
Handwashing after toilet use (Yes)	3,530	99.38	100.00
Frequency of bathing/showering (Every day)	817	22.98	100.00
Dimension 2: Access to Healthcare	**Freq**	**Percent**	**Cum**
Annual dental visit (Yes)	1,124	31.62	100.00
Nearby health facility (Yes)	2,894	81.43	100.00
Dimension 3: Health Status	**Freq**	**Percent**	**Cum**
Chronic or recent illness (No)	3,187	89.67	100.00
Child general health status (Very good)	680	19.13	100.00
Recent health complaints (No)	2,679	75.36	100.00
Dimension 4: Disability	**Freq**	**Percent**	**Cum**
Certified disability status (No)	3,509	98.71	100.00
Walking assistance (No)	3,530	99.30	100.00
Visual difficulty (No)	2,586	94.48	100.00
Hearing difficulty (No)	3,435	97.95	100.00
Self-care difficulty (No)	3,516	98.90	
Dimension 5: Nutrition	**Freq**	**Percent**	**Cum**
Frequency of fruit consumption (Everyday)	1,554	43.71	100.00
Frequency of vegetable consumption (Everyday)	1,162	32.69	100.00
Frequency of meat, chicken, and fish consumption (Everyday)	479	13.47	100.00
Frequency of legume consumption (Everyday)	394	11.08	100.00
Frequency of dairy product consumption (Everyday)	2,063	58.03	100.00
Frequency of sweets consumption (Everyday)	56	1.58	100.00
Frequency of snack consumption (Everyday)	133	3.74	100.00
Frequency of sugary drink consumption (Everyday)	367	10.32	100.00
Frequency of grain consumption (Everyday)	2,279	64.11	100.00
Dimension 6: Identification of Psychological Issues	**Freq**	**Percent**	**Cum**
Frequency of anxiety symptoms (Never)	735	20.79	100.00
Frequency of sadness/depressive symptoms (Never)	783	22.11	100.00
Behavior control (Agree)	2568	72.24	100.00
Emotional control (Agree)	2479	69.73	100.00
Task completion (Agree)	2489	70.01	100.00

Note: The related index is constructed using the dimension and variable classification of UNICEF (2014, p:49).

Table 5: Summary Statistics for Variables Constructing Material Deprivation Index for Adolescents aged 13–17

MATERIAL DEPRIVATION INDEX			
Dimension 1: Parental Economic Participation	**Freq**	**Percent**	**Cum**
Mother's labor force participation (Yes)	895	25.18	100.00
Father's labor force participation (Yes)	2,918	82.08	100.00
Dimension 2: Household Poverty Status	**Freq**	**Percent**	**Cum**
Household poverty status (No)	3,181	89.48	100.00
Dimension 3: Household Income Adequacy	**Freq**	**Percent**	**Cum**
Household income meets needs (Very difficult)	798	22.45	100.00
Dimension 4: Digital Deprivation	**Freq**	**Percent**	**Cum**
Computer ownership (Yes)	1,561	47.53	100.00
Tablet ownership (Yes)	867	26.40	100.00
Mobile phone ownership (Yes)	2,592	78.93	100.00

Note: The related index is constructed using the dimension and variable classification of UNICEF (2014, p:51).

Table 6: Summary Statistics for Variables Constructing Safety and Risk Index for Adolescents aged 13–17.

SAFETY AND RISK INDEX

Dimension 1: Access to safe, supportive environments in the neighborhood	**Freq**	**Percent**	**Cum**
Nearby secondary school (Yes)	2,944	83.07	100.00
Nearby high school (Yes)	2,098	59.45	100.00
Nearby sports field (Yes)	1,982	56.45	100.00
Nearby library (Yes)	1,174	34.01	100.00
Nearby vocational/education center (Yes)	1,380	39.92	100.00
Nearby place of worship (Yes)	3,403	95.75	100.00
Nearby children's park (Yes)	2,864	80.61	100.00
Nearby cinema/theater (Yes)	578	16.45	100.00
Nearby cultural/youth center (Yes)	895	25.67	100.00
Nearby market/grocery store (Yes)	3,190	89.73	100.00
Nearby police station (Yes)	1,582	44.79	100.00
Dimension 2: Neighborhood Environmental Risk	**Freq**	**Percent**	**Cum**
Noise problems (No)	2,948	82.93	100.00
Environmental problems (No)	2,756	77.52	100.00
Crime/violence in the neighborhood (No)	3,004	84.50	100.00
Dimension 3: Housing Safety and Care Risk	**Freq**	**Percent**	**Cum**
Own room (Yes)	1,570	44.16	100.00
Number of roommates (alone)	1,092	55.01	100.00
Roof problems (No)	2,889	81.27	100.00
Damp walls/floors/foundation problems (No)	2,601	73.16	100.00
Rot in window frames/floor problems (No)	2,973	83.63	100.00
Adequate lighting (Yes)	2,664	74.94	100.00
Availability of indoor toilet (Yes)	3,441	96.79	100.00
Availability of outdoor toilet (No)	219	6.16	100.00
Availability of bath/shower (Inside the house)	3,523	99.10	100.00
Childcare for elderly/sick household members (No)	3,402	95.70	100.00
Childcare for other children (No)	2,730	76.79	100.00
Dimension 4: Child Labor and Workload Risks (No)	**Freq**	**Percent**	**Cum**
Child agricultural work	3,065	86.22	100.00
Child family/relative work	3,206	90.18	100.00
Child production/sale of goods	3,462	97.38	100.00
Child other paid work	3,411	95.95	100.00
	Obs.	**Mean**	**Sd.dev.**
Child weekly working hours (0-84)	735	11.399	14.544
Dimension 5: Child Peer Safety Risk (Rarely or never)	**Freq**	**Percent**	**Cum**
Frequency of peer exclusion	3,203	92.15	100.00
Frequency of peer teasing	3,176	91.34	100.00
Frequency of peer threats	3,366	96.78	100.00
Frequency of belongings taken/damaged by peers	3,369	96.42	100.00
Frequency of being hit or pushed by peers	3,357	96.08	100.00
Frequency of rumors spread by peers	3,154	92.28	100.00

Note: The related index is constructed using the dimension and variable classification of UNICEF (2014, p:51).

Table 7: RDD Results for Maternal Education Effects

Well-being domain / dimension	Sharp RDD		Fuzzy RDD	
	60 months	**96 months**	**60 months**	**96 months**
CHILD WELL-BEING INDEX	0.225 (0.175)	0.129 (0.146)	1.145 (1.197)	0.633 (0.799)
Number of Obs	*1208*	*1851*	*1100*	*1681*
EDUCATION INDEX	0.130 (0.136)	0.625 (0.113)	0.475 (1.005)	0.024 (0.659)
Number of Obs	*1264*	*1944*	*1109*	*1694*
Dimension 1: Cultural and Extracurricular Lear.	**0.544** (0.254)**	**0.404* (0.213)**	2.496 (1.675)	1.60 (1.130)
Dimension 2: Daily school hours	**-0.704*** (0.268)**	**-0.544** (0.216)**	**-3.057* (1.696)**	**-2.243** (1.133)**
Dimension 3: School Experience and Satisfaction	-0.010 (0.199)	-0.038 (0.165)	-0.278 (1.471)	**-0.542** (0.983)**
SAFETY AND RISK INDEX	**0.375*** (0.136)**	**0.327*** (0.113)**	**1.822* (0.941)**	**1.532** (0.636)**
Number of Obs	*1358*	*2082*	*1169*	*1775*
Dimension 1: Access to Safe and Supportive Env.	**0.630** (0.303)**	**0.509** (0.250)**	2.722 (1.880)	2.016 (1.272)
Dimension 2: Neighborhood Environmental Risk	0.375 (0.322)	**0.478* (0.277)**	2.147 (1.882)	2.302 (1.419)
Dimension 3: Housing Safety and Care Risk	0.125 (0.163)	0.100 (0.137)	0.532 (0.910)	0.631 (0.662)
Dimension 4: Child Labor and Workload Risks	**0.358*** (0.105)**	**0.254*** (0.086)**	**1.981** (0.886)**	**1.291** (0.532)**
Dimension 5: Child Peer Safety Risk	-0.033 (0.108)	-0.004 (0.094)	-0.428 (0.715)	-0.356 (0.525)
MATERIAL DEPRIVATION INDEX	-0.026 (0.141)	-0.100 (0.117)	-0.026 (1.026)	-0.268 (0.704)
Number of Obs	*1264*	*1944*	*1109*	*1694*
Dimension 1: Maternal Economic Participation	**-0.627* (0.329)**	**-0.898*** (0.267)**	-3.895 (2.480)	**-4.606** (1.920)**
Dimension 2: HH Poverty Status	-0.213 (0.216)	-0.169 (0.189)	-1.454 (1.429)	-1.109 (1.051)
Dimension 3: HH Income Adequacy	0.118 (0.283)	0.040 (0.236)	1.339 (1.629)	1.160 (1.178)
Dimension 4: Digital Deprivation	0.078 (0.361)	-0.044 (0.300)	-0.296 (2.533)	-0.467 (1.700)
FAMILY INDEX	0.041 (0.163)	-0.011 (0.136)	-0.167 (1.071)	-0.192 (0.736)
Number of Obs	*1217*	*1864*	*1109*	*1694*
Dimension 1: Family Structure	0.341 (0.242)	0.139 (0.202)	1.474 (1.183)	0.774 (0.828)
Dimension 2: Maternal Education	**0.414*** (0.139)**	**0.328*** (0.118)**	**1.803*** (0.598)**	**1.201*** (0.446)**
Dimension 3: Housing Conditions	-0.090 (0.477)	-0.011 (0.399)	-0.521 (3.206)	0.976 (2.105)
Dimension 4: HH Social Assistance Receipt	-0.169 (0.178)	-0.231 (0.147)	-1.504 (1.225)	**-1.575* (0.891)**
Dimension 5: Family Discipline	**-0.253* (0.130)**	**-0.280** (0.110)**	-1.322 (0.939)	**-1.308* (0.687)**
Dimension 6: Time Spent with Parent	0.017 (0.189)	-0.064 (0.159)	-0.587 (1.130)	-0.655 (0.836)
HEALTH INDEX	0.096 (0.126)	0.055 (0.107)	0.497 (0.766)	0.304 (0.557)
Number of Obs	*1375*	*2105*	*1178*	*1788*
Dimension 1: Clean Water and Personal Hygiene	-0.050 (0.148)	-0.041 (0.125)	-0.870 (1.027)	-0.466 (0.718)
Dimension 2: Access to Healthcare	0.393 (0.286)	0.324 (0.240)	2.212 (1.879)	1.671 (1.317)
Dimension 3: Health Status	**0.412* (0.225)**	0.220 (0.186)	1.648 (1.535)	0.632 (1.018)
Dimension 4: Disability	-0.024 (0.104)	-0.037 (0.083)	-0.223 (0.663)	-0.273 (0.464)
Dimension 5: Nutrition	0.139 (0.104)	0.125 (0.085)	0.657 (0.654)	0.574 (0.460)
Dimension 6: Psychological Issues	-0.167 (0.200)	-0.135 (0.169)	-0.376 (1.213)	-0.248 (0.875)

*Note: The table reports Sharp and Fuzzy Regression Discontinuity Design (RDD) estimates using 60-month and 96-month bandwidths. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Statistically significant coefficients are shown in bold. HH denotes Household; N denotes the number of observations.*

Table 8: RDD Results for Paternal Education Effects

Well-being domain / dimension	Sharp RDD		Fuzzy RDD	
	60 months	**96 months**	**60 months**	**96 months**
CHILD WELL-BEING INDEX	0.581 (0.510)	0.383 (0.420)	41.82 (523.6)	5.377 (9.280)
Number of Obs	*482*	*1097*	*478*	*1083*
EDUCATION INDEX	-0.132 (0.310)	0.209 (0.274)	-20.57 (290.1)	-4.115 (8.262)
Number of Obs	*515*	*1155*	*486*	*1093*
Dimension 1: Cultural and Extracurricular Lear.	-0.491 (0.668)	-0.251 (0.572)	-6.216 (16.54)	-1.533 (5.389)
Dimension 2: Daily school hours	0.757 (0.908)	0.437 (0.724)	0.423 (10.22)	-1.887 (6.036)
Dimension 3: School Experience and Satisfaction	0.154 (0.418)	-0.142 (0.371)	11.31 (161.17)	-2.326 (6.349)
SAFETY AND RISK INDEX	**0.818** (0.361)**	**0.709** (0.330)**	9.276 (19.75)	5.482 (6.677)
Number of Obs	*559*	*1252*	*526*	*1185*
Dimension 1: Access to Safe and Supportive Env.	**1.626** (0.777)**	**1.289* (0.690)**	23.14 (50.10)	11.41 (14.47)
Dimension 2: Neighborhood Environmental Risk	0.870 (0.705)	**1.064* (0.627)**	6.445 (17.02)	6.491 (8.758)
Dimension 3: Housing Safety and Care Risk	0.570 (0.408)	0.444 (0.356)	6.360 (14.12)	3.731 (4.808)
Dimension 4: Child Labor and Workload Risks	-0.007 (0.230)	0.091 (0.217)	-0.209 (3.195)	0.543 (2.106)
Dimension 5: Child Peer Safety Risk	**0.348* (0.186)**	**0.249* (0.138)**	4.410 (8.514)	2.131 (2.288)
MATERIAL DEPRIVATION INDEX	0.475 (0.340)	0.396 (0.282)	30.80 (416.88)	4.032 (6.672)
Number of Obs	*515*	*1155*	*486*	*1093*
Dimension 1: Paternal Economic Participation	**1.183* (0.602)**	**0.998* (0.529)**	16.30 (31.92)	9.330 (9.826)
Dimension 2: HH Poverty Status	0.020 (0.438)	-0.167 (0.422)	1.061 (6.830)	-0.669 (4.145)
Dimension 3: HH Income Adequacy	-0.043 (0.623)	-0.090 (0.524)	-6.300 (16.53)	-3.434 (6.524)
Dimension 4: Digital Deprivation	**1.712* (1.027)**	1.320 (0.836)	119.05 (1633.9)	14.25 (25.04)
FAMILY INDEX	0.436 (0.591)	0.373 (0.448)	34.63 (459.58)	5.435 (8.840)
Number of Obs	*490*	*1107*	*486*	*1093*
Dimension 1: Family Structure	**1.741*** (0.550)**	**1.735*** (0.485)**	19.16 (37.70)	12.03 (12.30)
Dimension 2: Paternal Education	0.082 (0.320)	0.113 (0.259)	0.822 (2.762)	0.479 (1.749)
Dimension 3: Housing Conditions	1.772 (1.501)	1.366 (1.178)	62.12 (822.96)	10.13 (20.60)
Dimension 4: HH Social Assistance Receipt	0.462 (0.378)	**0.622* (0.317)**	5.200 (10.84)	5.729 (6.239)
Dimension 5: Family Discipline	-0.024 (0.364)	0.044 (0.339)	2.012 (5.901)	2.358 (3.479)
Dimension 6: Time Spent with Parent	-0.319 (0.656)	-0.448 (0.525)	-3.944 (14.47)	-4.106 (7.221)
HEALTH INDEX	0.076 (0.303)	-0.017 (0.246)	0.877 (4.168)	-0.063 (2.376)
Number of Obs	*570*	*1269*	*534*	*1195*
Dimension 1: Clean Water and Personal Hygiene	**0.497* (0.289)**	0.276 (0.246)	5.421 (11.50)	1.628 (2.670)
Dimension 2: Access to Healthcare	-0.010 (0.678)	-0.156 (0.590)	-1.159 (9.799)	-2.008 (5.923)
Dimension 3: Health Status	-0.524 (0.749)	-0.778 (0.627)	-8.510 (23.05)	-6.925 (10.87)
Dimension 4: Disability	**0.184*** (0.064)**	**0.092** (0.042)**	2.888 (5.902)	1.016 (1.132)
Dimension 5: Nutrition	**0.529** (0.241)**	0.283 (0.204)	6.764 (15.19)	2.388 (3.626)
Dimension 6: Psychological Issues	-0.125 (0.530)	0.088 (0.442)	-0.378 (7.710)	1.589 (3.909)

*Note: The table reports Sharp and Fuzzy Regression Discontinuity Design (RDD) estimates using 60-month and 96-month bandwidths. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Statistically significant coefficients are shown in bold. HH denotes Household; N denotes the number of observations.*

Table 9: Manipulation (Density) Tests Using the Running Variable

Sample	Bandwidth	Robust T-statistic	P-value	Interpretation
Fathers	±60 months	-1.782	0.075	Marginal at 10%, not significant at 5%
Fathers	±90 months	-1.782	0.075	Similar result across bandwidths
Fathers	±96 months	-1.782	0.075	Stable estimates
Mothers	±60 months	0.749	0.454	No evidence of manipulation
Mothers	±90 months	0.826	0.409	No evidence of manipulation
Mothers	±96 months	0.829	0.407	Stable estimates

Source: Authors' calculations using the local polynomial density test proposed

Table 10: Falsification (Placebo) Tests Using Child Gender as the Dependent Variable

Sample	Bandwidth	Treatment Coefficient	Robust Std. Error	P-value	Interpretation
Fathers	±96 months	-0.0298	0.1288	0.817	No discontinuity
Fathers	±60 months	-0.0608	0.1508	0.687	No discontinuity
Mothers	±96 months	0.0051	0.0494	0.918	No discontinuity
Mothers	±60 months	0.0129	0.0589	0.827	No discontinuity

Source: Authors' calculations.

Figures (Using Mother's Sample)

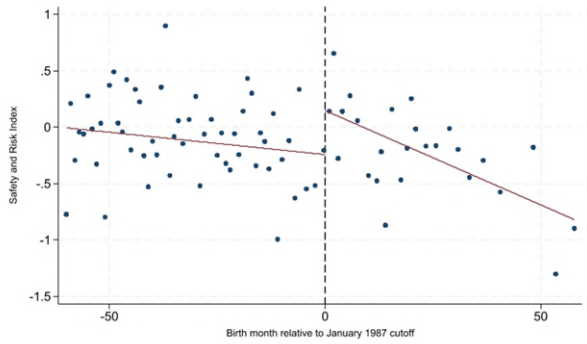


Figure 1 (a). Access to safe, supportive environments (mother sample, 60-month bandwidth)

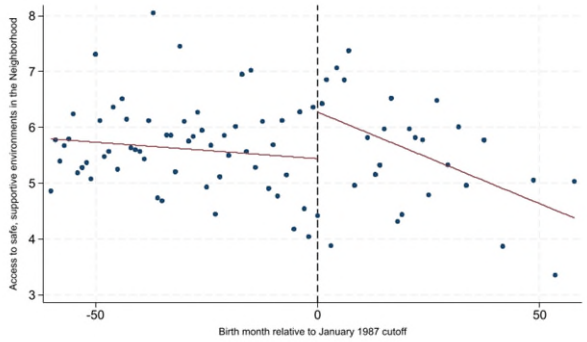


Figure 1(b). Safety and risk index — composite (mother sample, 60-month bandwidth)

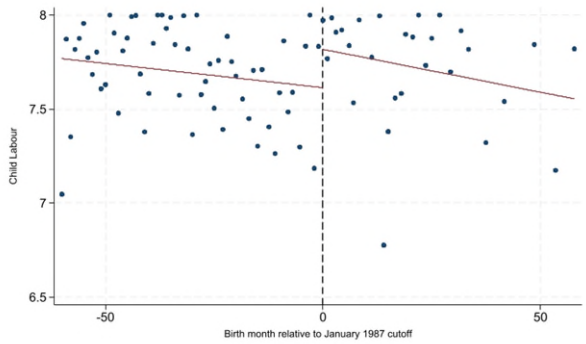


Figure 1 (c). Child labor and workload risks (mother sample, 60-month bandwidth)

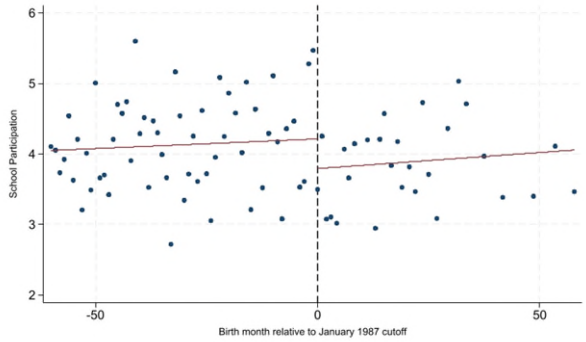


Figure 2(a). School participation (mother sample, 60-month bandwidth)

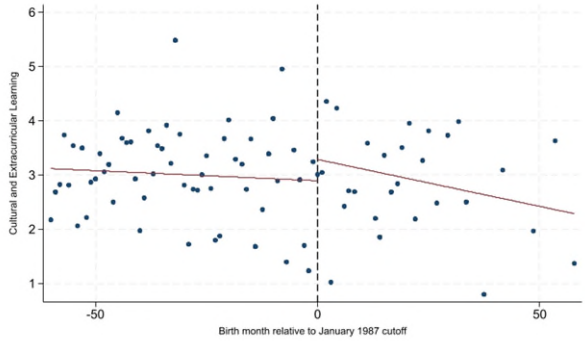


Figure 2(b). Cultural and extracurricular learning (mother sample, 60-month bandwidth)

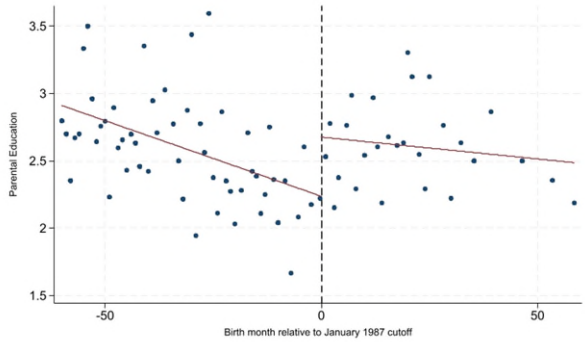


Figure 3(a). Maternal education (mother sample, 60-month bandwidth)

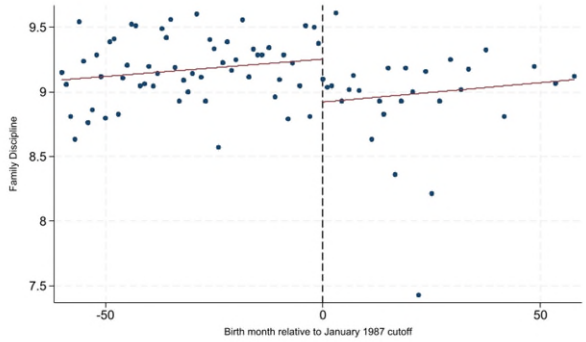


Figure 3(b). Family discipline (mother sample, 60-month bandwidth)

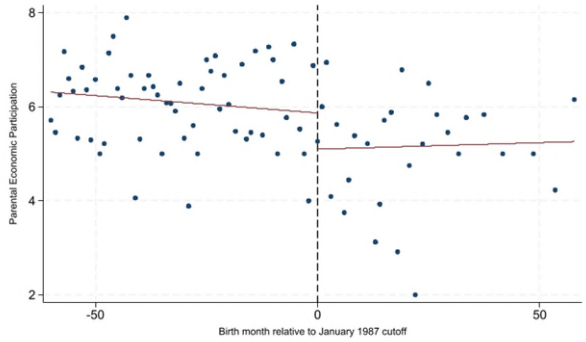


Figure 3(c). Maternal economic participation (mother sample, 60-month bandwidth)

Figures (Using Father's Sample)

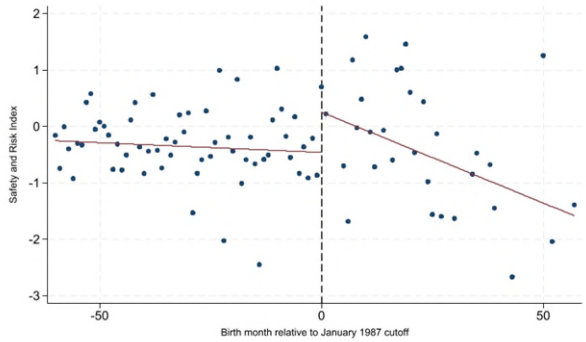


Figure 4(a). Safety and risk index — composite (father sample, 60-month bandwidth)

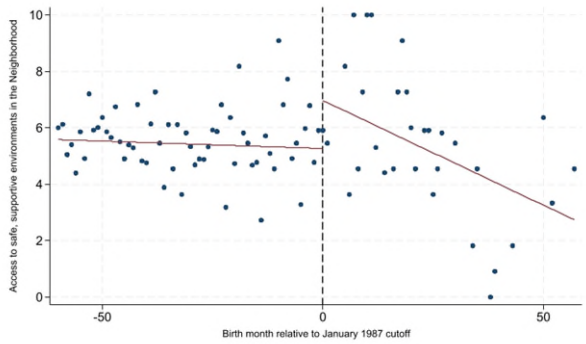


Figure 4(b). Access to safe, supportive environments (father sample, 60-month bandwidth)

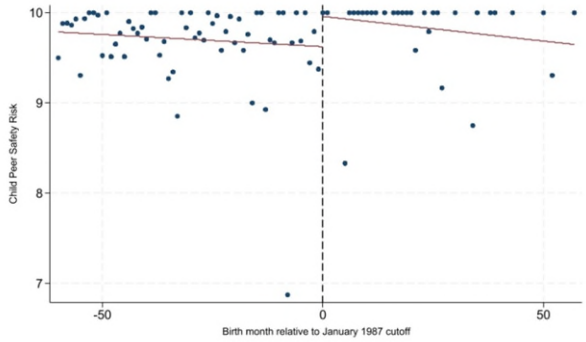


Figure 4(c). Child Peer Safety Risk (father sample, 60-month bandwidth)

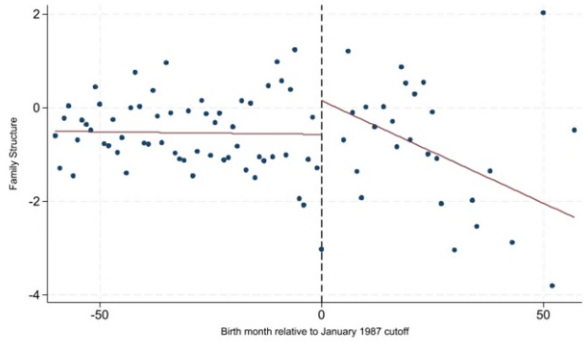


Figure 5. Family Structure (father sample, 60-month bandwidth)

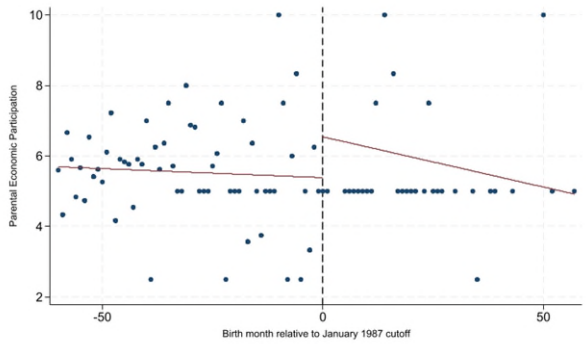


Figure 6. Parental economic participation (father sample, 60-month bandwidth)

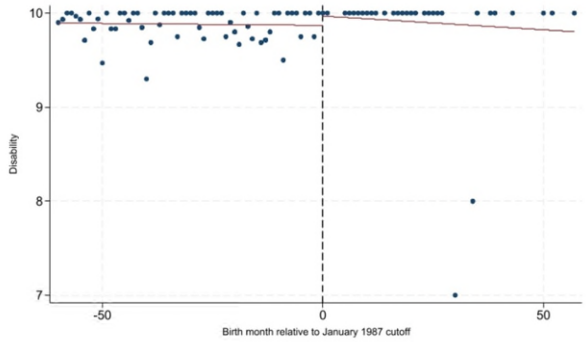


Figure 7. Disability (father sample, 60-month bandwidth)

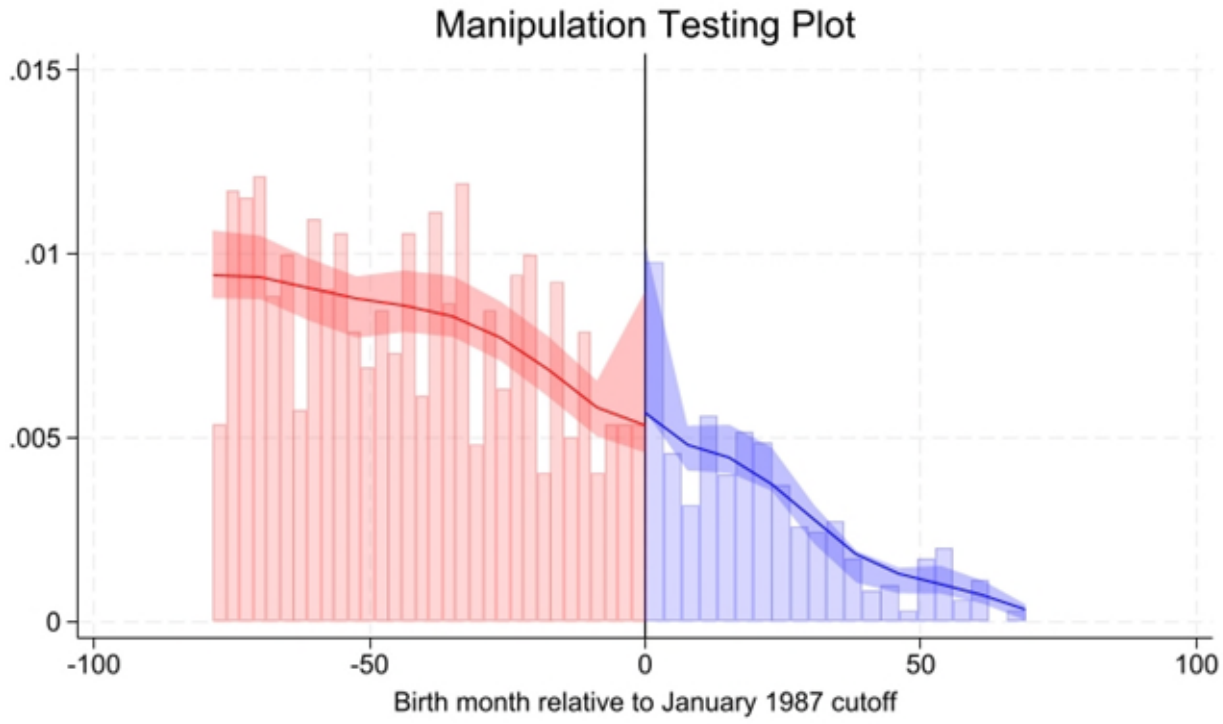


Figure 8(a). Manipulation Testing Plot (mother sample, 96 months)

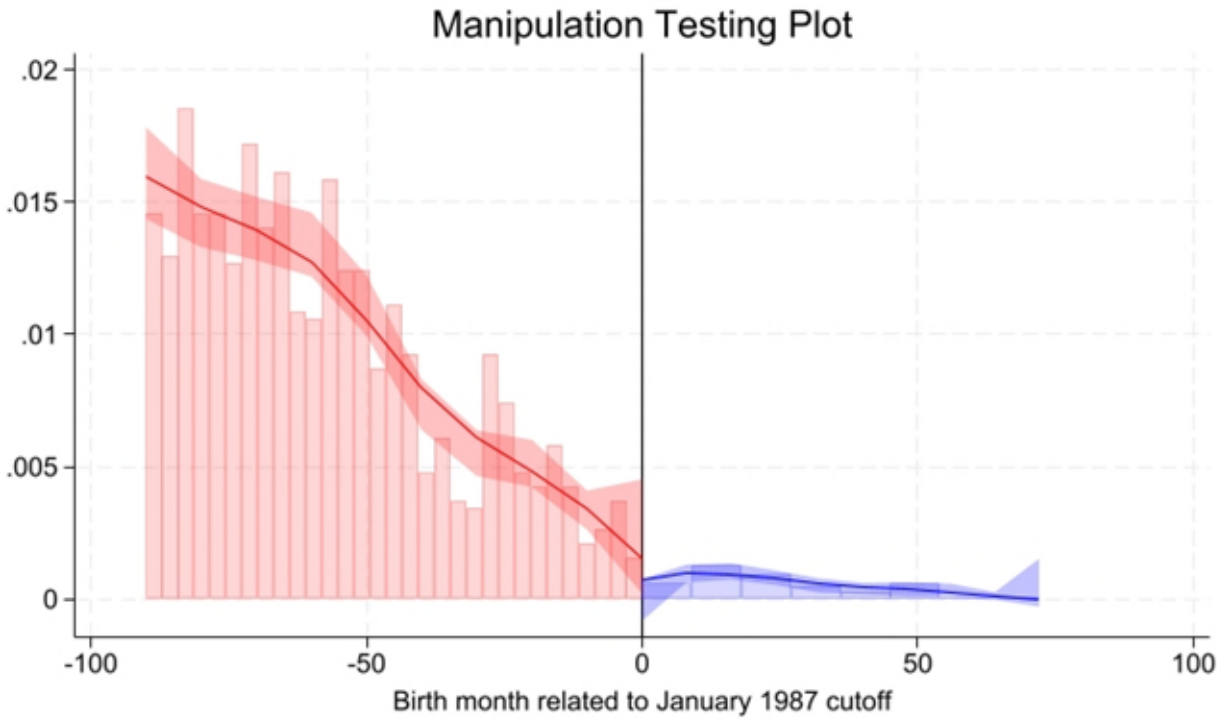


Figure 8(b). Manipulation Testing Plot (father sample, 96 months)