Parenting Style and Children's Skill Development[*]

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Abstract

How does parenting style influence children's cognitive and non-cognitive skill development? This paper examines the impact of key dimensions of parenting style - warmth, reasoning, hostility, and consistency - using longitudinal data from Australia that tracks children from middle childhood to adolescence. Estimating the effect of parenting style on skill development presents challenges related to omitted variable, simultaneity, and reporting bias. To address these, we employ fixed effects, control for baseline skills, and use past parenting style levels as instruments. Our findings show that a one standard deviation (SD) increase in parental hostility reduces children's non-cognitive skills by 0.12–0.23 SD, depending on age. Inconsistency in rule enforcement negatively affects skills in middle childhood (by 0.08–0.10 SD) but has no significant impact during adolescence. We find little evidence that parenting style significantly influences cognitive skill development. However, hostility also negatively impacts school performance, mirroring its impact on non-cognitive skills and suggesting an indirect influence through non-cognitive development. These results highlight the potential effectiveness of parenting training interventions aimed at reducing parental hostility and promoting consistent discipline to support children's non-cognitive skill development and long-term human capital formation.

Keywords: Parenting, parenting style, human capital, skill development

JEL Codes: D10, J13, J24

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1 Introduction

How parents raise children shapes their skill development and has lasting effects on human capital accumulation, well-being, labor market outcomes, and health (Hanushek and Woessmann (2008), Conti, Mason and Poupakis (2019)). Parenting style - the way parents set rules, provide guidance, and respond to children's behavior - is closely linked with the development of children's cognitive and non-cognitive skills.[1] Its key dimensions, such as hostility, reasoning, warmth, and consistency, often vary by socio-economic status (SES), highlighting the potential for targeted interventions to reduce skill gaps and promote intergenerational mobility. Designing effective interventions requires a clear understanding of which dimensions of parenting style are most critical to skill development and how their impact evolves throughout childhood. While the impact of other parental investments on children's development is well-documented, the influence of parenting style remains less explored.[2]

This paper addresses this gap by analyzing how parenting style influences children's skill development, focusing on four key dimensions: hostility, warmth, reasoning, and consistency. Using longitudinal data from Australia, we estimate the effects of these parenting dimensions on cognitive (matrix reasoning and vocabulary tests) and non-cognitive skills (emotional, behavioral, and prosocial skills), as well as school performance (general, math, and reading) during middle childhood and adolescence. Unlike prior studies that focus on broad parenting categories or single dimensions, we assess the distinct contributions of each dimension of parenting style, providing evidence to inform the design of targeted policy interventions such as parenting training programs.[3] Our findings also clarify which dimensions explain the links between parenting styles (e.g., authoritarian vs. authoritative) and children's outcomes found in previous literature (see, for example, Spera (2005) and Doepke and Zilibotti (2019)). By separately estimating effects on both types of skills and school performance, we contribute to a deeper understanding of the different mechanisms underlying skill development.

Estimating the impact of parenting style on skill development presents three key challenges. First, parenting style is shaped by parents' characteristics and other parental investments that also influence skill development, leading to omitted variable bias. Second, simultaneity bias arises because parenting style and children's skills influence each other,

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[1] See, for example Cunha et al. (2006), Spera (2005), Fletcher et al. (2008), García and Gracia (2009), Luyckx et al. (2011), Heckman and Mosso (2014), Attanasio et al. (2020a), Doepke and Zilibotti (2017).

[2] See Heckman and Mosso (2014), Almond, Currie and Duque (2018) and Doepke and Zilibotti (2019) for an overview.

[3] Kim (2019) and Agostinelli et al. (2023) develop and estimate models for parenting style choices to address selection and endogeneity issues, but focus on specific dimensions of parenting style, such as punishment or interfering with the choice of friends. Falk et al. (2021) include broader definitions of parenting style, but group dimensions that do not allow identifying which dimension of parenting style influences skills in particular.

with parents often adjusting their parenting strategies in response to changes in their child's skills. Third, skill measures reported by parents, as we show, suffer from reporting bias that is correlated with parenting style. To address these challenges, we estimate a skill production function with fixed effects to control for time-invariant characteristics, baseline skills to account for earlier investments and initial conditions, and time-varying controls for dynamic household- or child-specific factors. To mitigate simultaneity bias, we use an instrumental variable (IV) approach, where we instrument current changes in parenting style dimensions using their past levels. This approach assumes that past parenting style influences the current one but is uncorrelated with current unobserved factors shaping skill development. Finally, to address reporting bias in parent-reported skill measures, which may be correlated with parenting style, we employ two approaches. First, our IV approach mitigates reporting bias, as past parenting style is unlikely to be correlated with current changes in reporting bias. Second, we also use teacher-reported skill measures, as the bias in teacher reports is unlikely to be correlated with current parenting style.

For our empirical analysis, we use the Longitudinal Study of Australian Children (LSAC)[4], which offers rich information on parenting style and other relevant factors such as time investments and multidimensional measures of children's skills. To assess the multidimensional nature of parenting style, we employ a factor analysis, which identifies five parenting style dimensions. First, parental warmth, captures how much affection parents express to their children. Second, parental reasoning, assesses how parents explain rules and consequences to their children. Third, parental hostility, captures how often parents react angrily to negative behavior, as well as how frequently they praise the child for positive behavior. Fourth, attempted consistency, evaluates how often parents attempt to reinforce the completion of requests and punishments for non-compliance. Fifth, inconsistency, measures how often the child gets out of such punishment.[5]

Using these dimensions of parenting style, we provide novel empirical evidence that parent-reported non-cognitive skill measures are subject to reporting bias. Parents who

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[4] Department of Social Services, Australian Institute of Family Studies and Australian Bureau of Statistics (2022)

[5] We link to the literature on parenting style in economics and developmental psychology. In economics, the literature has focused on the impact of different parenting styles following the psychology literature as Baumrind (1967) and Maccoby and Martin (1983) like permissive, neglecting, authoritarian, and authoritative style on skill development (see Doepke, Sorrenti and Zilibotti (2019) for an overview). The styles summarize the extent to which parents choose to intervene in their children's behavior. For instance, see Doepke and Zilibotti (2017) who define the following: parents exert a permissive style when they leave children their independence and are supportive but not strict. This is contrasted by an authoritarian style, where parents impose their will through coercion strictly and are not supportive. Parents can instead also be authoritative; which is when they aim to affect the child's choice using persuasion and are strict but supportive. Another category are neglectful parents who are neither strict nor supportive.

exhibit more hostile behavior and less consistent disciplinary strategies tend to underreport their children's skills relative to teachers' reports.[6] We rely on teacher-reported measures as a benchmark, as their reporting bias is unlikely to be correlated with parenting style. However, a concern remains that children spend less time with teachers than with parents, children behave differently in school than at home, and teachers observe them in group settings, which may bias their judgments.[7] To get a holistic view, we use parent's reports on skills and apply an IV approach to correct for reporting bias. Using estimates based on teacher-reported measures, we verify that the IV strategy successfully mitigates reporting bias. Consequently, we present as main results estimates based on parent-reported measures, which offer greater precision due to the larger sample size.

We find that a one standard deviation (SD) increase in parental hostility reduces non-cognitive skills (behavioral and emotional skills), by 0.12 to 0.23 SD, depending on age.[8] At younger ages (8-11), parental inconsistency also significantly reduces non-cognitive skills by 0.09-0.10 SD. We do not find significant effects of other parenting style dimensions such as parental warmth, reasoning or attempted consistency. However, when analyzing subcategories of non-cognitive skills, we find that parental warmth positively influences prosocial skills (helping others, kindness) but has no effect on externalizing skills (conduct and hyperactivity) and internalizing skills (emotional and peer problems). These findings indicate that the association between authoritative parenting (low hostility, high warmth, consistency, and reasoning) and non-cognitive skill development, as documented in previous research (see Spera (2005) and Doepke and Zilibotti (2019) for an overview), is primarily driven by low levels of hostility and inconsistency. Parental warmth and reasoning play a limited role, except in the development of prosocial skills. In contrast, for authoritarian parents (high hostility and consistency, low warmth and reasoning), the benefits of consistency are outweighed by the negative impact of higher levels of hostility.

We show that cognitive skills are less affected by variation in parenting style. For vocabulary and matrix reasoning tests, a one SD increase in parental warmth lowers scores by 0.03 SD, while inconsistency reduces them by 0.07 SD. School performance, in contrast, is

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[6] This is consistent with Del Bono, Kinsler and Pavan (2020) reporting bias in parental-reported measures of children's non-cognitive skills linked to parents' non-cognitive skills.

[7] In absolute values, teacher reports might be also biased, however we apply fixed effects to abstract from individual level effects. A concern might be that we falsely detect a reporting bias because children do not change behavior at school but only at home. In the case of the reported bias, that implies that children being subject to increased parental hostility do not change their behavior at school but only at home. This is unlikely as we also find an effect of parental hostility and inconsistency on children's skills using teacher reports, indicating that behavior at school also changes.

[8] Our main outcome for non-cognitive skills is the reversed total Strengths and Difficulties Questionnaire (SDQ), indexing high externalizing (low conduct and hyperactivity problems) and internalizing (low emotional and peer problems) skills.

affected by hostility in the same direction as for non-cognitive skills, suggesting that it is indirectly influenced by non-cognitive skills. For both skills and school performance, we find no systematic gender differences. We also find that parents with lower income exhibit higher levels of hostile and inconsistent parenting, which may contribute to the skills gap between children from different socio-economic backgrounds in the case of non-cognitive skills and school performance. For example, hostile and inconsistent parenting may result from stress (Sanders and Woolley (2005), Bloomfield and Kendall (2012), Hutchison et al. (2016) and Cobb-Clark, Salamanca and Zhu (2019)), which parents with lower income experience at a higher level.

Our findings indicate that parental training programs aimed at reducing hostility and inconsistency could be more effective than programs targeting other dimensions of parenting style, assuming that parenting style is equally modifiable across dimensions. Therefore, targeting households with higher levels of hostile and inconsistent parenting may be a promising way to improve skills and school performance. Since the effects on cognitive skills are smaller, policy interventions should address other factors beyond parenting to achieve substantial improvements in cognitive skills.

This paper contributes to the literature on children's skill development. Existing research primarily focuses on time and monetary investments as key determinants of skills in models of human capital formation (Cunha and Heckman (2008) and Cunha, Heckman and Schennach (2010), Attanasio, Meghir and Nix (2020), Attanasio et al. (2020b) and Wiswall and Agostinelli (2020)). Caucutt et al. (2020) find that time and monetary investments are complementary, while Del Boca, Flinn and Wiswall (2014) document an increasing influence for monetary investments in later childhood. None of these studies considers parenting style as investment, a gap closed by theoretical models of parenting style and skill development as in Lizzeri and Siniscalchi (2008), Doepke and Zilibotti (2017, 2019), Cobb-Clark, Salamanca and Zhu (2019). These theoretical extensions are supported by associations between parenting style and skills documented in the literature (Spera (2005), Dooley and Stewart (2007), Fiorini and Keane (2014), Del Bono et al. (2016), Le Forner (2021)). However, identifying the impact of parenting style remains challenging due to data limitations and estimation difficulties. Thus, our main contribution is to address these identification challenges and provide novel evidence on the causal impact of parenting style and its dimensions on skill formation.

The remainder of the paper is structured as follows. Section 2 describes the data used and presents key empirical facts on parenting style dimensions and skill development in Australia, as well as evidence for potential reporting bias in parent-reported skill measures. Section 3 outlines the empirical framework, while Section 4 discusses the results. Finally,

Section 5 provides concluding remarks.

2 Data

2.1 Data sources and construction

To estimate the impact of parenting style on children's skills, we use data from the LSAC. The survey collects information about the children and their parents, including measures of child development such as cognitive and non-cognitive skills. A key advantage of LSAC is its detailed information on parenting style, time-use diaries, children's skills, and demographics. This feature allows a rigorous analysis of the impact of parenting style on children's skill outcomes taking into account other parental investments such as time spent with the child. Additionally, the dataset is rich enough to compare effects on various types of non-cognitive skills across age groups.

The richness of the parenting style questions allows us to explore different dimensions of parenting style and their impact. An additional advantage is that child skills assessments are reported by two respondents: teacher and parent. The availability of the same measures from different respondents enables us to address potential reporting bias. This is useful when evaluating non-cognitive skills as these measures often suffer from reporting bias related to respondent characteristics (Del Bono, Kinsler and Pavan (2020)).

The LSAC survey follows two cohorts of Australian children. The older cohort (K - kindergarten), born 1999-2000 (4,983 children) is followed from age 4-5, while the younger cohort (B - baby), born 2003-2004 (5,107 children) is followed from age 0-1 onward. Due to the availability of measures and biannual panel construction, we analyze impacts for the following age groups: 8-9, 10-11, 12-13, and 14-15.[9] Hence, we can study the impact of parenting style on child development from middle childhood to adolescence.

In this section, we first provide a detailed discussion of the variables used in our estimation. We then outline the sample selection process and present descriptive statistics.

Non-cognitive skills

The LSAC measures non-cognitive skills using the Strengths and Difficulties Questionnaire (SDQ), which is completed by parents and teachers for children aged 4-15. The SDQ consists of 25 items that cover five areas of non-cognitive skills: emotional difficulties, conduct problems, hyperactivity issues, peer problems, and pro-social behavior (see Table 1 for details).

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[9] Data for the age groups 4-5 and 6-7 years are only used as instruments in the estimation - see Section 3 for details.

Each item is scored on a scale from 0 to 2, and the scores are summed to create an index for each of the five areas. These area scores are further summed to obtain three broader indexes, as described by Goodman, Lamping and Ploubidis (2010) and Le Forner (2021).

The indexes are emotional skills (internalizing SDQ), behavioral skills (externalizing SDQ), and pro-social skills (social SDQ). Emotional skills include questions about emotional health and peer problems such as whether the child often worries, is unhappy, prefers to play alone, or gets along with other children. In contrast, behavioral skills capture conduct problems and hyperactivity issues, describing the child as restless, easily distracted, disobedient or prone to cheating. Finally, pro-social skills reflect pro-social behavior such as being kind, volunteering to help, or being considerate of other's feelings. Internalizing and externalizing SDQ scores are conventionally summed to produce the total SDQ score, which is the measure we use in our main analysis. We later present results for externalizing, internalizing, and social skills separately.

To facilitate the interpretation of results, we reverse the SDQ measures so that higher values indicate fewer problems in the respective area and higher non-cognitive skills. We standardize all indexes within each age group. This allows us to focus on changes in relative skills compared to peers rather than on overall skill accumulation.

Cognitive skills

We use two types of measures to quantify children's cognitive skills. The first measure is the Peabody Picture Vocabulary Test (PPVT). The PPVT is an age-adjusted test that assesses children's understanding of spoken words and their receptive vocabulary. In LSAC, it is administered to children aged 4-5 years, 6-7 years, and 8-9 years. Second, we use the Matrix Reasoning Test (MRT), a nonverbal intelligence test that assesses children's ability to complete patterns in diagrams, measuring their logical reasoning skills. This test is administered to children aged 6-7 years, 8-9 years, and 10-11 years. Measures of cognitive skills are standardized by age group following the same approach as for non-cognitive skills.

School performance

Since cognitive measures are only available for younger children and do not cover the entire childhood, we also use parent-reported school performance as a proxy for cognitive skill development.[10] These measures are informative not only because they capture cognitive abilities, but also because school performance is associated with skills such as memory,

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[10] For three age groups, teacher-reported school performance data is also available. However, the panel is too short, and the number of observations is too small to use it in the estimation.

problem-solving, and critical thinking. Moreover, this performance measure may also capture certain non-cognitive skills as traits like easily being distracted or nervousness can affect children's grades relative to their peers. These combined abilities are essential for academic success and impact future labor market prospects. Nonetheless, school performance is a less objective measure, and may be a subject to reporting bias similar to the bias discussed in the case of non-cognitive skills.

In our estimation, we use measures of school performance in three areas: total performance, reading, and math. Parents were asked to compare the child's performance in each area to that of other children in their class. Responses were recorded on a five-point scale, ranging from 'much better' to 'much worse'. Data on total school performance are available for children aged 6 to 15. For reading and math performance, data is available for children up to age 13. All school performance measures performance are standardized by age group following the same approach as for non-cognitive skills.

Parenting style dimensions

We use parent-reported information on their behavior towards the child to measure parenting style dimensions. In LSAC, parenting questions are consistently asked across waves in four areas: hostile parenting, parental warmth, consistent parenting and inductive reasoning (see Table 2 for a more detailed description of each subgroup). We abstract from using other available information on parenting style (i.e. provided by the secondary caregiver) as it was not consistently collected across waves and instead use the information provided by the primary caregiver (hereafter referred to as 'parent'). To pool question items, we follow Fiorini and Keane (2014), Del Bono et al. (2016) and Le Forner (2021) applying factor analysis to derive dimensions of parenting style. In contrast to Fiorini and Keane (2014) and Le Forner (2021), we do not pool all parenting questions together to extract as few factors as possible. As our paper focuses on the impact of parenting style dimensions on skill development, we investigate how the different components influence skill development. Therefore, we conduct a separate factor analysis by age group for each of the four parenting areas available across survey waves to be measure their impact separately: hostile parenting, parental warmth, consistent parenting and inductive reasoning. We perform the factor analysis by age groups, as certain parental behaviors may occur with different frequencies at different child ages, thereby impacting parenting style differently. For details on the procedure, please see Appendix A.3.

Factor analysis results in five dimensions of parenting style (see Table 3). The first dimension, parental warmth, reflects how often the parent expresses affection, hugs the child, and enjoys spending time with them. The second dimension, parental reasoning, describes

how often parents explain rules or corrections to the child. The third dimension, parental hostility, captures the absence of praise, the level of disapproval and the display of negative emotions when punishing the child. Consistent parenting is represented by two dimensions.[11] The first, attempted consistency, indicates how often the parent attempts to punish the child or ensures requests are completed. The second, parental inconsistency, describes how often the child avoids or ignores punishment.

Time investments

In the LSAC dataset, time-use diaries are used to collect data on children's activities. These diaries cover over two 24-hour periods-typically one on a weekday and another on a weekend day-and completed by the parent until the child reaches age 10 after which children fill them out themselves. We categorize the recorded activities into five main groups, following Fiorini and Keane (2014) and Le Forner (2021): (1) educational activities with parents, (2) educational activities with adults other than parents, (3) general care time with parents, (4) general care time with adults other than parents, and (5) other time.

2.2   Sample selection

For the estimation, we pool both birth cohorts together and compare their outcomes at the same ages to increase sample size, and hence, power. Due to the panel attrition, the sample at age 4-5 is smaller with 9,369 children compared to 10,090 at the beginning of the panel. Its size decreases over time to 6,664 at the age of 14-15 (the details of panel attrition by age and cohort are presented in Table 4).

   We further restrict our sample by dropping observations with missing information on any of the explanatory variables used in our analysis. The primary source of missing data is time investment information, which is unavailable for slightly more than 30% of the initial sample. In particular, all observations at ages 6–7 and 8–9 are missing for the younger cohort (B). As a result, our sample is reduced to 7,355 children and 20,368 observations over the entire study period.

2.3   Demographics and sample representativeness

Table 5 presents descriptive statistics for the estimation sample across age groups, ranging from 8-9 years to 14-15 years. The statistics indicate that roughly half of the children are female. The proportion of Indigenous children is around 3%-4% and corresponds to the

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[11] Two factors are identified as significant according to the eigenvalue rule in factor analysis.

general share of Indigenous people in the Australian population.[12] The percentage of children living with both parents declines with age, likely due to parental separation or divorce as the child grows older, resulting in children living with a single parent or alternating between households. Due to missing time investment data, only children from cohort K are included in the 8-9 age group, whereas in older age groups, the sample is approximately evenly split between cohort K and cohort B.

The primary caregivers in the estimation sample are predominantly women (over 97%), with an average age of 39 years in the first estimation wave. This means that reporters of parenting style and children's skills are mothers. Approximately 30% of these primary caregivers have a college education. Twenty percent of households live in poverty, a higher rate than in the general population, where it is around 13% (Sila and Dugain, 2019).[13] On average, households have 1.5 children, suggesting that most are only children. The majority of households reside in urban areas.

To assess the representativeness of the estimation sample, we compare it to the original sample based on key demographic characteristics (see Table 6). Children in the estimation sample are less likely to be from Indigenous groups and more likely to live with both parents. Additionally, their parents are, on average, slightly older (by less than one year) and more educated (by 2.5 percentage points). Households in the estimation sample tend to have fewer children and higher incomes, and are less likely to live in poverty. However, the differences between the original sample and the estimation sample are not very large. Nevertheless, our estimates should be interpreted with the understanding that the estimation sample is not fully representative of the underlying population.

2.4 Descriptive evidence on parenting style, skills and income

Association between parenting style and skills

How parents raise their children can significantly influence their human capital development. To explore the relationship between human capital and parenting style dimensions, we present the associations of different styles with non-cognitive skills (total SDQ; see Figure 1) and cognitive skills (matrix reasoning test; see Figure 2).[14] Non-cognitive skills are

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[12] In 2021, Aboriginal and Torres Strait Islander people represented 3.8% of the total Australian population (Australian Bureau of Statistics, 2021a).

[13] Both studies follow the OECD definition, which states that the poverty line is set at half the median household income of the total population.

[14] We also conduct a correlation analysis to examine how different parenting style dimensions correlate with each other and relate to the four parenting styles commonly used in the literature (authoritative, authoritarian, neglectful, and permissive). For details, see Appendix A.4

positively correlated with parental warmth and negatively correlated with hostility and in-consistency. Cognitive skills show a weak negative correlation with inconsistency.

However, since we plot correlations, other factors may drive the association between parenting style dimensions and skills. Therefore, our empirical strategy seeks to establish a more structured and informative relationship. For instance, parental income and education levels could influence parenting style. Financial stress, for example, may lead to increased hostility or inconsistency, as parents may face time constraints, reduced mental bandwidth, and less patience to enforce rules calmly or consistently (Haushofer and Salicath, 2023). Additionally, the number of siblings and the child's gender could act as confounding factors. Reporting bias might also affect the association, as more hostile parents potentially underreport their children's skills. By accounting for these potential confounders and employing a rigorous empirical approach, we present more robust evidence on the nuanced relationship between parenting style dimensions and skill outcomes. Before proceeding, we present descriptive evidence on two potential confounders to motivate our empirical approach: variation in parenting style by SES and differences in skill reports from teachers and parents.

Parenting style and income

Children from socioeconomically disadvantaged backgrounds, on average, display lower skill levels than their peers (Cunha et al. (2006), Heckman and Mosso (2014), Attanasio et al. (2020a)). The skill gap associated with socio-economic background is well-documented across various contexts and applies to both cognitive and non-cognitive skills. While factors such as lower investments, initial skills, and peer influence are well-studied drivers of this gap, the impact of parenting style remains less explored (see Heckman and Mosso (2014) and Almond, Currie and Duque (2018) for an overview of the literature). If parenting style vary systematically by income or education, this variation might contribute to the skill gap and drive inequality in children's skills. For example, hostile and inconsistent parenting can arise from stress, which parents with lower incomes experience at higher levels (Sanders and Woolley (2005), Bloomfield and Kendall (2012) and Hutchison et al. (2016), Haushofer and Salicath (2023)). Consequently, these parents may exhibit higher levels of hostility, which is negatively associated with non-cognitive skills.

We examine whether the distribution of parenting style dimensions in Australia varies by income and education. We estimate the kernel density of parenting dimensions for different household income groups (the 1st, 3rd, and 5th quintiles; see Figure 3) and the primary caregiver's education level (college and non-college; see Figure 4). The plotted distributions reveal notable differences in parenting style across income quintiles. Parents in the lower part of the income distribution (1st quintile) are more likely to exhibit higher hostility and

inconsistency than those in higher income quintiles. Conversely, parents with lower incomes generally show lower levels of attempted consistency and warmth.

With respect to parental education, we observe less variation in parenting style. The primary differences are in attempted consistency and inconsistent parenting. College-educated parents exhibit higher levels of attempted consistency and lower levels of inconsistent parenting than those without a college degree (see Figure 4). Additionally, college-educated parents display lower levels of warmth. Differences in reasoning and hostility are minimal.

Generally, household income and parental education are associated with different parenting style and might contribute to children from lower socio-economic backgrounds lagging behind their peers, particularly in non-cognitive skills. Therefore, in our estimation, we control for socio-economic background to consistently estimate the effect of different parenting style dimensions on skills during childhood.

Non-cognitive skills and reporting bias

Reporting bias is another potential factor influencing the association between children's skills and parenting style. Existing research documents differences in the reporting of children's skills between teachers and parents, particularly in the context of non-cognitive skills (Kraemer et al. (2003), De Los Reyes et al. (2015)). These differences depend on parents' characteristics, such as their education, and their own non-cognitive skills (Del Bono, Kinsler and Pavan (2020)).

Using Australian data, we find that differences in reported children's skills between teachers and parents vary with parenting style. Figure 5 illustrates the distribution of differences in reported children's non-cognitive skills for parents exhibiting high and low levels of different parenting style. Notably, parents with higher levels of hostility and inconsistency tend to report their children's skills significantly lower than teachers do, while parents with high warmth tend to report higher non-cognitive skills for their children.

Time-invariant differences in reporting children's skills can be addressed by using child fixed-effects in the estimation process, while time-variant differences pose a challenge to a credible identification. For example, if parents become more hostile over time, they may report lower skill levels for their children because they focus more on misbehavior. Similarly, if parents become warmer, they might tolerate more misbehavior from their children as they prioritize maintaining a positive and supportive relationship. This scenario could lead to overestimation of the effect of hostility on skills when using the parent-reported measures or an underestimation of the effect of parental warmth.

To examine whether the correlation between differences in reported children skills and parenting style is not spurious, we regress the difference (both nominal and absolute value)

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in reported measures of children's skills on parenting style and parents' demographic characteristics while controlling for child fixed effects (see Table 7). We find that higher levels of parental hostility and inconsistency appear to widen the gap in reported non-cognitive skills (total SDQ score) between parents and teachers, with parents generally reporting lower skills than teachers. Conversely, parental warmth has the opposite effect, reducing the gap in reported measures of non-cognitive skills and leading parents to report higher skills on average. For total school performance, none of the parenting style dimensions appears to have a significant effect.[15]

Given these findings, we outline a comprehensive estimation strategy in Section 3. Since reporting bias is not constant over time and its changes are correlated with parenting style dimensions, failing to account for it would lead to biased and inconsistent estimates of the impact of parenting style on children's skills. To mitigate this bias, we employ an IV approach, leveraging the panel dimension of the data.

3 Empirical framework

In this section, we outline the empirical strategy used to estimate the causal impact of parenting style on cognitive and non-cognitive skills. We assume the production function of children's skills has the following form:

$$y_{ia} = F_a(Z_{ia}, y_{i0}) + \epsilon_{ia} \tag{1}$$

where y_{ia} represents the skills of child i in age group a, and F_a is an age-specific function that transforms a vector of production inputs Z_{ia} and the child's initial skill endowment y_{i0} into the skills level at age a. The production inputs Z_{ia} include vectors of parenting style dimensions PS_{ia} (parental warmth, reasoning, hostility, inconsistency and attempted consistency), time investments TI_{ia} (education and care time spent with parents and other adults) and primary caregiver and household characteristics X_{ia} at age a, which influence skill development.

There are three potential sources of bias when estimating the parameters of the production function described in Equation 1. First, omitted variables bias can arise if omitted factors are correlated with independent variables, such as parenting style dimensions. For example, excluding parental time investments, which may be correlated with parenting style (i.e. warmer parents tend to spend more time with their children), could bias results if both

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[15] As the panel is too short, and the number of observations is too small, we do not use teacher-reported school performance in the estimation.

factors contribute to skill development. Additionally, parents may adopt specific parenting style based on demographic characteristics (e.g., education), which also directly influence children's skills. Second, parenting style and children's skills may simultaneously influence each other. Parents might adjust their parenting style in response to current changes in children's skills, not just past ones-for example, compensating lower skill levels by increasing investments. Third, most skills measures rely on parent-reported indicators. As shown in Section 2.4, these indicators are subject to reporting bias, which may be correlated with production inputs. This could lead to over- or underestimation of the impact of investments on children's skills, depending on the relationship between the reporting bias and production input.

We assume a linear form of the production function, and estimate the following equation:

$$y_{ia} = \alpha_i + PS'_{ia}\delta_a + TI'_{ia}\gamma_a + X'_{ia}\beta + Y_{ia-1}\lambda + \epsilon_{ia} \tag{2}$$

using the method proposed by Blundell and Bond (1998). This approach provides unbiased estimates of the parameters associated with past skill levels by instrumenting past values of children's skills with their first and higher-order lags. Compared to the Arellano-Bond and Arellano-Bover estimators, this method uses both level and first-difference equations, thereby extracting more information from the data and enhancing the efficiency of the estimates.

Our estimation strategy addresses three potential sources of bias. With the model specification defined by Equation 2, we mitigate potential omitted variable bias in several ways. By including child-specific fixed effects, we control for all time-invariant factors that could influence both children's current skills and parenting style, such as initial skill levels, caregivers' education, or unobserved permanent parental ability. We also include a vector of lagged skill outcomes (Y_{ia-1}) to control for past skill levels and, consequently, past investments. Additionally, we incorporate a vector of time-varying controls (X_{ia}) that could influence both parenting style and children's skills, such as the primary caregiver's age and mental health status (Kessler Psychological Distress Scale), the presence of both biological parents in the household, the number of siblings, the log of caregivers' income, and a neighborhood quality measure.[16] To capture the age-specific impact of these investments on children's skills, we allow the coefficients of parenting style dimensions and time investments to vary by age groups.

To address the potential simultaneity bias between children's skills and parental investments, we employ the IV approach. Specifically, we use past values of parenting style and time investments as instruments. For the level equations, we instrument current parental

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[16]The neighborhood quality is measured using Socio-Economic Indexes for Areas (SEIFA) (Australian Bureau of Statistics (2021b)).

investments using changes from two periods ago (or earlier, if available), assuming that past variations in investments affect children's current skills only through their influence on present investment levels. Similarly, in the first-difference equation, we instrument changes in parental investments using their levels from two periods ago (or earlier), based on the assumption that past investment levels impact current skill changes only through their effect on changes in parental behavior. This approach ensures that our estimates are not biased by simultaneity, as the instruments rely on past information that should be unrelated to current skill shocks. The validity of this method depends on two key assumptions: (1) unexpected changes (shocks) in children's skills are uncorrelated over time, and (2) past values serve as strong predictors of parental investments while remaining uncorrelated with unobserved current factors.

Using instruments to address simultaneity issues may also help eliminate potential biases arising from the use of parent-reported measures (see Section 2.4). Reporting bias is correlated with the parenting style dimensions, leading to biased estimates. However, it is unlikely that reporting bias or its changes are correlated with past parental investments. By employing the IV approach with fixed effects, we can mitigate the impact of reporting bias in parent-reported measures on the causal estimates of parental investments' effects on children's skills.

To assess the presence of simultaneity and reporting biases, we leverage the richness of our data by comparing estimates obtained with both parent-reported and teacher-reported measures, with and without employing the IV approach. In theory, if there is no significant difference between the results obtained with and without IV using parent-reported measures, this would indicate that simultaneity and reporting biases are not present. In that case, we report the estimates obtained without the IV, as they are more efficient. However, if differences are observed, we then compare the results with and without IV using teacher-reported measures, which should be free from reporting bias correlated with parenting style dimensions. Finally, to further examine the presence of simultaneity bias, we compare the estimates derived from teacher-reported and parent-reported measures. In Section 4.3, we discuss the details and magnitude of the potential biases.

4   Results and Discussion

This section presents the estimation results obtained using the strategy discussed in Section 3. We begin with the main findings for non-cognitive skills, followed by those for cognitive skills. Then, we explore the heterogeneity of impacts and briefly discuss the outcomes of the robustness checks.

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4.1 Main findings

Relationship of parenting style with non-cognitive skills

We first describe results for non-cognitive skills using parent-reported total SDQ as the outcome. Table 8 presents the results for the main specification defined by Equation 2, estimating the impact of parenting style dimensions on non-cognitive skills at different age groups. Both Sargan and Hansen tests indicate that the instruments are relevant and exogenous.[17]. Across different age groups, only parental hostility has a consistently significant negative impact on non-cognitive skills ranging from 0.12 to 0.23 standard deviations (SD) per one SD increase of hostility, depending on age group. At younger ages (8-9 and 10-11), inconsistency decreases skills significantly by 0.09-0.10 SD. Reasoning has a negative impact of 0.07 SD at ages 8-9. However, this effect is only significant at the 10% level. Warmth and attempted consistency do not influence total SDQ. Comparing these values with the impact of parental education (post-compulsory schooling), estimated to be around 0.1 SD, the effect sizes of parental hostility and inconsistency are substantial (see Attanasio et al. (2020a) for estimates for the UK).

Given the significant relationship of parenting style with non-cognitive skills measured by total SDQ, we explore further how this relationship varies across different dimensions of non-cognitive skills. We use externalizing, internalizing, and prosocial skills as dependent variables and compare them with our main findings for total SDQ (pooling internalizing and externalizing skills). Externalizing skills describe behavioral problems like hyperactivity, while internalizing skills capture emotional difficulties like anxiety. Prosocial skills reflect social behavior, such as empathy. Figure 6 illustrates this comparison by plotting the estimated coefficient for the impact of each parenting style dimension on different categories of non-cognitive skills across ages (for estimation results, see Tables 9-11). Overall, the effect sizes and directions in the sub-categories are similar to those observed for total SDQ. Hostility and inconsistency appear to have a weaker influence on internalizing than on externalizing skills. However, for prosocial skills, parental warmth emerges as a significant factor, which is not the case for other non-cognitive skills. A one SD increase in parental warmth results in 0.10-0.14 SD increase in prosocial skills, with the effect increasing with age.

These findings link to the literature on different parenting styles (authoritative, authoritarian, neglectful, and permissive styles). For example, the authoritative parenting style is characterized by high warmth, reasoning, and consistency, along with low hostility. Previous research suggests that children of authoritative parents tend to have higher non-cognitive skills (Spera (2005), Luyckx et al. (2011), Delvecchio et al. (2020), McWhirter et al. (2023)).

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[17] The χ^2 statistics are equal to 43 and 38, respectively

Our results support these findings, suggesting that low hostility is the primary driver of the positive impact of this style, followed by high consistency. In contrast, we do not find an impact of warmth on total SDQ, so this dimension of authoritative parenting is not associated with higher non-cognitive skills. The negative impact of hostility may also explain the negative associations between non-cognitive skills and authoritarian and neglectful parenting styles found in previous studies (Fiorini and Keane (2014), Le Forner (2021), Spera (2005), Fletcher et al. (2008), Heberle, Briggs-Gowan and Carter (2015), McWhirter et al. (2023)). Given that we find hostility to have nearly twice the negative impact on non-cognitive skills compared to inconsistency, its negative effect is likely to offset the positive impact of consistency in authoritarian parenting. Permissive parenting (high warmth, high inconsistency, and low hostility) is associated with more externalizing problems and antisocial behavior (see McWhirter et al. (2023) for an overview). Our finding suggests that in this case, the negative effects of inconsistency can offset the positive effects of higher warmth on prosocial skills, leading to an overall decline in skill levels.

Our results suggest that parenting interventions should focus on reducing behaviors that contribute to hostility and inconsistency to enhance their effectiveness. In particular, increasing parental warmth may be crucial for improving social skills, indicating that the development of prosocial skills differs to some extent from that of internalizing and externalizing skills. Additionally, the timing of interventions is crucial, as the impact of parenting style on skill development varies by age. Tailoring interventions to the age group where they would be most effective can maximize their benefits. Based on our findings, reducing hostility at all ages can yield positive outcomes, while addressing inconsistency appears to be more effective at earlier ages, particularly before age 12.

Relationship of parenting style with cognitive skills and school performance

Table 12 presents the estimation results for the cognitive skills measured by MRT and PPVT scores.[18] The first column displays the results for MRT scores at ages 8-9 and 10-11, while the second column shows the results for PPVT scores at ages 6-7 and 8-9.[19] All coefficients for parenting dimensions are insignificant, except for warmth and inconsistency. Parental warmth has negative coefficients, with a decrease in cognitive skills by around 0.03 SD by one SD increase. Inconsistency decreases cognitive skills by around 0.07 SD.

Given that we do not have these cognitive assessments for all ages, we also present results

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[18] MRT and PPVT are neither parent- nor teacher-reported measures and are therefore not subject to reporting bias. Hausman tests indicate that both estimates, with and without IV, are consistent. Consequently, the presented estimates are derived without instrumenting for past parental investments.

[19] The sample size for the PPVT and MRT tests is too small to estimate the coefficients separately by age group.

for another, less objective measure: parent-reported school performance. Estimation results are presented in Table 13 for overall school performance, in Table 14 for math, and in Table 15 for reading. Hostile and inconsistent parenting negatively impact overall school performance, with an effect size of approximately 0.1 SD. For math performance, hostile parenting and warmth have negative effects, while for reading mostly inconsistency decreases performance.

In contrast to Fiorini and Keane (2014) and Le Forner (2021), we find evidence of the impact of parenting style on cognitive skills (MRT and PPVT scores). This could stem from our estimation strategy, which focuses on the effects of specific parenting style dimensions. Fiorini and Keane (2014) and Le Forner (2021) examine broad parenting styles, such as authoritarian or authoritative, which may obscure the effects of specific parenting style dimensions. We also find significant effects of parenting style dimensions on school performance, where, unlike cognition measures, hostility plays a role. One possible explanation is that performance is also influenced by non-cognitive skills, which could explain why our results for school performance align with those for non-cognitive skills.

These results indicate that parenting training focused on parenting style may be particularly effective in improving non-cognitive skills but less so for cognitive skills directly. Depending on the specific goals of policymakers, different intervention designs are required. However, it is important to consider that severe behavioral problems can impact grade progression and school outcomes, which in turn can affect cognitive skill development in the long run. Additionally, non-cognitive skills have increasing returns for wages later in life (see Carneiro, Crawford and Goodman (2007), Deming (2017) and Edin et al. (2022)). This relationship is further highlighted by our findings on school performance.

4.2 Heterogeneous effects by gender and socio-economic status

Tables 16 and 17 present estimates of the main specification separately for male and female children for non-cognitive skills. We split the sample to examine whether the effects of parenting dimensions differ by the child's gender. The differences in estimated coefficients are marginal. The effects of hostility are slightly larger for boys, who also appear to be more affected by inconsistency. However, magnitude of these differences is small. For cognitive tests such as MRT and PPVT, we do not find any gender differences (see Table 18 and 19). Similar to non-cognitive skills, we find stronger effects for boys regarding inconsistency in overall school performance and hostility in math and reading (see Tables 20 - 25). On average, boys seem to be more impacted by these parenting behaviors.

We also split the sample to examine whether the effects of parenting dimensions differ by household SES. We define households with income below the sample median as low SES

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households and those above the median as high SES households. For non-cognitive skills (total SDQ), we do not find significant differences in the effects of parenting style dimensions between low and high SES households (see Tables 26 and 27). This suggests that parenting interventions targeting parenting style are relevant for both low and high SES households. For cognitive skills, the results are mixed. For cognitive tests such as MRT and PPVT, the estimates are very similar across SES groups (see Tables 28 and 29). However, for school performance, the impact of parental inconsistency appears to be stronger among low SES households, whereas hostility plays a greater role in high SES households (see Tables 30–35).

4.3 Sensitivity analysis and robustness checks

In this section, we assess the robustness of our main results for total SDQ (non-cognitive skills), MRT and PPVT scores (cognitive skills), as well as school performance using Equation 2. First, we discuss how our empirical approach corrects for measurement error, reporting bias, and simultaneity. Then, we conduct checks for omitted variable bias and perform a sensitivity analysis to evaluate the robustness of our findings.

Assessing reporting bias and simultaneity

Do reporting and simultaneity biases affect the estimates of the impact of parenting style dimensions on children's skills? If so, to what extent? To address these questions, we compare a series of results. We begin by examining the estimates from the main specification for parent-reported non-cognitive skills with and without using the IV approach (see Table 8 for IV estimates and Table 36 for estimates without IV). If neither bias is present, the results obtained with and without IV should not differ significantly. Compared to the main results with IV, the non-IV estimates consistently show a negative impact of reasoning on skills. Additionally, the negative effect of hostility at younger ages appears to be overestimated, while the effect of inconsistency is underestimated. A Hausman test confirms that only the IV estimates are consistent, as we reject the null hypothesis of equal estimates ($\chi^2(48) = 83.58$, p-value $= 0.0011$). Thus, employing the IV approach is necessary to obtain consistent estimates.

The previous test, however, does not determine which bias-reporting bias, simultaneity bias, or both-affects the results. Since teacher-reported measures should be free from reporting bias correlated with parenting style dimensions, we investigate the impact of potential simultaneity bias by comparing IV and non-IV estimates for teacher-reported measures (see Table 37 for IV results and Table 38 for non-IV results).[20] The comparison suggests that

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[20] The teacher and parent samples are generally similar. However, in the parent sample, slightly more

while there are differences in the magnitudes of the coefficients for inconsistency, and reasoning varies in significance, a Hausman test comparing the estimates fails to reject the null hypothesis that the estimates are equivalent ($\chi^2(48) = 22.50$, p-value $= 0.9994$). This suggests that simultaneity bias may not be present and that reporting bias appears to be a greater concern than simultaneity bias.

The remaining question is whether our estimation strategy successfully mitigates reporting bias. To test this, we compare estimates using parent-reported and teacher-reported measures, as they should yield similar results (see Table 8 and Table 37). Figure 7 plots the estimated coefficients with their confidence intervals for teacher- and parent-reported skill measures. Coefficients for parental warmth, reasoning, and attempted consistency are similar in magnitude and significance. For hostility, a similar pattern emerges. However, in teacher reports, hostility at ages 14–15 is not significant, and although the coefficient remains negative, its magnitude is smaller. For inconsistency, teacher reports indicate greater relevance at later ages, while magnitudes remain similar at younger ages. Overall, the results hold, and our estimation approach appears to effectively mitigate reporting biases to a large extent.

We also test for the presence and extent of simultaneity and reporting biases in the case parent-reported school performance. Since teacher reports are not available, we can only compare estimates using parent-reported measures with and without the IV approach (see Table 13 for IV estimates and Table 39 for non-IV results). Coefficients for hostility obtained from regressions without IV are similar in magnitude to the IV results. In contrast, warmth and reasoning are significant at certain ages, while inconsistency appears smaller in magnitude. At the 0.1 confidence level, we reject the null hypothesis of the Hausman test, which states that the estimates are not significantly different ($\chi^2(38) = 53.11$, p-value $= 0.0526$). Therefore, bias appears to be present, and the use of the IV approach is advisable. Since reporting bias in parent-reported school performance does not appear to be an issue after controlling for fixed effects (see Section 2.4), this suggests that we may be dealing with a weak simultaneity bias in this case. Without adopting the IV approach, the impact of warmth would likely be overestimated, while the impact of inconsistency would be underestimated for school performance.

For cognitive measures such as MRT and PPVT scores, which are directly administered to the child during the survey, respondent bias is not a concern. However, simultaneity bias remains a potential issue. We do not find evidence that the use of instruments is necessary

children live with both parents, parents tend to have slightly higher education levels, and families have slightly higher incomes. They are also less likely to live in poverty but more likely to reside in rural areas. Additionally, children in the parent sample are more often from the older cohort (see Table 40).

(see Table 12 for results without IV and Table 41 for IV results). According to the Hausman test, we cannot reject the null hypothesis that the estimates are not significantly different in both cases. Therefore, we present the estimates without IV, as they are more efficient ($\chi^2(18) = 10.35$, p-value = 0.9199 for MRT; $\chi^2(17) = 5.59$, p-value = 0.9955 for PPVT).

Omitted variable bias

To avoid the omitted variable bias, we include factors in the regressions that are known in the literature to be associated with skill development and could potentially be linked to parenting style. These factors include time investments, the age, education, and mental health status of the primary caregiver, the presence of both biological parents in the household, the number of siblings, family income, and a neighborhood quality measure (Doepke, Sorrenti and Zilibotti (2019), Cobb-Clark, Salamanca and Zhu (2019), and Heckman and Mosso (2014)). Nonetheless, there may still be other factors that influence both skill development and parenting style, potentially inducing omitted variable bias.

To assess robustness, we extend the main model specification by including an additional set of controls. Specifically, we add variables for the type of school, the number of books at home, family financial shocks, child health shocks, and other stressful events. The type of school indicates whether the child attends a private or Catholic school versus a public school, as this may influence both parenting and skill development (e.g., differences in PTA meetings and the availability of information on children's behavior at school). The number of books at home is included as a proxy for additional parental investments. To account for financial instability, we include a dummy variable for financial shocks, which captures whether the family has experienced difficulties such as being unable to pay bills on time, missing mortgage payments, going without meals, being unable to heat or cool their home, or receiving welfare assistance. Financial shocks can be highly stressful and may influence both parenting behavior and children's skill development. Similarly, child health shocks could affect both parenting and skill outcomes. We control for this by including information on whether the child has any impairments in body function or structure. Additionally, we account for other stressful household events, such as the death or imprisonment of a family member, alcohol abuse within the household, and other adverse circumstances.

All of the shocks have a negative impact on skills, but the estimated parameters for parenting style remain unchanged (see Table 42, Table 43 for MRT and PPVT, and Table 44 for school performance). Therefore, it is likely that these shocks are not correlated over time and not correlated with the parenting style dimensions, as our main results still hold after controlling for these variables. Overall, adding these controls does not affect the results. This suggests that the main specification is relatively saturated and the omitted variables

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may not introduce endogeneity bias.

Despite these robustness checks, certain limitations of our approach remain. Firstly, given that we use time-invariant fixed effects, we do not control for time-varying selection. Therefore, estimates could be biased if, for example, financial shocks influence skills both directly and indirectly by increasing parental hostility due to stress. To mitigate these concerns, we include controls that serve as proxies for stress, such as parental separation and financial instability. However, any remaining time-varying influences may still bias the results, and the absence of exogenous variation in parenting style remains a limitation.

Sensitivity analysis

In the sensitivity analysis, we first examine how our results are affected by the way we define parenting style dimensions. In the main specification, we conducted a factor analysis on selected subgroups of questions related to parental behavior, resulting in five distinct dimensions of parenting style. Alternatively, we can pool all the questions together and obtain four factors through a joint factor analysis. Based on the reported loadings (see Tables 45 - 50), we label the factors as warm style, reasoning style, hostile and inconsistent style, and consistent style. Depending on the survey wave, the described factors load differently, so we assign the factors accordingly to the appropriate variable (see table notes and Appendix A.3 for details on the procedure). We then re-estimate the main specification using these new parenting style variables.

For non-cognitive skills, the results remain largely consistent with the main findings. However, warmth now exhibits a positive influence (see Table 52). This could be driven by the fact that praise, which originally loaded on hostility, is now included in the warmth dimension. Additionally, reasoning emerges as a negative predictor, though its effect is not consistent over time, similar to some previous results. As this effect lacks consistency, we refrain from overinterpreting it.

For cognition and school performance, our main results also hold (see Table 53 for cognitive skills and Table 54 for school performance). In general, reasoning consistently appears as a negative predictor, and since the factor score also loads on warmth, this may be related to our finding that these dimensions negatively impact skill development. The sensitivity analysis suggest that the choice of defining the parenting style dimensions does not affect the results.

5   Summary and Concluding Remarks

In this paper, we investigate the impact of parenting style on cognitive and non-cognitive skill development. Using the Longitudinal Survey of Australian Children, we estimate the effects of parental warmth, reasoning, hostility, and consistency on skill development. Additionally, we provide novel empirical evidence demonstrating reporting bias in parent-reported measures of non-cognitive skills. Parents who exhibit more hostile behavior and employ less consistent disciplinary strategies are more likely to underreport their children's skills compared to teachers' assessments.

We exploit the panel structure of the data, the IV approach, and the availability of rich demographic and investment variables to address potential omitted variable, simultaneity, and reporting biases, providing a robust analysis of the impact of parenting style dimensions on skill development. Our findings show that higher levels of parental hostility and inconsistency significantly reduce non-cognitive skills, while other parenting dimensions, such as warmth and reasoning, have limited effects. One exception is the positive impact of warmth on prosocial skills, which does not extend to externalizing or internalizing skills.

These results suggest that the positive association between authoritative parenting and skill development observed in the literature is primarily driven by low hostility and inconsistency, with warmth and reasoning playing a secondary role. In the case of authoritarian parenting, higher hostility offsets the positive effects of consistency, with hostility having a larger negative impact on skills than inconsistency.

For cognitive skills, measured via matrix reasoning and vocabulary tests, we find smaller effects. Warmth and inconsistency have negative impacts on cognition, though the magnitudes are small. In contrast, school performance is influenced by the same parenting dimensions as non-cognitive skills, suggesting an indirect effect of parenting on school outcomes through non-cognitive pathways.

These results highlight the importance of distinguishing between cognitive and non-cognitive skill development when modeling the effects of parenting. Parenting behaviors characterized by low hostility and inconsistency emerge as key factors for improving non-cognitive skills, making them promising targets for child development policies. Interventions aimed at reducing hostility and inconsistency could be particularly effective, especially when combined with strategies to promote parental warmth for enhancing prosocial skills. However, given the smaller direct impacts of parenting on cognitive skills, policies focused on improving cognition may need to incorporate additional components, such as educational investments, alongside parenting interventions.

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A   Data and descriptives

A.1   Non-cognitive skills measure

In this paper, we assess non-cognitive skills using the SDQ framework. Table 1 presents the five dimensions of non-cognitive skills, along with descriptions of the behaviors they encompass.

A.2   Cognitive measurements

To administer the Peabody Picture Vocabulary Test (PPVT), children are shown 40 plates of pictures from a PPVT stimuli book and given a word. They must then select the picture that best represents the meaning of the word, either by pointing to the correct image or stating its corresponding number. Test scores are calculated using Rasch modeling to ensure that changes in scores reflect actual changes in knowledge rather than shifts in position relative to peers.

The Matrix Reasoning Test is a nonverbal intelligence assessment consisting of 35 items of increasing complexity. Each item presents an incomplete set of diagrams, and the child must select the correct completion from five possible options. The test score is the number of correct responses given by the child, scaled according to age norms as determined in the WISC-IV manual.

A.3   Parenting measures

To identify dimensions of parenting style, we use questions on parental behavior toward their children. These questions are grouped into four categories, as described in Table 2.

We conduct a principal component analysis (PCA) for each parenting measure (warmth, hostility, reasoning, and consistency) by age group. To do so, we retain factors with eigenvalues greater than 1 and apply a rotation. In the survey, inductive reasoning at ages 4–5 and 6–7 includes only 2 and 3 of the 5 questions, respectively, that are asked at other ages. Therefore, we use only the available questions for those age groups.

Table 3 presents the rotated factor loading coefficients from the PCA for each measure and age group. Factor loadings greater than 0.25 in absolute value are displayed in bold. The PCA for each measure results in a single factor pooling all sub-questions (eigenvalues > 1), except for consistency, where we identify two distinct factors. The first factor represents an inconsistent parenting style, characterized by the child escaping punishment or ignoring it. The second factor captures whether parents attempt to ensure that the child fulfills requests and impose consequences when they do not. We refer to this factor as *attempted consistency*.

Factor loadings remain stable across waves, except for parental consistency in wave 3, where only one factor-*inconsistency*-is needed to describe the variation.

For our sensitivity analysis, we explore alternative ways to summarize the variation in parenting style using a joint factor analysis. Specifically, we conduct an additional factor analysis that pools all parenting style dimensions together. The factor loadings for this analysis are presented in Tables 45 to 50. This approach yields four factors, which largely correspond to those used in the main specification, with one key difference: hostile and inconsistent parenting are now combined into a single factor, characterized by high hostility and children escaping punishment. An additional factor captures high levels of attempted consistency alongside low levels of implemented inconsistency. Factors remain fairly consistent across waves, though their order may differ, or they may express the opposite direction. To ensure comparability, we assign them accordingly and reverse values where necessary.

Time investments

The data collection process employs two methods for measuring time spent with the child. For cohort K spanning three waves (ages 4-9), and cohort B, also across three waves (ages 0-5), data is collected over two 24-hour periods, typically one on a weekday and another on a weekend day. Parents record the information using paper diaries divided into 96 intervals of 15 minutes each. They select the activity, location, and individuals involved from a predefined set of options.

For cohort K, spanning three waves (ages 10-15), and cohort B, also across three waves (ages 10-15), children themselves become the informants, with support from the interviewer. Additionally, the Time Use Diaries undergo significant modifications. Instead of paper diaries, data is now collected using a computerized instrument. The time span of activities is no longer restricted to 15-minute intervals, and records are limited to a single day of the week—either a weekday or a weekend day. However, similar to the previous version, children complete the diary by selecting the activity, location, and individuals involved from a predetermined set of options.

To analyze the effect of parental time investment on children's cognitive and non-cognitive skills, we categorize the recorded activities into five main groups:

1. Educational activities with parents
2. Educational activities with adults other than parents
3. General care with parents
4. General care with adults other than parents
5. Other activities

Since time investments are not the primary focus of our analysis, we follow the aggregation rules established by Fiorini and Keane (2014) and Le Forner (2021) to classify activities. It is important to note that while the set of activity options may change over time, the primary divisions between educational, general care, and other activities remain consistent across survey waves. When multiple activities are reported simultaneously, we prioritize the primary activity. If information about the activity is missing, we categorize it as "other activities" to ensure that the total recorded time always sums to 24 hours. Regarding time spent with adults other than parents, we include it only when parents were not present during the activity. If parents were involved, the activity is classified as time spent with parents.

Depending on the survey wave, time-use diaries are collected on both weekdays and weekends or only on one of these days. When data is collected for both weekdays and weekends, we compute a weighted average for each time input, assigning a weight of 5 to weekdays and 2 to weekend days. To ensure comparability, we standardize time investments by wave and collection day (weekday, weekend, or weighted average of both).

A.4 Correlation of parenting styles

As the literature often summarizes parenting behaviors into broader parenting styles (patterns observed across parents), we examine their correlations in Table 55. Parental warmth and parental hostility are negatively correlated, while warmth is positively correlated with reasoning. Attempted consistency also shows a positive correlation with reasoning, though with a smaller magnitude. In contrast, hostility is positively correlated with inconsistency. Other correlation coefficients are relatively small. By construction, attempted consistency and inconsistency are uncorrelated, as they originate from the same factor analysis. Overall, the correlations are not particularly strong, reinforcing the multi-dimensional nature of parenting styles.

To compare these dimensions and their correlations with established parenting styles in the literature, we classify them according to Baumrind (1967) and Maccoby and Martin (1983) (see Spera (2005) and McWhirter et al. (2023) for an overview). This classification includes four parenting styles:

1. Authoritarian: Low warmth and reasoning, high consistency and hostility.

2. Authoritative: High warmth, reasoning, and consistency, low hostility.

3. Permissive: High warmth, low consistency and hostility.

4. Neglecting: Low warmth, reasoning, consistency, and hostility.

Regarding the observed correlations, the positive association between parental warmth and reasoning aligns with patterns of an authoritative parenting style. High hostility, on the other hand, is characteristic of an authoritarian parenting style. However, the presence of low consistency does not fully align with this classification and may instead be indicative of a neglectful style. When analyzing the factor structure summarizing parenting styles into fewer dimensions, we find that the first factor corresponds to an authoritative parenting style (see Table 51). This factor is characterized by high loadings for warmth, reasoning, and attempted consistency, while parents scoring low on this factor could be classified as neglectful. In contrast, the second factor loads primarily on hostility and actual inconsistency, which may correspond to an authoritarian style. A permissive style, meanwhile, appears to load on both the first and second factors, offsetting the hostility captured in the second factor.

B Figures
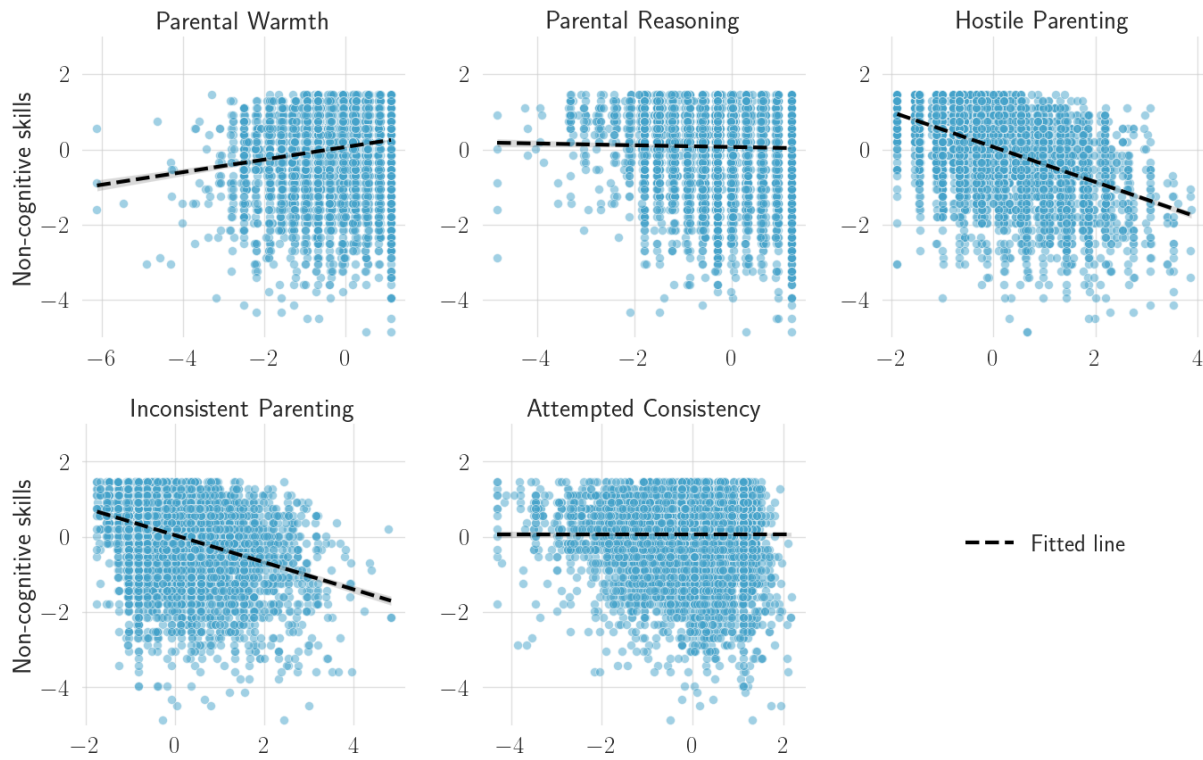
FIGURE 1: Correlation of parenting style dimension with parent-reported non-cognitive skills

Note: The figure displays the relationship between parent-reported non-cognitive skills (total SDQ score) and different parenting style dimensions. Each data point represents a child from age group 8-9. In addition to the data points, a line is plotted on the graph, which represents the fitted values based on a linear regression. The slope is estimated using population weights.
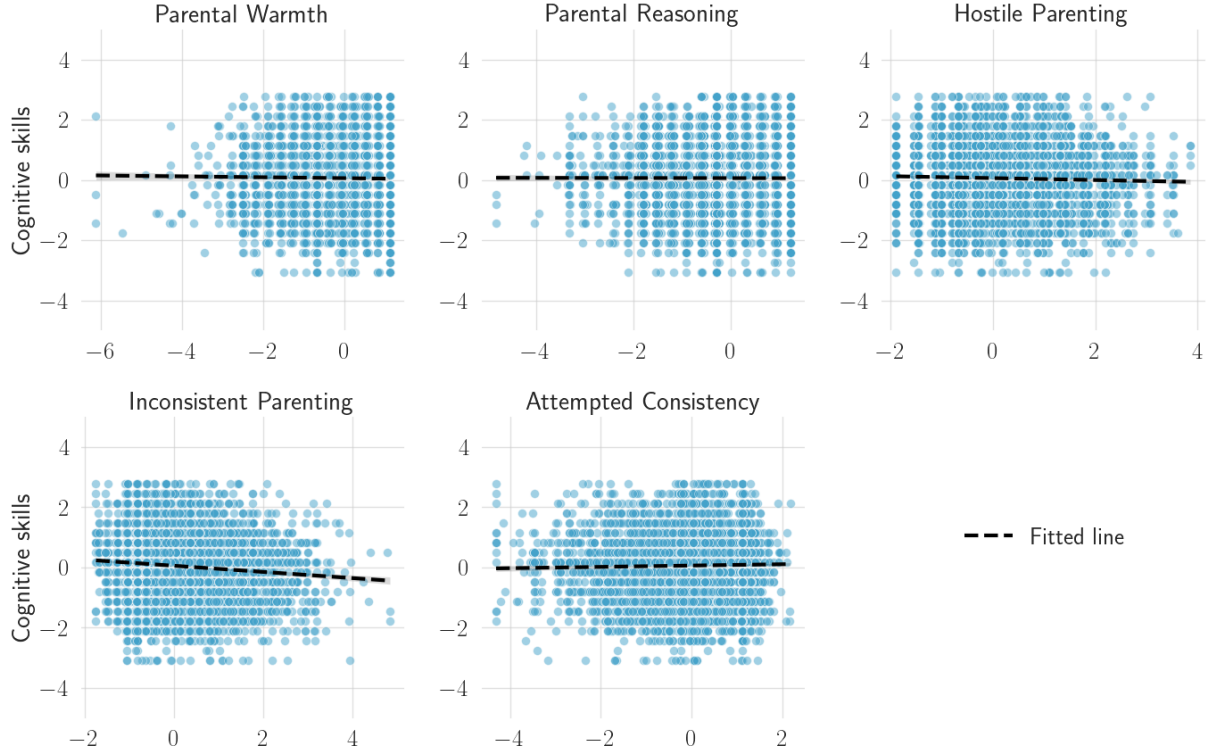
FIGURE 2: Correlation of parenting style dimension with cognitive skills

Note: The figure displays the relationship between cognitive skills (measured by the MRT) and different parenting style dimensions. Each data point represents a child from age group 8-9. In addition to the data points, a line is plotted on the graph, which represents the fitted values based on a linear regression. The slope is estimated using population weights.
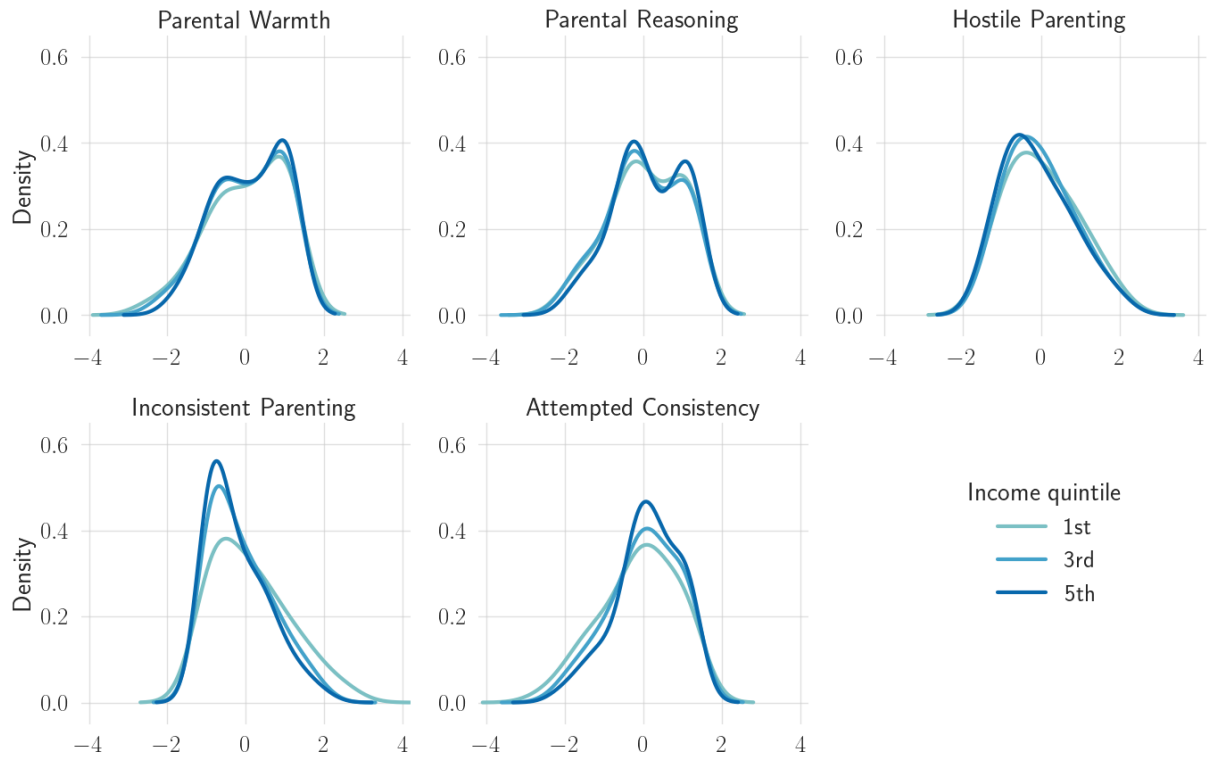
FIGURE 3: Distribution of parenting style dimensions by household income

Note: The figure displays the empirical distribution (smoothed using the kernel function approach with population weights) of different parenting style dimensions by income quintile for children aged 8-9.
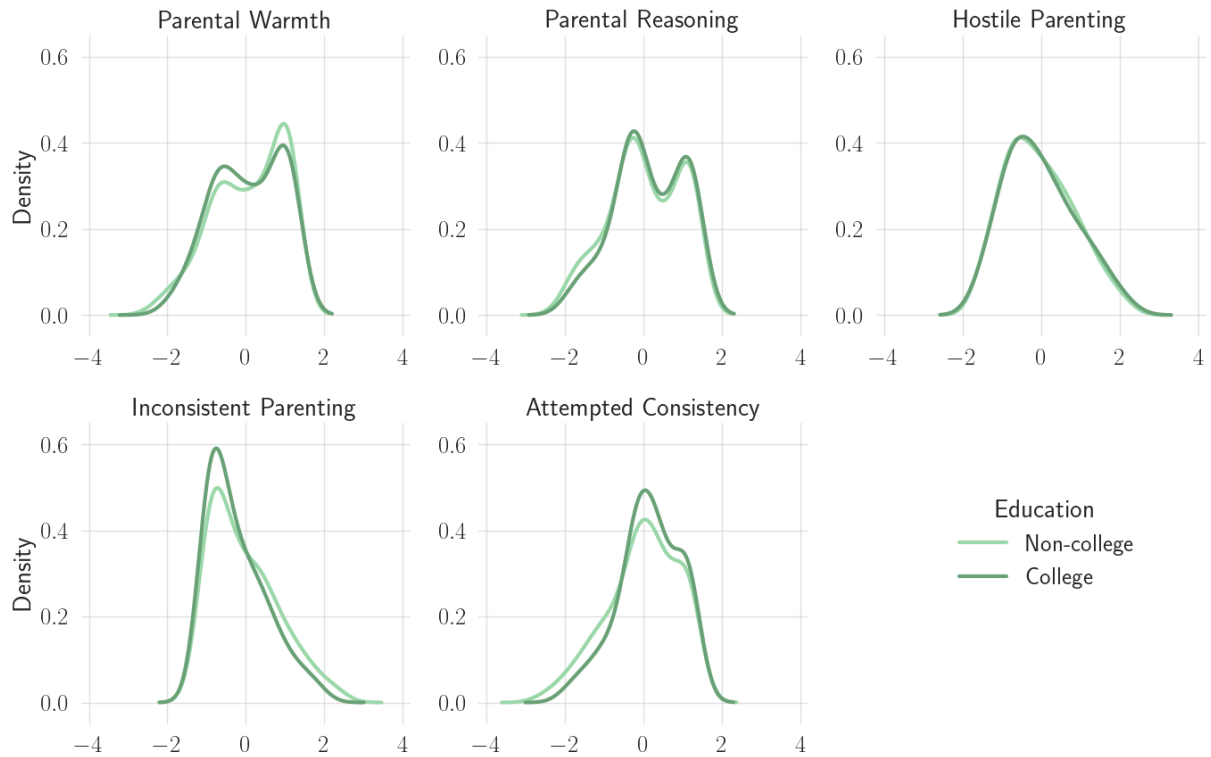
FIGURE 4: Distribution of parenting style dimensions by primary caregiver's education

Note: The figure displays the empirical distribution (smoothed using the kernel function approach with population weights) of different parenting style dimensions by primary caregiver's education for children aged 8-9.
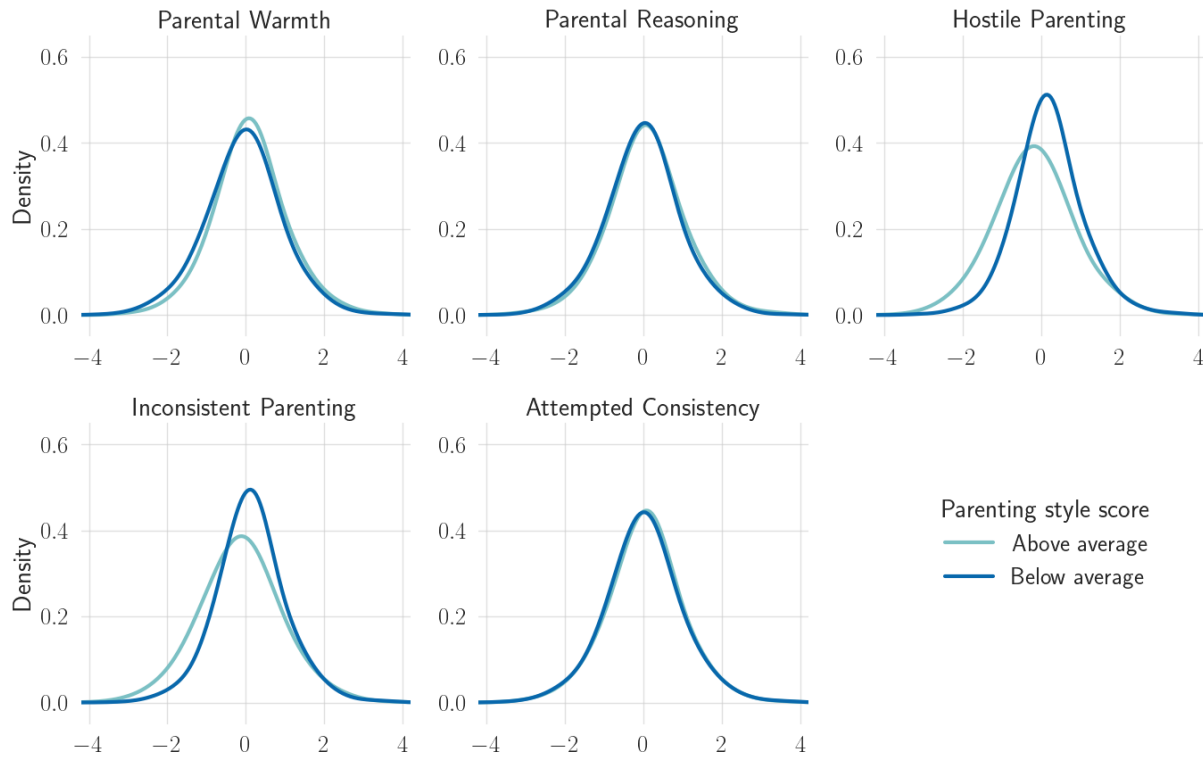
FIGURE 5: Distribution of teacher and parent-reported non-cognitive skills by parenting style dimension

Note: The figure displays the empirical distribution (smoothed using the kernel function approach with population weights) of parent-reported non-cognitive skills by parenting style dimensions for children aged 8-9.
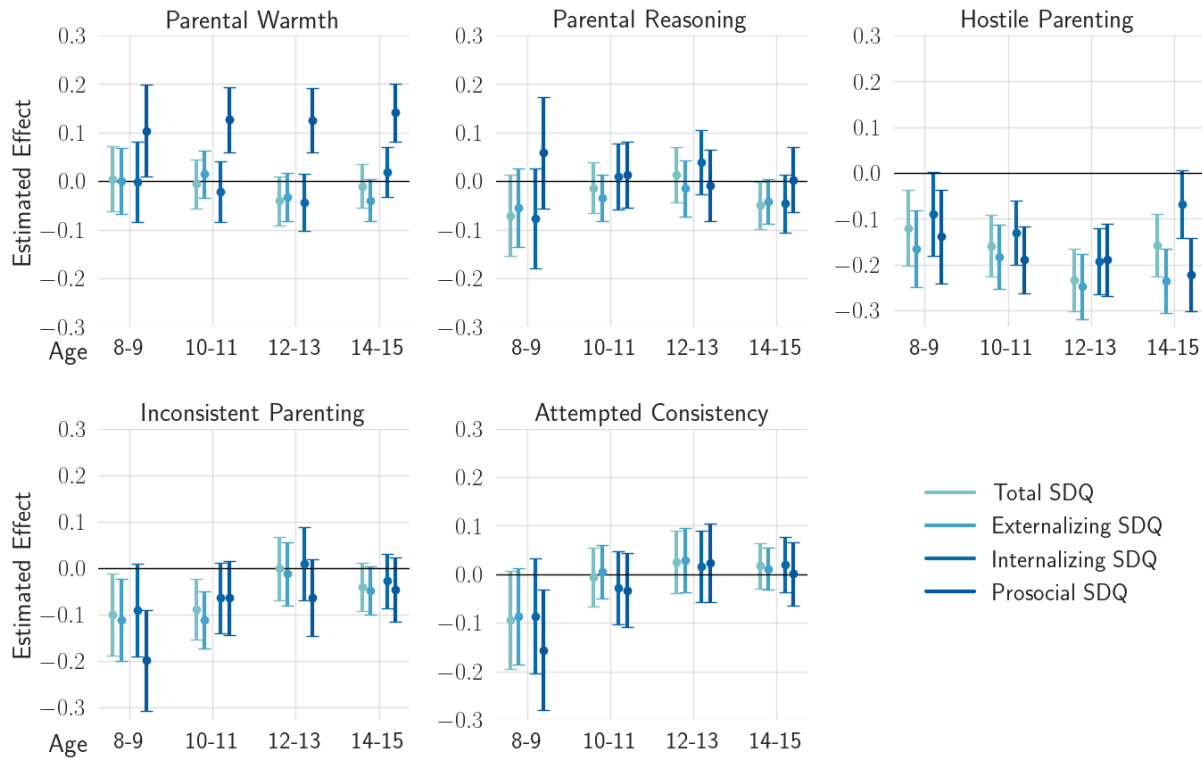
FIGURE 6: Impact of parenting style dimensions on parent-reported SDQ measures

Note: The figure presents estimated coefficients for the impact of five parenting styles on total, external, internal and prosocial skills measured by SDQ score using Blundel-Bond method. The range bars correspond to a 95% confidence interval for the estimated coefficients. The employed specification includes various controls: time investments, such as educational time spent with parents and others, care time spent with parents and others, the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).
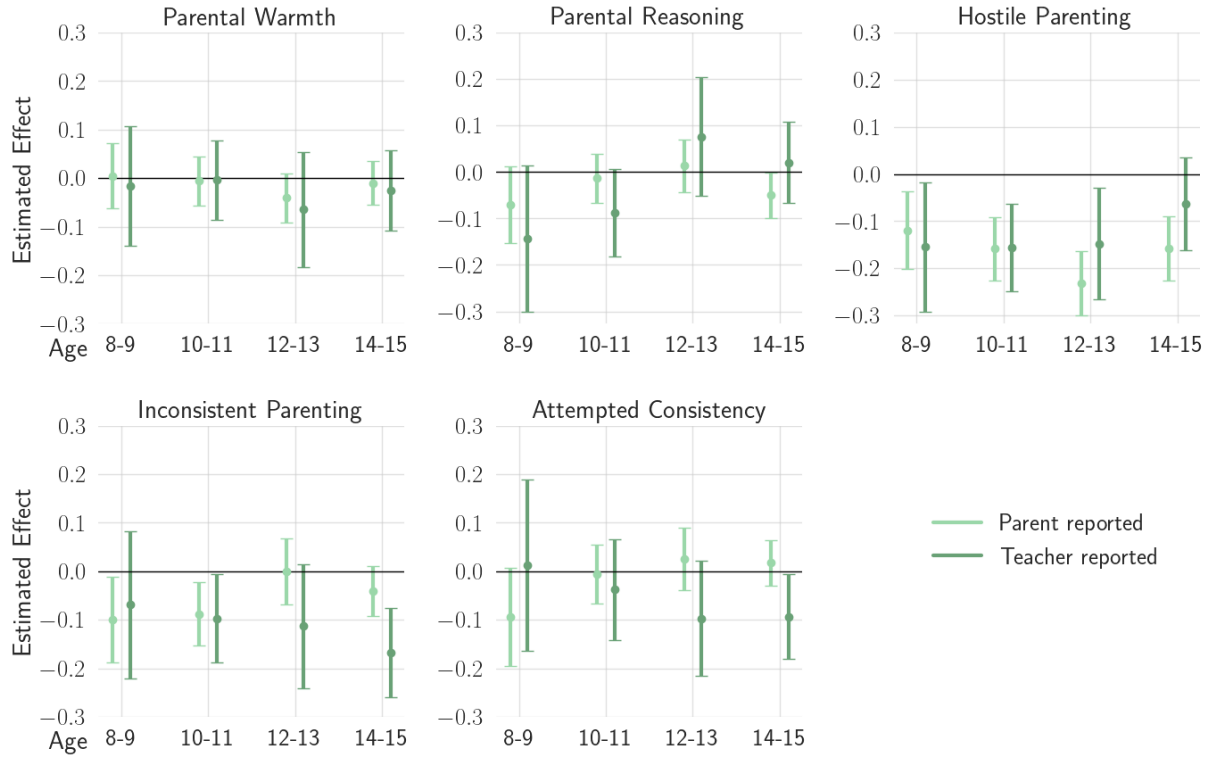
FIGURE 7: Impact of parenting style dimensions on total SDQ reported by parent vs teacher

Note: The figure presents estimated coefficients for the impact of five parenting behaviours on non-cognitive skills by parent and teacher reports using the Blundell-Bond method. The range bars correspond to a 95% confidence interval for the estimated coefficients. The employed specification includes various controls: time investments, such as educational time spent with parents and others, care time spent with parents and others, the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

C Tables

TABLE 1: Description of non-cognitive skill dimensions in the LSAC

Dimension	Description
Externalizing skills:	
Conduct	Displays hot temper, fights, does not display obedience, lies or cheats, steals
Hyperactivity	Restless, overactive, constantly fidgeting, easily distracted, does not think before acting, low attention span
Internalizing skills:	
Peers	Plays alone, few good friends, not liked by other children, bullied, get better along with adults than children
Emotions	Complains about headaches or sickness, unhappy, worries a lot, nervous or clingy in new situations, fearful
Prosocial skills:	
Social	Kind to younger children, volunteers to help others, considerate of other people's feelings, shares with other children, helpful if someone is hurt/feeling ill or upset

TABLE 2: Description of parenting dimensions in the LSAC

Dimension	Description
Parental warmth	Parent shows affection with hugs, kisses and holds the child often, hugs the child without a reason, expresses happiness about child, has warm and close times with the child, enjoys listening to child and doing things with them, parent feels close to child when it is happy or upset
Parental hostility	Frequency with which parents react to child's behaviour with praise or disapproval, parents react with anger when punishing child, feel to have problems managing child
Parental consistency	Frequency of making sure child completes requests, punishment if child does not complete requests, how often child gets away with things which parents feel they should be punished for, child gets out of punishment or ignores it
Parental reasoning	Frequency with which parent explains why child gets corrected, reasons about misbehaviour and why rules should be obeyed, explains consequences of behaviour, emphasizes reasons for rules

TABLE 3: Rotated factor loadings for single factors

	Age:					
	4-5	6-7	8-9	10-11	12-13	14-15
Parental warmth:						
Expresses affection	**0.739**	**0.817**	**0.829**	**0.835**	**0.850**	**0.848**
Hugs child	**0.741**	**0.775**	**0.776**	**0.792**	**0.805**	**0.795**
Expresses happiness	**0.757**	**0.771**	**0.796**	**0.796**	**0.790**	**0.794**
Warm/close times together	**0.797**	**0.829**	**0.850**	**0.850**	**0.847**	**0.843**
Enjoy time together	**0.747**	**0.786**	**0.812**	**0.795**	**0.792**	**0.801**
Feels close to child	**0.753**	**0.796**	**0.796**	**0.803**	**0.800**	**0.793**
Parental hostility:						
Praise child	**-0.550**	**-0.555**	**-0.641**	**-0.649**	**-0.688**	**-0.711**
Disapproval	**0.731**	**0.754**	**0.763**	**0.780**	**0.805**	**0.804**
Angry when punishing	**0.673**	**0.678**	**0.659**	**0.692**	**0.676**	**0.682**
Having problems managing	**0.743**	**0.744**	**0.733**	**0.752**	**0.760**	**0.756**
Parental consistency: Factor 1						
Ensures requests complete	-0.053	-0.055	-0.035	-0.043	-0.031	-0.050
Punishes child	-0.245	-0.223	**-0.279**	**-0.263**	-0.232	-0.188
Child gets away	**0.779**	**0.771**	**0.774**	**0.802**	**0.805**	**0.828**
Child gets out of punishment	**0.804**	**0.800**	**0.815**	**0.809**	**0.816**	**0.824**
Child ignores punishment	**0.793**	**0.812**	**0.800**	**0.808**	**0.818**	**0.842**
Parental consistency: Factor 2						
Ensures requests complete		**0.847**	**0.860**	**0.864**	**0.853**	**0.838**
Punishes child		**0.779**	**0.750**	**0.771**	**0.778**	**0.787**
Child gets away		**-0.259**	**-0.259**	-0.204	-0.202	-0.166
Child gets out of punishment		-0.147	-0.124	-0.144	-0.123	-0.131
Child ignores punishment		-0.021	-0.038	-0.060	-0.035	-0.039
Parental inductive reasoning:						
Explains corrections	**0.870**	**0.887**	**0.881**	**0.887**	**0.897**	**0.904**
Reasons when misbehaves	**0.870**	**0.819**	**0.751**	**0.738**	**0.756**	**0.746**
Reasons for rules		**0.882**	**0.867**	**0.864**	**0.882**	**0.887**
Explains consequences			**0.892**	**0.896**	**0.913**	**0.906**
Emphasizes reasons			**0.888**	**0.894**	**0.905**	**0.907**

Note: Factor loadings greater than 0.25 in absolute value are printed in bold. To summarize the variation across all measures, a single factor was sufficient, except for parental consistency from age 6–7 onward. Factors were selected based on eigenvalues greater than 1.

TABLE 4: Panel attrition

Age group	Younger cohort (B)	Older cohort (K)	Total
0-1	5,107	0	5,107
2-3	4,606	0	4,606
4-5	4,386	4,983	9,369
6-7	4,242	4,464	8,706
8-9	4,085	4,331	8,416
10-11	3,764	4,169	7,933
12-13	3,381	3,956	7,337
14-15	3,127	3,537	6,664

TABLE 5: Demographic characteristics of the sample

	Age			
	8-9	10-11	12-13	14-15
Child:				
Female	0.488	0.487	0.486	0.486
Age	8.339	10.385	12.459	14.385
Indigenous	0.040	0.038	0.032	0.032
Living with both parents	0.759	0.729	0.723	0.691
Premature infant	0.072	0.073	0.069	0.068
Older cohort (K)	0.510	0.510	0.510	0.510
Primary caregiver:				
Female	0.979	0.979	0.979	0.979
Age	39.036	41.100	43.281	45.306
College education	0.274	0.273	0.285	0.287
Household:				
Number of children	1.660	1.655	1.632	1.555
Weekly income (in AUD)	1,917	2,028	2,212	2,257
Living in poverty	0.189	0.202	0.190	0.203
Urban	0.860	0.861	0.858	0.866
Observations	8,416	7,933	7,337	6,664

Note: All means calculated using population weights.

TABLE 6: Sample selection for the estimation

Characteristic	Full sample	Estimation sample	P-value
Child:			
Female	0.487	0.489	0.533
Indigenous	0.035	0.026	0.000
Living with both parents	0.725	0.750	0.000
Premature infant	0.070	0.070	0.806
Older cohort (K)	0.510	0.547	0.000
Primary caregiver:			
Female	0.979	0.980	0.306
Age	42.177	43.003	0.000
College education	0.280	0.305	0.000
Household:			
Number of children	1.625	1.561	0.000
Weekly income (in AUD)	2,256	2,386	0.000
Living in poverty	0.196	0.160	0.000
Urban	0.861	0.859	0.311
Observations	30,350	20,368	

Note: For each characteristic, the means of the full and estimation samples are reported. The last column presents the results of a non-parametric test assessing the significance of differences between the full and estimation samples for each characteristic.

TABLE 7: Estimated parameters of the nominal and absolute difference between parent- and teacher-reported measures

	Total SDQ		Total school performance	
	Nominal diff.	Absolute diff.	Nominal diff.	Absolute diff.
Parental warmth	0.015	-0.021**	0.001	0.013
	(0.012)	(0.009)	(0.036)	(0.020)
Parental reasoning	-0.006	0.015**	0.031	0.018
	(0.010)	(0.007)	(0.029)	(0.016)
Hostile parenting	-0.118***	0.038***	-0.052	-0.015
	(0.012)	(0.009)	(0.033)	(0.018)
Inconsistent parenting	-0.060***	0.026***	0.048	-0.011
	(0.011)	(0.008)	(0.034)	(0.018)
Attempted consistency	0.017*	-0.001	-0.044	-0.012
	(0.009)	(0.007)	(0.027)	(0.014)
Educational time parents	0.004	0.002	0.010	-0.008
	(0.007)	(0.005)	(0.019)	(0.010)
Educational time others	0.000	0.000	-0.000	-0.019*
	(0.007)	(0.005)	(0.020)	(0.011)
Care time parents	-0.005	-0.006	-0.004	-0.014
	(0.007)	(0.005)	(0.020)	(0.011)
Care time others	0.012*	0.001	0.006	-0.009
	(0.007)	(0.005)	(0.020)	(0.011)
Observations	20460	20460	8184	8184

Note: All parameters are obtained from a single regression covering all children aged 4–15, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, moderate and severe mental health issues of the primary caregiver (measured by the Kessler test), the occurrence of stressful events in the household, and time fixed effects.

TABLE 8: Estimated parameters of the production function for parent-reported non-cognitive skills

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	0.004	-0.006	-0.041	-0.010
	(0.034)	(0.026)	(0.026)	(0.023)
Parental reasoning	-0.071*	-0.014	0.013	-0.050**
	(0.042)	(0.027)	(0.029)	(0.025)
Hostile parenting	-0.120***	-0.159***	-0.233***	-0.158***
	(0.042)	(0.034)	(0.035)	(0.035)
Inconsistent parenting	-0.100**	-0.088***	-0.001	-0.041
	(0.045)	(0.033)	(0.035)	(0.027)
Attempted consistency	-0.095*	-0.006	0.026	0.017
	(0.052)	(0.031)	(0.033)	(0.024)
Observations	2635	6469	5879	5385

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. The employed specification includes various controls: time investments, such as educational time spent with parents and others, care time spent with parents and others, the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test). For the full list of estimates, see Table 56.

TABLE 9: Estimated parameters of the production function for parent-reported externalizing skills

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	-0.000	0.014	-0.032	-0.040*
	(0.035)	(0.025)	(0.025)	(0.022)
Parental reasoning	-0.055	-0.035	-0.015	-0.042*
	(0.042)	(0.024)	(0.029)	(0.023)
Hostile parenting	-0.166***	-0.182***	-0.248***	-0.235***
	(0.043)	(0.036)	(0.036)	(0.035)
Inconsistent parenting	-0.111**	-0.111***	-0.012	-0.049*
	(0.045)	(0.031)	(0.035)	(0.026)
Attempted consistency	-0.087*	0.005	0.029	0.011
	(0.051)	(0.028)	(0.033)	(0.022)
Educational time parents	0.069	-0.067	0.096	-0.019
	(0.049)	(0.122)	(0.132)	(0.074)
Educational time others	0.012	0.129	0.195	0.038
	(0.100)	(0.200)	(0.169)	(0.202)
Care time parents	-0.019	-0.005	0.077	0.141*
	(0.051)	(0.212)	(0.087)	(0.072)
Care time others	-0.048	-0.070	-0.012	-0.205
	(0.134)	(0.126)	(0.162)	(0.130)
Observations	2637	6473	5880	5385

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Externalizing skills are measured using SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 10: Estimated parameters of the production function for parent-reported internalizing skills

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	-0.002	-0.022	-0.044	0.019
	(0.042)	(0.032)	(0.030)	(0.027)
Parental reasoning	-0.076	0.010	0.039	-0.046
	(0.053)	(0.035)	(0.034)	(0.030)
Hostile parenting	-0.090*	-0.130***	-0.193***	-0.068*
	(0.047)	(0.036)	(0.037)	(0.037)
Inconsistent parenting	-0.090*	-0.064*	0.010	-0.028
	(0.051)	(0.039)	(0.040)	(0.030)
Attempted consistency	-0.087	-0.028	0.017	0.019
	(0.061)	(0.039)	(0.038)	(0.029)
Educational time parents	0.048	-0.135	0.012	0.046
	(0.063)	(0.169)	(0.145)	(0.098)
Educational time others	-0.080	0.229	0.191	0.217
	(0.143)	(0.243)	(0.200)	(0.295)
Care time parents	-0.026	-0.275	0.127	0.194**
	(0.065)	(0.271)	(0.096)	(0.083)
Care time others	0.064	-0.307*	0.225	-0.107
	(0.170)	(0.184)	(0.184)	(0.169)
Observations	2636	6471	5880	5386

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Internalizing skills are measured using SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 11: Estimated parameters of the production function for parent-reported prosocial skills

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	0.104**	0.127***	0.125***	0.141***
	(0.048)	(0.034)	(0.034)	(0.031)
Parental reasoning	0.058	0.013	-0.010	0.003
	(0.059)	(0.035)	(0.038)	(0.034)
Hostile parenting	-0.139***	-0.189***	-0.190***	-0.222***
	(0.052)	(0.037)	(0.040)	(0.041)
Inconsistent parenting	-0.199***	-0.064	-0.064	-0.046
	(0.055)	(0.041)	(0.042)	(0.035)
Attempted consistency	-0.156**	-0.033	0.023	0.001
	(0.063)	(0.039)	(0.041)	(0.033)
Educational time parents	-0.031	-0.184	0.109	0.006
	(0.057)	(0.156)	(0.165)	(0.108)
Educational time others	0.133***	0.126	-0.177	0.469
	(0.040)	(0.205)	(0.247)	(0.299)
Care time parents	0.065	-0.201	-0.036	-0.107
	(0.070)	(0.309)	(0.105)	(0.100)
Care time others	-0.064	0.032	-0.202	-0.101
	(0.141)	(0.196)	(0.217)	(0.169)
Observations	2638	6475	5881	5386

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Prosocial skills are measured using SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 12: Estimated parameters of the production function for cognitive skills

	Matrix reasoning	Vocabulary test
Parental warmth	-0.034***	-0.033**
	(0.012)	(0.015)
Parental reasoning	0.009	0.013
	(0.011)	(0.014)
Hostile parenting	-0.006	0.009
	(0.012)	(0.015)
Inconsistent parenting	-0.069***	-0.067***
	(0.012)	(0.015)
Attempted consistency	-0.003	0.011
	(0.010)	(0.013)
Educational time parents	0.009	0.054***
	(0.009)	(0.013)
Educational time others	0.005	-0.001
	(0.007)	(0.014)
Care time parents	0.016*	-0.001
	(0.009)	(0.013)
Care time others	0.027***	-0.004
	(0.009)	(0.014)
Observations	9714	2607

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Cognitive skills are measured using Matrix Reasoning Test and Peabody Picture Vocabulary Test. The estimation for matrix reasoning is based on a sample of children aged 8–9 and 10–11, while the estimation for vocabulary tests uses a sample of children aged 6–7 and 8–9. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 13: Estimated parameters of the production function for parent-reported school performance

	Effect at age		
	10-11	12-13	14-15
Parental warmth	-0.050	-0.051	-0.010
	(0.033)	(0.038)	(0.031)
Parental reasoning	0.034	0.008	-0.033
	(0.040)	(0.045)	(0.038)
Hostile parenting	-0.089**	-0.102**	-0.072
	(0.039)	(0.046)	(0.044)
Inconsistent parenting	-0.090**	-0.136***	-0.136***
	(0.043)	(0.053)	(0.038)
Attempted consistency	-0.016	-0.034	-0.060*
	(0.042)	(0.053)	(0.035)
Educational time parents	0.058	0.352	0.145
	(0.178)	(0.256)	(0.141)
Educational time others	-0.109	0.414	0.302
	(0.300)	(0.283)	(0.374)
Care time parents	0.293	0.216*	0.307***
	(0.269)	(0.128)	(0.118)
Care time others	-0.092	-0.394	-0.295
	(0.187)	(0.319)	(0.248)
Observations	6872	6160	5346

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

T̲ABLE̲ 14: Estimated parameters of the production function for parent-reported math performance

	Effect at age	
	10-11	12-13
Parental warmth	-0.077**	-0.103***
	(0.034)	(0.034)
Parental reasoning	0.006	0.011
	(0.040)	(0.039)
Hostile parenting	-0.122***	-0.128***
	(0.039)	(0.040)
Inconsistent parenting	-0.008	-0.039
	(0.044)	(0.052)
Attempted consistency	0.028	0.051
	(0.045)	(0.051)
Educational time parents	-0.044	0.045
	(0.161)	(0.256)
Educational time others	-0.235	0.260
	(0.276)	(0.378)
Care time parents	0.144	0.305
	(0.271)	(0.217)
Care time others	0.091	-0.415
	(0.172)	(0.279)
Observations	6741	6022

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 15: Estimated parameters of the production function for parent-reported reading performance

	Effect at age	
	10-11	12-13
Parental warmth	-0.035	-0.058
	(0.049)	(0.040)
Parental reasoning	0.066	0.128***
	(0.050)	(0.044)
Hostile parenting	-0.049	-0.124***
	(0.053)	(0.045)
Inconsistent parenting	-0.128**	-0.169***
	(0.057)	(0.059)
Attempted consistency	-0.079	-0.128**
	(0.057)	(0.059)
Educational time parents	0.103	-0.286
	(0.213)	(0.309)
Educational time others	-0.572	-0.040
	(0.378)	(0.483)
Care time parents	-0.474	-0.045
	(0.411)	(0.255)
Care time others	-0.010	-0.442
	(0.218)	(0.304)
Observations	6778	5986

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 16: Estimated parameters of the production function for non-cognitive skills among boys

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	0.040	-0.007	-0.020	0.010
	(0.048)	(0.033)	(0.041)	(0.031)
Parental reasoning	-0.153**	-0.010	0.032	-0.080**
	(0.065)	(0.044)	(0.042)	(0.037)
Hostile parenting	-0.116**	-0.166***	-0.245***	-0.171***
	(0.058)	(0.043)	(0.048)	(0.046)
Inconsistent parenting	-0.110*	-0.071	0.012	-0.008
	(0.065)	(0.049)	(0.049)	(0.039)
Attempted consistency	-0.057	-0.026	-0.011	0.039
	(0.084)	(0.049)	(0.052)	(0.035)
Educational time parents	0.107	-0.112	0.045	-0.031
	(0.075)	(0.198)	(0.154)	(0.077)
Educational time others	0.067	0.220	0.393	-0.127
	(0.100)	(0.224)	(0.386)	(0.188)
Care time parents	-0.027	0.138	0.038	0.145*
	(0.065)	(0.353)	(0.122)	(0.078)
Care time others	-0.057	0.105	-0.045	-0.090
	(0.155)	(0.175)	(0.157)	(0.235)
Observations	1343	3298	2980	2725

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 17: Estimated parameters of the production function for non-cognitive skills among girls

| | Effect at age | | | |
	8-9	10-11	12-13	14-15
Parental warmth	-0.028	0.024	-0.030	-0.025
	(0.055)	(0.039)	(0.038)	(0.035)
Parental reasoning	0.007	-0.018	0.006	-0.043
	(0.064)	(0.037)	(0.041)	(0.036)
Hostile parenting	-0.103	-0.103*	-0.193***	-0.140***
	(0.065)	(0.059)	(0.052)	(0.048)
Inconsistent parenting	-0.073	-0.081	-0.020	-0.063
	(0.067)	(0.050)	(0.051)	(0.040)
Attempted consistency	-0.093	0.023	0.037	0.017
	(0.067)	(0.040)	(0.048)	(0.033)
Educational time parents	0.056	0.081	0.011	0.024
	(0.083)	(0.203)	(0.194)	(0.118)
Educational time others	-0.239	0.020	0.067	0.071
	(0.222)	(0.329)	(0.155)	(0.212)
Care time parents	-0.093	-0.062	0.111	0.198*
	(0.097)	(0.222)	(0.111)	(0.118)
Care time others	0.212	-0.267	0.269	-0.117
	(0.167)	(0.226)	(0.215)	(0.115)
Observations	1292	3171	2899	2660

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 18: Estimated parameters of the production function for cognitive skills among boys

	Matrix reasoning	Vocabulary test
Parental warmth	-0.038**	-0.036*
	(0.017)	(0.021)
Parental reasoning	0.021	0.017
	(0.015)	(0.021)
Hostile parenting	-0.010	0.019
	(0.016)	(0.020)
Inconsistent parenting	-0.057***	-0.066***
	(0.016)	(0.022)
Attempted consistency	-0.010	-0.002
	(0.014)	(0.019)
Educational time parents	0.008	0.074***
	(0.013)	(0.019)
Educational time others	0.010	0.028
	(0.010)	(0.017)
Care time parents	0.009	-0.013
	(0.012)	(0.018)
Care time others	0.026*	0.001
	(0.014)	(0.020)
Observations	4947	1322

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Cognitive skills are measured using Matrix Reasoning Test and Peabody Picture Vocabulary Test. The estimation for matrix reasoning is based on a sample of children aged 8–9 and 10–11, while the estimation for vocabulary tests uses a sample of children aged 6–7 and 8–9. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 19: Estimated parameters of the production function for cognitive skills among girls

	Matrix reasoning	Vocabulary test
Parental warmth	-0.032*	-0.026
	(0.017)	(0.022)
Parental reasoning	-0.001	0.012
	(0.015)	(0.020)
Hostile parenting	0.006	-0.013
	(0.017)	(0.022)
Inconsistent parenting	-0.082***	-0.074***
	(0.017)	(0.022)
Attempted consistency	0.007	0.023
	(0.013)	(0.017)
Educational time parents	0.010	0.035**
	(0.013)	(0.017)
Educational time others	0.002	-0.038**
	(0.010)	(0.016)
Care time parents	0.021	0.011
	(0.013)	(0.018)
Care time others	0.027**	0.001
	(0.012)	(0.020)
Observations	4767	2635

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Cognitive skills are measured using Matrix Reasoning Test and Peabody Picture Vocabulary Test. The estimation for matrix reasoning is based on a sample of children aged 8–9 and 10–11, while the estimation for vocabulary tests uses a sample of children aged 6–7 and 8–9. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 20: Estimated parameters of the production function for parent-reported school performance among boys

	Effect at age		
	10-11	12-13	14-15
Parental warmth	-0.056	-0.002	-0.030
	(0.045)	(0.049)	(0.057)
Parental reasoning	0.037	0.062	-0.012
	(0.058)	(0.065)	(0.061)
Hostile parenting	-0.063	-0.037	0.009
	(0.052)	(0.059)	(0.072)
Inconsistent parenting	-0.084	-0.222***	-0.217***
	(0.067)	(0.070)	(0.071)
Attempted consistency	-0.008	-0.105	-0.091
	(0.067)	(0.073)	(0.061)
Educational time parents	0.278	-0.052	0.203
	(0.243)	(0.263)	(0.158)
Educational time others	0.022	0.316	0.008
	(0.244)	(0.374)	(0.331)
Care time parents	0.110	0.198	0.343**
	(0.467)	(0.160)	(0.168)
Care time others	-0.172	-0.278	-0.749
	(0.265)	(0.223)	(0.461)
Observations	3509	3125	2703

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 21: Estimated parameters of the production function for parent-reported school performance among girls

	Effect at age		
	10-11	12-13	14-15
Parental warmth	0.024	-0.053	0.024
	(0.054)	(0.055)	(0.046)
Parental reasoning	0.002	0.022	-0.075
	(0.048)	(0.063)	(0.046)
Hostile parenting	-0.096	-0.122*	-0.097*
	(0.074)	(0.069)	(0.056)
Inconsistent parenting	-0.092	-0.085	-0.090*
	(0.063)	(0.076)	(0.048)
Attempted consistency	0.011	-0.000	0.030
	(0.052)	(0.078)	(0.041)
Educational time parents	-0.306	0.245	-0.093
	(0.287)	(0.304)	(0.198)
Educational time others	0.208	0.213	0.361
	(0.375)	(0.271)	(0.259)
Care time parents	-0.006	0.065	0.109
	(0.316)	(0.177)	(0.153)
Care time others	-0.236	0.311	-0.122
	(0.289)	(0.317)	(0.184)
Observations	3363	3035	2643

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 22: Estimated parameters of the production function for parent-reported math performance among boys

	Effect at age	
	10-11	12-13
Parental warmth	-0.067	-0.068
	(0.048)	(0.051)
Parental reasoning	0.077	0.058
	(0.059)	(0.075)
Hostile parenting	-0.130**	-0.096*
	(0.053)	(0.057)
Inconsistent parenting	0.015	-0.165**
	(0.073)	(0.078)
Attempted consistency	0.007	-0.026
	(0.075)	(0.070)
Educational time parents	-0.174	-0.609
	(0.197)	(0.487)
Educational time others	0.137	0.178
	(0.244)	(0.775)
Care time parents	0.336	-0.107
	(0.384)	(0.306)
Care time others	0.025	0.029
	(0.199)	(0.315)
Observations	3446	3060

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 23: Estimated parameters of the production function for parent-reported math performance among girls

	Effect at age	
	10-11	12-13
Parental warmth	-0.068	-0.095
	(0.061)	(0.063)
Parental reasoning	-0.035	0.056
	(0.068)	(0.065)
Hostile parenting	-0.109	-0.075
	(0.083)	(0.069)
Inconsistent parenting	-0.070	-0.069
	(0.067)	(0.078)
Attempted consistency	-0.050	-0.039
	(0.060)	(0.083)
Educational time parents	0.048	-0.023
	(0.269)	(0.389)
Educational time others	-0.536	-0.113
	(0.454)	(0.344)
Care time parents	-0.025	0.509
	(0.334)	(0.359)
Care time others	0.400	0.176
	(0.250)	(0.361)
Observations	3295	2962

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 24: Estimated parameters of the production function for parent-reported reading performance among boys

	Effect at age	
	10-11	12-13
Parental warmth	-0.086	-0.073
	(0.078)	(0.060)
Parental reasoning	0.122	0.184**
	(0.080)	(0.089)
Hostile parenting	-0.083	-0.124*
	(0.085)	(0.068)
Inconsistent parenting	-0.155	-0.194**
	(0.095)	(0.089)
Attempted consistency	-0.140	-0.140*
	(0.093)	(0.084)
Educational time parents	0.063	-0.323
	(0.297)	(0.529)
Educational time others	-0.025	0.259
	(0.152)	(1.138)
Care time parents	-0.603	-0.491
	(0.737)	(0.324)
Care time others	-0.128	0.044
	(0.206)	(0.518)
Observations	3457	3032

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 25: Estimated parameters of the production function for parent-reported reading performance among girls

	Effect at age	
	10-11	12-13
Parental warmth	-0.030	-0.069
	(0.058)	(0.066)
Parental reasoning	-0.041	0.085
	(0.058)	(0.058)
Hostile parenting	-0.035	-0.024
	(0.082)	(0.064)
Inconsistent parenting	-0.067	-0.215***
	(0.061)	(0.076)
Attempted consistency	0.008	-0.135*
	(0.054)	(0.072)
Educational time parents	0.137	-0.416
	(0.233)	(0.297)
Educational time others	-0.222	0.299
	(0.405)	(0.358)
Care time parents	0.148	0.332
	(0.318)	(0.296)
Care time others	0.019	-0.236
	(0.275)	(0.372)
Observations	3321	2954

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 26: Estimated parameters of the production function for non-cognitive skills among low SES household

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	-0.058	-0.055	-0.068	-0.040
	(0.067)	(0.041)	(0.043)	(0.041)
Parental reasoning	-0.005	0.012	0.059	-0.057
	(0.061)	(0.052)	(0.054)	(0.046)
Hostile parenting	-0.135*	-0.165***	-0.236***	-0.256***
	(0.078)	(0.062)	(0.064)	(0.063)
Inconsistent parenting	-0.103	-0.051	0.017	0.033
	(0.076)	(0.055)	(0.053)	(0.047)
Attempted consistency	-0.127*	0.006	-0.004	0.068*
	(0.073)	(0.054)	(0.057)	(0.040)
Educational time parents	-0.008	0.147	0.186	0.019
	(0.086)	(0.156)	(0.168)	(0.084)
Educational time others	0.004	0.181	-0.019	-0.061
	(0.145)	(0.199)	(0.202)	(0.185)
Care time parents	0.077	0.017	0.138	0.201**
	(0.097)	(0.259)	(0.197)	(0.102)
Care time others	-0.088	-0.413	0.148	0.036
	(0.253)	(0.288)	(0.171)	(0.091)
Observations	1168	2719	2445	2203

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 27: Estimated parameters of the production function for non-cognitive skills among high SES households

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	0.028	0.061	0.007	0.007
	(0.044)	(0.039)	(0.036)	(0.028)
Parental reasoning	-0.103	-0.066*	0.002	-0.025
	(0.074)	(0.039)	(0.036)	(0.028)
Hostile parenting	-0.119**	-0.144***	-0.205***	-0.114***
	(0.051)	(0.044)	(0.051)	(0.039)
Inconsistent parenting	-0.061	-0.090**	-0.036	-0.055
	(0.066)	(0.043)	(0.047)	(0.035)
Attempted consistency	-0.047	0.029	-0.001	-0.027
	(0.095)	(0.045)	(0.043)	(0.027)
Educational time parents	0.118	-0.279	-0.095	0.068
	(0.081)	(0.211)	(0.144)	(0.142)
Educational time others	-0.093	0.475*	0.135	0.220
	(0.116)	(0.269)	(0.212)	(0.150)
Care time parents	-0.062	-0.135	0.113	0.164*
	(0.073)	(0.298)	(0.098)	(0.091)
Care time others	0.290*	0.022	0.260	-0.156
	(0.173)	(0.216)	(0.254)	(0.241)
Observations	1467	3750	3434	3182

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 28: Estimated parameters of the production function for cognitive skills among low SES households

	Matrix reasoning	Vocabulary test
Parental warmth	-0.041**	-0.004
	(0.016)	(0.022)
Parental reasoning	0.020	0.015
	(0.015)	(0.021)
Hostile parenting	-0.014	0.032
	(0.017)	(0.023)
Inconsistent parenting	-0.066***	-0.072***
	(0.016)	(0.021)
Attempted consistency	-0.008	0.006
	(0.013)	(0.018)
Educational time parents	0.016	0.037**
	(0.014)	(0.018)
Educational time others	0.007	0.004
	(0.009)	(0.019)
Care time parents	0.035***	0.003
	(0.013)	(0.018)
Care time others	0.038***	0.001
	(0.015)	(0.020)
Observations	4236	1149

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Cognitive skills are measured using Matrix Reasoning Test and Peabody Picture Vocabulary Test. The estimation for matrix reasoning is based on a sample of children aged 8–9 and 10–11, while the estimation for vocabulary tests uses a sample of children aged 6–7 and 8–9. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 29: Estimated parameters of the production function for cognitive skills among high SES households

	Matrix reasoning	Vocabulary test
Parental warmth	-0.026	-0.051**
	(0.017)	(0.021)
Parental reasoning	-0.001	0.013
	(0.015)	(0.019)
Hostile parenting	0.001	-0.009
	(0.016)	(0.020)
Inconsistent parenting	-0.070***	-0.066***
	(0.017)	(0.023)
Attempted consistency	-0.001	0.012
	(0.014)	(0.018)
Educational time parents	0.003	0.066***
	(0.013)	(0.018)
Educational time others	0.006	-0.004
	(0.010)	(0.018)
Care time parents	0.000	-0.002
	(0.012)	(0.018)
Care time others	0.019*	-0.014
	(0.011)	(0.018)
Observations	5478	2953

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Cognitive skills are measured using Matrix Reasoning Test and Peabody Picture Vocabulary Test. The estimation for matrix reasoning is based on a sample of children aged 8–9 and 10–11, while the estimation for vocabulary tests uses a sample of children aged 6–7 and 8–9. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 30: Estimated parameters of the production function for parent-reported school performance among low SES households

	Effect at age		
	10-11	12-13	14-15
Parental warmth	-0.009	-0.004	0.051
	(0.052)	(0.065)	(0.072)
Parental reasoning	0.025	0.023	-0.128
	(0.068)	(0.080)	(0.080)
Hostile parenting	-0.035	0.021	-0.006
	(0.070)	(0.087)	(0.106)
Inconsistent parenting	-0.188**	-0.202**	-0.148
	(0.085)	(0.079)	(0.091)
Attempted consistency	-0.087	-0.095	-0.068
	(0.070)	(0.090)	(0.081)
Educational time parents	0.009	-0.027	0.225
	(0.238)	(0.295)	(0.201)
Educational time others	-0.277	0.234	-0.663
	(0.325)	(0.395)	(0.407)
Care time parents	-0.280	0.354	0.411**
	(0.392)	(0.257)	(0.171)
Care time others	0.082	-0.727**	-0.041
	(0.415)	(0.370)	(0.210)
Observations	2951	2602	2178

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 31: Estimated parameters of the production function for parent-reported school performance among high SES households

| | Effect at age | | |
	10-11	12-13	14-15
Parental warmth	-0.044	-0.043	-0.018
	(0.045)	(0.049)	(0.041)
Parental reasoning	-0.013	-0.034	0.006
	(0.047)	(0.055)	(0.043)
Hostile parenting	-0.086*	-0.161***	-0.073
	(0.049)	(0.060)	(0.048)
Inconsistent parenting	-0.017	-0.050	-0.111**
	(0.054)	(0.067)	(0.049)
Attempted consistency	0.083	0.027	-0.048
	(0.052)	(0.065)	(0.040)
Educational time parents	0.149	0.346	0.310
	(0.247)	(0.233)	(0.224)
Educational time others	0.070	0.338	0.055
	(0.290)	(0.251)	(0.198)
Care time parents	0.374	0.117	0.213
	(0.272)	(0.150)	(0.184)
Care time others	-0.279	-0.292	-0.366
	(0.195)	(0.306)	(0.420)
Observations	3921	3558	3168

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 32: Estimated parameters of the production function for parent-reported math performance among low SES households

	Effect at age	
	10-11	12-13
Parental warmth	-0.088	-0.105**
	(0.054)	(0.046)
Parental reasoning	0.045	0.068
	(0.074)	(0.069)
Hostile parenting	-0.107	-0.104
	(0.069)	(0.067)
Inconsistent parenting	-0.039	-0.143*
	(0.089)	(0.074)
Attempted consistency	-0.038	-0.035
	(0.076)	(0.086)
Educational time parents	0.139	-0.250
	(0.224)	(0.226)
Educational time others	-0.135	0.178
	(0.271)	(0.332)
Care time parents	-0.078	-0.138
	(0.330)	(0.383)
Care time others	0.187	-0.276
	(0.413)	(0.316)
Observations	2879	2531

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 33: Estimated parameters of the production function for parent-reported math performance among high SES households

	Effect at age	
	10-11	12-13
Parental warmth	-0.033	-0.081
	(0.042)	(0.052)
Parental reasoning	-0.050	0.018
	(0.047)	(0.050)
Hostile parenting	-0.107**	-0.118**
	(0.045)	(0.057)
Inconsistent parenting	-0.005	-0.060
	(0.048)	(0.068)
Attempted consistency	0.074	0.059
	(0.051)	(0.056)
Educational time parents	-0.071	-0.078
	(0.227)	(0.308)
Educational time others	0.084	-0.374
	(0.215)	(0.860)
Care time parents	-0.048	0.471**
	(0.234)	(0.233)
Care time others	0.072	-0.182
	(0.175)	(0.313)
Observations	3862	3491

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 34: Estimated parameters of the production function for parent-reported reading performance among low SES households

	Effect at age	
	10-11	12-13
Parental warmth	-0.112**	-0.046
	(0.056)	(0.046)
Parental reasoning	0.128*	0.106
	(0.072)	(0.073)
Hostile parenting	-0.127*	-0.075
	(0.071)	(0.067)
Inconsistent parenting	-0.131	-0.127
	(0.090)	(0.090)
Attempted consistency	-0.077	-0.110
	(0.076)	(0.101)
Educational time parents	-0.071	-0.098
	(0.214)	(0.238)
Educational time others	-0.156	0.426
	(0.298)	(0.517)
Care time parents	-0.335	-0.000
	(0.321)	(0.413)
Care time others	0.046	-0.328
	(0.439)	(0.267)
Observations	2903	2524

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 35: Estimated parameters of the production function for parent-reported reading performance among high SES households

	Effect at age	
	10-11	12-13
Parental warmth	-0.005	-0.068
	(0.045)	(0.056)
Parental reasoning	-0.021	0.143***
	(0.050)	(0.051)
Hostile parenting	-0.017	-0.116*
	(0.053)	(0.061)
Inconsistent parenting	-0.100*	-0.182***
	(0.055)	(0.068)
Attempted consistency	-0.018	-0.094*
	(0.058)	(0.056)
Educational time parents	0.179	-0.535**
	(0.247)	(0.272)
Educational time others	-0.218	-0.181
	(0.233)	(0.779)
Care time parents	-0.145	0.144
	(0.241)	(0.257)
Care time others	0.192	-0.118
	(0.174)	(0.348)
Observations	3875	3462

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 36: Estimated parameters of the production function for parent-reported non-cognitive skills without IV

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	0.015	0.020**	0.028***	0.026**
	(0.015)	(0.009)	(0.010)	(0.010)
Parental reasoning	-0.042***	-0.035***	-0.028***	-0.044***
	(0.013)	(0.008)	(0.008)	(0.008)
Hostile parenting	-0.204***	-0.196***	-0.207***	-0.169***
	(0.016)	(0.011)	(0.013)	(0.013)
Inconsistent parenting	-0.058***	-0.082***	-0.056***	-0.093***
	(0.016)	(0.010)	(0.010)	(0.012)
Attempted consistency	-0.016	0.000	0.005	0.016**
	(0.012)	(0.007)	(0.007)	(0.008)
Educational time parents	0.006	-0.003	-0.002	0.011
	(0.011)	(0.008)	(0.008)	(0.007)
Educational time others	-0.007	0.005	-0.007	-0.008
	(0.010)	(0.007)	(0.006)	(0.008)
Care time parents	-0.012	-0.009	0.001	0.000
	(0.012)	(0.007)	(0.008)	(0.008)
Care time others	-0.005	0.016**	0.004	-0.006
	(0.015)	(0.008)	(0.007)	(0.007)
Observations	2635	6469	5879	5385

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 37: Remaining estimated parameters of the production function for teacher-reported non-cognitive skills

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	-0.016	-0.004	-0.065	-0.025
	(0.063)	(0.042)	(0.061)	(0.042)
Parental reasoning	-0.144*	-0.088*	0.076	0.021
	(0.080)	(0.048)	(0.065)	(0.045)
Hostile parenting	-0.155**	-0.156***	-0.148**	-0.064
	(0.070)	(0.047)	(0.060)	(0.050)
Inconsistent parenting	-0.069	-0.097**	-0.113*	-0.167***
	(0.077)	(0.046)	(0.065)	(0.047)
Attempted consistency	0.012	-0.038	-0.098	-0.094**
	(0.090)	(0.053)	(0.060)	(0.045)
Educational time parents	0.109	-0.084	-0.450	0.148
	(0.112)	(0.178)	(0.314)	(0.222)
Educational time others	-0.113	0.170	0.124	-0.122
	(0.156)	(0.262)	(0.426)	(0.280)
Care time parents	-0.064	-0.109	0.011	-0.010
	(0.106)	(0.340)	(0.170)	(0.139)
Care time others	0.287	-0.078	0.423	-0.182
	(0.359)	(0.189)	(0.345)	(0.230)
Observations	1367	4185	3630	2859

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using teacher-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 38: Estimated parameters of the production function for teacher-reported non-cognitive skills without IV

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	0.012	0.009	0.025	0.026
	(0.025)	(0.015)	(0.016)	(0.018)
Parental reasoning	-0.026	-0.049***	-0.039***	-0.032**
	(0.021)	(0.013)	(0.014)	(0.015)
Hostile parenting	-0.113***	-0.146***	-0.095***	-0.093***
	(0.025)	(0.016)	(0.019)	(0.021)
Inconsistent parenting	-0.028	0.002	-0.036**	-0.056***
	(0.025)	(0.015)	(0.017)	(0.020)
Attempted consistency	0.003	0.012	-0.002	-0.008
	(0.019)	(0.012)	(0.013)	(0.014)
Educational time parents	0.008	0.006	0.002	0.017
	(0.021)	(0.011)	(0.012)	(0.011)
Educational time others	0.004	0.008	-0.006	-0.018
	(0.019)	(0.009)	(0.013)	(0.015)
Care time parents	-0.009	0.009	0.003	-0.000
	(0.019)	(0.011)	(0.013)	(0.015)
Care time others	0.036	0.016	-0.026*	-0.019
	(0.023)	(0.010)	(0.014)	(0.018)
Observations	1367	4185	3630	2859

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using teacher-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 39: Estimated parameters of the production function for parent-reported school performance without IV

	Effect at age		
	10-11	12-13	14-15
Parental warmth	0.020*	0.028**	0.050***
	(0.012)	(0.013)	(0.013)
Parental reasoning	-0.013	-0.026**	-0.051***
	(0.011)	(0.012)	(0.011)
Hostile parenting	-0.103***	-0.143***	-0.115***
	(0.012)	(0.014)	(0.014)
Inconsistent parenting	-0.004	-0.042***	-0.065***
	(0.012)	(0.013)	(0.013)
Attempted consistency	0.015	0.003	-0.000
	(0.011)	(0.011)	(0.011)
Educational time parents	-0.011	0.010	-0.014
	(0.009)	(0.010)	(0.009)
Educational time others	0.002	-0.001	-0.002
	(0.009)	(0.013)	(0.009)
Care time parents	-0.021**	0.006	0.023**
	(0.010)	(0.010)	(0.010)
Care time others	0.007	0.000	-0.015
	(0.010)	(0.009)	(0.011)
Observations	6872	6160	5346

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 40: Comparison of parent and teacher estimation samples

Characteristic	Parent sample	Teacher sample	P-value
Child:			
Female	0.498	0.489	0.081
Indigenous	0.026	0.026	0.874
Living with both parents	0.765	0.750	0.001
Premature infant	0.066	0.070	0.134
Older cohort (K)	0.562	0.547	0.003
Primary caregiver:			
Female	0.980	0.980	0.862
Age	42.954	43.003	0.401
College education	0.314	0.305	0.045
Household:			
Number of children	1.559	1.561	0.834
Weekly income (in AUD)	2,416	2,386	0.087
Living in poverty	0.149	0.160	0.005
Urban	0.851	0.859	0.030
Observations	20,368	12,041	

Note: For each characteristic, the means of the parent and teacher estimation samples are reported. The last column presents the results of a non-parametric test assessing the significance of differences between the parent and teacher estimation samples for each characteristic.

TABLE 41: Estimated parameters of the production function for cognitive skills with IV

	Matrix reasoning	Vocabulary test
Parental warmth	0.290	-0.155
	(0.178)	(0.361)
Parental reasoning	-0.306	0.126
	(0.242)	(0.355)
Hostile parenting	0.273	-0.134
	(0.224)	(0.397)
Inconsistent parenting	-0.267	0.017
	(0.198)	(0.232)
Attempted consistency	0.025	0.042
	(0.202)	(0.334)
Educational time parents	0.100	0.039
	(0.108)	(0.209)
Educational time others	0.029	0.105
	(0.206)	(0.158)
Care time parents	-0.072	0.080
	(0.107)	(0.177)
Care time others	0.310	-0.021
	(0.285)	(0.343)
Observations	9714	2607

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Cognitive skills are measured using Matrix Reasoning Test and Peabody Picture Vocabulary Test. The estimation for matrix reasoning is based on a sample of children aged 8–9 and 10–11, while the estimation for vocabulary tests uses a sample of children aged 6–7 and 8–9. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummy variables for the presence of both biological parents at home, as well as for moderate and severe mental health issues of the primary caregiver (measured by the Kessler test).

TABLE 42: Estimated parameters of the production function for parent-reported non-cognitive skills with additional controls

	Effect at age			
	8-9	10-11	12-13	14-15
Parental warmth	0.014	-0.000	-0.034	-0.008
	(0.034)	(0.026)	(0.025)	(0.022)
Parental reasoning	-0.079*	-0.017	0.016	-0.052**
	(0.043)	(0.026)	(0.028)	(0.024)
Hostile parenting	-0.108**	-0.154***	-0.228***	-0.155***
	(0.043)	(0.034)	(0.034)	(0.034)
Inconsistent parenting	-0.104**	-0.086***	-0.006	-0.038
	(0.046)	(0.033)	(0.033)	(0.026)
Attempted consistency	-0.089*	-0.003	0.016	0.020
	(0.053)	(0.031)	(0.031)	(0.023)
Educational time parents	0.078	-0.069	0.016	0.023
	(0.053)	(0.136)	(0.119)	(0.076)
Educational time others	-0.061	0.201	0.158	0.077
	(0.139)	(0.248)	(0.148)	(0.219)
Care time parents	-0.041	-0.104	0.101	0.184**
	(0.052)	(0.211)	(0.086)	(0.072)
Care time others	-0.000	-0.185	0.125	-0.168
	(0.156)	(0.136)	(0.153)	(0.142)
Observations	2541	6468	5878	5385

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummies for the presence of both biological parents at home, for moderate and severe mental issues of the primary caregiver (measured by the Kessler test), presence of financial shock in the household, presence of child's health shock, presence of other stressful events in the household (death, imprisonment, alcohol abuse of a household member, etc.) number of books at home, and dummies for attending catholic and private school.

TABLE 43: Estimated parameters of production function for cognitive skills with additional controls

	Matrix reasoning	Vocabulary test
Parental warmth	-0.034***	-0.031**
	(0.012)	(0.015)
Parental reasoning	0.006	0.012
	(0.011)	(0.014)
Hostile parenting	-0.005	0.011
	(0.012)	(0.015)
Inconsistent parenting	-0.065***	-0.066***
	(0.012)	(0.015)
Attempted consistency	-0.005	0.009
	(0.010)	(0.013)
Educational time parents	0.009	0.051***
	(0.009)	(0.013)
Educational time others	0.005	-0.001
	(0.007)	(0.014)
Care time parents	0.015*	-0.001
	(0.009)	(0.013)
Care time others	0.028***	-0.005
	(0.009)	(0.014)
Observations	9714	2607

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Cognitive skills are measured using Matrix Reasoning Test and Peabody Picture Vocabulary Test. The estimation for matrix reasoning is based on a sample of children aged 8–9 and 10–11, while the estimation for vocabulary tests uses a sample of children aged 6–7 and 8–9. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummies for the presence of both biological parents at home, for moderate and severe mental issues of the primary caregiver (measured by the Kessler test), presence of financial shock in the household, presence of child's health shock, presence of other stressful events in the household (death, imprisonment, alcohol abuse of a household member, etc.) number of books at home, and dummies for attending catholic and private school.

TABLE 44: Estimated parameters of the production function for parent-reported school performance with additional controls

	Effect at age		
	10-11	12-13	14-15
Parental warmth	-0.050	-0.048	-0.009
	(0.033)	(0.037)	(0.031)
Parental reasoning	0.038	0.011	-0.035
	(0.040)	(0.044)	(0.037)
Hostile parenting	-0.086**	-0.101**	-0.070
	(0.040)	(0.046)	(0.044)
Inconsistent parenting	-0.088**	-0.137***	-0.137***
	(0.043)	(0.051)	(0.038)
Attempted consistency	-0.020	-0.046	-0.059*
	(0.042)	(0.050)	(0.034)
Educational time parents	0.086	0.317	0.149
	(0.183)	(0.247)	(0.138)
Educational time others	-0.157	0.348	0.239
	(0.321)	(0.248)	(0.360)
Care time parents	0.280	0.216*	0.314***
	(0.267)	(0.126)	(0.118)
Care time others	-0.100	-0.427	-0.289
	(0.184)	(0.314)	(0.245)
Observations	6871	6159	5346

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummies for the presence of both biological parents at home, for moderate and severe mental issues of the primary caregiver (measured by the Kessler test), presence of financial shock in the household, presence of child's health shock, presence of other stressful events in the household (death, imprisonment, alcohol abuse of a household member, etc.) number of books at home, and dummies for attending catholic and private school.

TABLE 45: Rotated factor loadings at age 4-5 - joint estimation

	Factor 1	Factor 2	Factor 3	Factor 4
Parental warmth:				
Expresses affection	**0.808**	-0.070	0.024	0.014
Hugs child	**0.812**	-0.061	0.016	0.024
Expresses happiness	**0.660**	0.001	-0.157	**0.335**
Warm/close times together	**0.742**	0.012	-0.118	0.238
Enjoy time together	**0.609**	0.001	-0.225	**0.357**
Feels close to child	**0.649**	-0.003	-0.217	**0.277**
Parental hostility:				
Praise child	**0.276**	0.076	**-0.468**	**0.319**
Disapproval	-0.143	0.122	**0.686**	0.038
Angry when punishing	-0.020	0.077	**0.684**	-0.050
Having problems managing	-0.113	**0.289**	**0.674**	-0.034
Parental consistency:				
Ensures requests complete	0.053	**-0.424**	0.062	**0.479**
Punishes child	0.023	**-0.668**	**0.286**	**0.257**
Child gets away	-0.018	**0.747**	0.212	-0.021
Child gets out of punishment	-0.020	**0.763**	0.176	0.037
Child ignores punishment	-0.077	**0.621**	**0.437**	0.019
Parental inductive reasoning:				
Explains corrections	0.212	-0.072	-0.011	**0.761**
Reasons when misbehaves	**0.256**	-0.016	-0.033	**0.741**

Note: Factor loadings larger than 0.25 in absolute value printed in bold. Factors can be assigned the following across waves: factor 1: parental warmth, factor 2: reasoning, factor 3: hostile and inconsistent parenting, factor 4: consistency. As at age 4-5 factor 2 describes inconsistency, we assign it to the variable consistency, but we reverse values of factor 2 before assignment to ensure comparability across waves. Instead we assign factor 4 as reasoning.

TABLE 46: Rotated factor loadings at age 6-7 - joint estimation

	Factor 1	Factor 2	Factor 3	Factor 4
Parental warmth:				
Expresses affection	**0.837**	0.104	0.002	-0.057
Hugs child	**0.799**	0.121	0.021	-0.057
Expresses happiness	**0.677**	**0.336**	-0.188	0.011
Warm/close times together	**0.787**	0.234	-0.119	-0.014
Enjoy time together	**0.701**	**0.268**	-0.172	-0.031
Feels close to child	**0.736**	0.213	-0.170	-0.036
Parental hostility:				
Praise child	**0.400**	0.162	**-0.449**	0.110
Disapproval	-0.197	0.038	**0.699**	0.065
Angry when punishing	-0.039	-0.083	**0.687**	0.011
Having problems managing	-0.150	0.021	**0.686**	**0.272**
Parental consistency:				
Ensures requests complete	0.151	**0.254**	0.105	**-0.537**
Punishes child	0.037	0.198	0.218	**-0.722**
Child gets away	-0.024	-0.044	**0.330**	**0.715**
Child gets out of punishment	0.003	0.003	**0.298**	**0.691**
Child ignores punishment	-0.059	0.012	**0.534**	**0.543**
Parental inductive reasoning:				
Explains corrections	0.196	**0.866**	-0.023	-0.077
Reasons when misbehaves	**0.285**	**0.736**	0.007	-0.067
Reasons for rules	0.212	**0.855**	-0.003	-0.068

Note: Factor loadings larger than 0.25 in absolute value printed in bold. Factors can be assigned the following across waves: factor 1: parental warmth, factor 2: reasoning, factor 3: hostile and inconsistent parenting, factor 4: consistency. As at age 6-7 factor 4 describes inconsistency, when creating the variable consistency, we reverse values of factor 4 before assignment to ensure comparability across waves.

TABLE 47: Rotated factor loadings at age 8-9 - joint estimation

	Factor 1	Factor 2	Factor 3	Factor 4
Parental warmth:				
Expresses affection	**0.833**	0.155	0.001	-0.053
Hugs child	**0.794**	0.144	0.009	-0.055
Expresses happiness	**0.705**	**0.319**	-0.179	0.034
Warm/close times together	**0.787**	**0.269**	-0.114	-0.014
Enjoy time together	**0.729**	**0.256**	-0.179	-0.048
Feels close to child	**0.736**	0.212	-0.191	-0.043
Parental hostility:				
Praise child	**0.437**	0.121	**-0.479**	0.067
Disapproval	**-0.268**	0.088	**0.680**	0.020
Angry when punishing	-0.047	-0.025	**0.690**	0.008
Having problems managing	-0.163	0.059	**0.688**	**0.254**
Parental consistency:				
Ensures requests complete	0.139	0.219	0.132	**-0.549**
Punishes child	0.020	0.181	0.203	**-0.747**
Child gets away	-0.027	-0.050	**0.355**	**0.698**
Child gets out of punishment	-0.000	-0.028	**0.339**	**0.672**
Child ignores punishment	-0.072	0.012	**0.536**	**0.538**
Parental inductive reasoning:				
Explains corrections	0.170	**0.864**	-0.017	-0.073
Reasons when misbehaves	**0.271**	**0.687**	0.033	-0.107
Reasons for rules	0.180	**0.852**	0.002	-0.047
Explains consequences	0.202	**0.864**	0.037	-0.061
Emphasizes reasons	0.171	**0.874**	0.003	-0.035

Note: Factor loadings larger than 0.25 in absolute value printed in bold. Factors can be assigned the following across waves: factor 1: parental warmth, factor 2: reasoning, factor 3: hostile and inconsistent parenting, factor 4: consistency. As at age 8-9 factor 4 describes inconsistency, when creating the variable consistency, we reverse values of factor 4 before assignment to ensure comparability across waves.

TABLE 48: Rotated factor loadings at age 10-11 - joint estimation

	Factor 1	Factor 2	Factor 3	Factor 4
Parental warmth:				
Expresses affection	**0.840**	0.156	-0.009	-0.066
Hugs child	**0.817**	0.121	0.002	-0.076
Expresses happiness	**0.724**	**0.277**	-0.185	0.021
Warm/close times together	**0.792**	0.245	-0.147	-0.019
Enjoy time together	**0.697**	**0.261**	-0.237	-0.022
Feels close to child	**0.724**	0.196	-0.235	-0.005
Parental hostility:				
Praise child	**0.454**	0.085	**-0.474**	0.051
Disapproval	**-0.291**	0.117	**0.690**	-0.041
Angry when punishing	-0.103	0.002	**0.689**	-0.005
Having problems managing	-0.191	0.046	**0.716**	0.167
Parental consistency:				
Ensures requests complete	0.114	0.208	0.109	**-0.598**
Punishes child	0.031	0.187	0.124	**-0.772**
Child gets away	-0.024	-0.015	**0.445**	**0.653**
Child gets out of punishment	-0.000	-0.018	**0.415**	**0.630**
Child ignores punishment	-0.082	-0.012	**0.581**	**0.488**
Parental inductive reasoning:				
Explains corrections	0.151	**0.876**	-0.007	-0.076
Reasons when misbehaves	**0.258**	**0.693**	0.013	-0.088
Reasons for rules	0.149	**0.861**	-0.016	-0.026
Explains consequences	0.185	**0.873**	0.057	-0.079
Emphasizes reasons	0.161	**0.883**	0.020	-0.050

Note: Factor loadings larger than 0.25 in absolute value printed in bold. Factors can be assigned the following across waves: factor 1: parental warmth, factor 2: reasoning, factor 3: hostile and inconsistent parenting, factor 4: consistency. As at age 10-11 factor 4 describes inconsistency, when creating the variable consistency, we reverse values of factor 4 before assignment to ensure comparability across waves.

TABLE 49: Rotated factor loadings at age 12-13 - joint estimation

	Factor 1	Factor 2	Factor 3	Factor 4
Parental warmth:				
Expresses affection	**0.849**	0.140	-0.021	0.086
Hugs child	**0.820**	0.113	-0.002	0.106
Expresses happiness	**0.715**	**0.260**	-0.203	-0.084
Warm/close times together	**0.794**	0.210	-0.148	0.013
Enjoy time together	**0.715**	0.192	-0.232	0.024
Feels close to child	**0.728**	0.163	**-0.258**	0.007
Parental hostility:				
Praise child	**0.482**	0.037	**-0.467**	-0.154
Disapproval	**-0.311**	0.166	**0.661**	0.159
Angry when punishing	-0.099	0.034	**0.684**	0.156
Having problems managing	-0.236	0.113	**0.716**	-0.073
Parental consistency:				
Ensures requests complete	0.108	0.249	0.030	**0.595**
Punishes child	0.026	0.196	0.004	**0.766**
Child gets away	-0.091	0.009	**0.584**	**-0.531**
Child gets out of punishment	0.005	0.002	**0.549**	**-0.531**
Child ignores punishment	-0.130	0.042	**0.675**	**-0.368**
Parental inductive reasoning:				
Explains corrections	0.121	**0.889**	0.012	0.070
Reasons when misbehaves	0.240	**0.707**	0.021	0.076
Reasons for rules	0.129	**0.877**	0.034	0.017
Explains consequences	0.154	**0.890**	0.065	0.092
Emphasizes reasons	0.126	**0.898**	0.047	0.048

Note: Factor loadings larger than 0.25 in absolute value printed in bold. Factors can be assigned the following across waves: factor 1: parental warmth, factor 2: reasoning, factor 3: hostile and inconsistent parenting, factor 4: consistency.

TABLE 50: Rotated factor loadings at age 14-15 - joint estimation

	Factor 1	Factor 2	Factor 3	Factor 4
Parental warmth:				
Expresses affection	**0.854**	0.105	-0.023	0.110
Hugs child	**0.818**	0.083	-0.009	0.121
Expresses happiness	**0.745**	0.235	-0.153	-0.074
Warm/close times together	**0.792**	0.193	-0.155	-0.032
Enjoy time together	**0.721**	0.180	-0.222	-0.039
Feels close to child	**0.725**	0.152	-0.246	-0.067
Parental hostility:				
Praise child	**0.522**	-0.006	**-0.407**	-0.201
Disapproval	**-0.347**	0.226	**0.568**	**0.294**
Angry when punishing	-0.121	0.083	**0.600**	**0.322**
Having problems managing	-0.239	0.121	**0.718**	0.097
Parental consistency:				
Ensures requests complete	0.082	0.223	-0.134	**0.640**
Punishes child	0.011	0.206	-0.197	**0.736**
Child gets away	-0.094	0.037	**0.744**	**-0.292**
Child gets out of punishment	-0.042	0.020	**0.706**	**-0.313**
Child ignores punishment	-0.148	0.052	**0.771**	-0.166
Parental inductive reasoning:				
Explains corrections	0.100	**0.904**	0.022	0.055
Reasons when misbehaves	0.230	**0.713**	0.052	0.122
Reasons for rules	0.102	**0.890**	0.033	0.021
Explains consequences	0.138	**0.889**	0.072	0.091
Emphasizes reasons	0.101	**0.899**	0.066	0.076

Note: Factor loadings larger than 0.25 in absolute value printed in bold. Factors can be assigned the following across waves: factor 1: parental warmth, factor 2: reasoning, factor 3: hostile and inconsistent parenting, factor 4: consistency.

TABLE 51: Rotated factor loadings across age groups - joint estimation

	Age:					
	4-5	6-7	8-9	10-11	12-13	14-15
Factor 1:						
Parental warmth	**0.849**	**0.730**	**0.693**	**-0.544**	**-0.645**	**-0.668**
Hostile parenting	**-0.260**	-0.152	-0.103	**0.876**	**0.883**	**0.886**
Attempted consistency	0.055	**0.637**	**0.637**	0.193	0.108	0.075
Parental inconsistency		0.030	0.037	**0.766**	**0.767**	**0.787**
Parental reasoning	**0.856**	**0.848**	**0.856**	-0.041	0.011	0.053
Factor 2:						
Parental warmth		**-0.352**	**-0.433**	**0.612**	**0.513**	**0.480**
Hostile parenting		**0.851**	**0.859**	-0.049	0.073	0.116
Attempted consistency		0.201	0.213	**0.664**	**0.703**	**0.697**
Parental inconsistency		**0.808**	**0.778**	0.059	0.084	0.094
Parental reasonig		-0.039	-0.017	**0.854**	**0.859**	**0.860**

Note: Factor loadings larger than 0.25 in absolute value printed in bold. Factors can be assigned the following across waves: factor 1: authoritative style, and factor 2: authoritarians tyle.

TABLE 52: Estimated parameters of the production function for paren-reported non-cognitive skills with jointly determine parenting styles

	Effect at age			
	8-9	10-11	12-13	14-15
Warm style	0.026	0.051***	0.053***	0.063***
	(0.023)	(0.019)	(0.019)	(0.017)
Reasoning style	-0.021	-0.054***	-0.008	-0.073***
	(0.024)	(0.016)	(0.021)	(0.018)
Hostile/inconsistent style	-0.178***	-0.185***	-0.196***	-0.165***
	(0.034)	(0.027)	(0.026)	(0.023)
Consistent style	0.096**	0.033*	-0.013	-0.033*
	(0.039)	(0.020)	(0.020)	(0.020)
Educational time parents	0.086	-0.077	0.026	-0.019
	(0.054)	(0.150)	(0.137)	(0.082)
Educational time others	-0.076	0.233	0.162	0.224
	(0.130)	(0.235)	(0.174)	(0.263)
Care time parents	-0.044	-0.085	0.119	0.154**
	(0.053)	(0.245)	(0.090)	(0.074)
Care time others	0.128	-0.177	0.230	-0.058
	(0.171)	(0.156)	(0.174)	(0.151)
Observations	2635	6469	5879	5385

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummies for the presence of both biological parents at home as well as for moderate and severe mental issues of the primary caregiver (measured by the Kessler test).

TABLE 53: Estimated parameters of production function for cognitive skills with jointly determine parenting styles

	Matrix reasoning	Vocabulary test
Warm style	-0.026***	-0.026**
	(0.009)	(0.013)
Reasoning style	-0.041***	-0.054***
	(0.010)	(0.014)
Hostile/inconsistent style	-0.040***	-0.019
	(0.010)	(0.013)
Consistent style	0.005	-0.001
	(0.009)	(0.012)
Educational time parents	0.009	0.054***
	(0.009)	(0.013)
Educational time others	0.005	-0.001
	(0.007)	(0.014)
Care time parents	0.017*	-0.000
	(0.009)	(0.013)
Care time others	0.027***	-0.004
	(0.009)	(0.014)
Observations	9714	2607

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Cognitive skills are measured using Matrix Reasoning Test and Peabody Picture Vocabulary Test. The estimation for matrix reasoning is based on a sample of children aged 8–9 and 10–11, while the estimation for vocabulary tests uses a sample of children aged 6–7 and 8–9. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummies for the presence of both biological parents at home as well as for moderate and severe mental issues of the primary caregiver (measured by the Kessler test).

TABLE 54: Estimated parameters of production function for total school performance with jointly determine parenting styles

	Effect at age		
	10-11	12-13	14-15
Warm style	-0.001	0.014	0.036*
	(0.022)	(0.025)	(0.021)
Reasoning style	-0.043**	-0.034	-0.071***
	(0.020)	(0.029)	(0.025)
Hostile/inconsistent style	-0.120***	-0.174***	-0.166***
	(0.030)	(0.031)	(0.024)
Consistent style	-0.015	0.026	-0.043
	(0.027)	(0.029)	(0.027)
Educational time parents	0.176	0.338	0.098
	(0.201)	(0.237)	(0.142)
Educational time others	-0.018	0.241	0.339
	(0.257)	(0.205)	(0.391)
Care time parents	0.127	0.184	0.257**
	(0.264)	(0.119)	(0.112)
Care time others	-0.244	-0.196	-0.126
	(0.204)	(0.299)	(0.240)
Observations	6872	6160	5346

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. The employed specification includes various controls: the age of the primary caregiver, the number of siblings, the log of family income, the local neighborhood disadvantage index, and dummies for the presence of both biological parents at home as well as for moderate and severe mental issues of the primary caregiver (measured by the Kessler test).

TABLE 55: Correlation between parenting dimensions

	Parental warmth	Parental reasoning	Hostile parenting	Inconsistent parenting	Attempted consistency
Parental warmth	1.000				
Parental reasoning	**0.492**	1.000			
Hostile parenting	**-0.385**	-0.047	1.000		
Attempted consistency	-0.134	-0.031	**0.442**	1.000	
Inconsistent parenting	0.128	**0.310**	0.036	0.000	1.000

Note: Displayed are correlation between different dimensions of parenting styles in the data (exemplary for age group 8-9). Statistics are calculated using population weights.

TABLE 56: Remaining estimated parameters of the production function for parent-reported non-cognitive skills

| | Effect at age | | | |
	8-9	10-11	12-13	14-15
Educational time parents	0.087*	-0.101	0.055	0.011
	(0.052)	(0.136)	(0.127)	(0.077)
Educational time others	-0.044	0.238	0.208	0.149
	(0.127)	(0.241)	(0.165)	(0.229)
Care time parents	-0.036	-0.071	0.116	0.187**
	(0.053)	(0.222)	(0.087)	(0.073)
Care time others	0.023	-0.182	0.127	-0.175
	(0.161)	(0.140)	(0.158)	(0.146)
	Age invariant			
Living with both parents	0.071***			
	(0.017)			
Primary caregiver's age	0.000			
	(0.001)			
Degree of primary caregiver's mental disorder:				
moderate	-0.139***			
	(0.014)			
severe	-0.299***			
	(0.040)			
Number of children	0.015**			
	(0.007)			
Log of weekly income	0.025**			
	(0.010)			
Neighborhood advantage score	0.038***			
	(0.007)			
1st lag of non-cognitive skills	0.427***			
	(0.019)			
2nd lag of non-cognitive skills	0.134***			
	(0.015)			
Observations	2635	6469	5879	5385

Note: All parameters are obtained from a single regression, with standard errors shown in parentheses. Non-cognitive skills are measured using parent-reported SDQ. Base category for degree of primary caregiver's mental disorder is no or mild.