The Parental Wage Gap and the Development of Socio-emotional Skills in Children

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Abstract

In this paper, I study the causal impact of the parental wage gap (PWG)—defined as the relative potential wages of mothers and fathers—on children's socio-emotional skills. I leverage administrative and survey data from Germany to create exogenous between-sibling variation in the PWG through a shift-share design. I find that decreases in the PWG do not affect children's socio-emotional skills as measured by their personality traits, externalizing/internalizing behaviors, BMI, and school progression. This null effect can be rationalized by the offsetting effects of children's increased exposure to non-parental care and an improvement in family finances.

JEL-Codes: J13; J16; J22; J24
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1 INTRODUCTION

Children's skill development crucially depends on the money and time resources provided by parents. The provision of these resources is the outcome of a decision process in which mothers and fathers balance the well-being of their children against alternative uses of their money and time. How parents solve this trade-off depends on mothers' and fathers' labor market incentives. For example, standard models of household decision-making predict that spouses with a comparative advantage in market work will spend less time at home with the children than their partner (Becker, 1981). In many countries, parent's relative labor market incentives have changed profoundly in recent decades (Blau and Kahn, 2017; Olivetti and Petrongolo, 2016). For example, the average gender pay gap in OECD countries has almost halved from 19.0% in 1995 to 11.2% in 2020 (OECD, 2023). This trend is likely to have significant consequences for parental resource allocations and the environments in which children grow up. How do these changes affect children's development? While the "grand gender convergence" in labor markets is well-documented and the closure of remaining gaps remains high on the policy agenda (Cortés and Pan, 2023; Gender Policy Council, 2021; Goldin, 2014), causal evidence linking the pay gaps of mothers and fathers to the skill formation of their children is scant.

In this paper, I study how changes in the parental wage gap (PWG)—defined as the relative potential wages of mothers and fathers—affect the skill formation of their children. In particular, I focus on the development of socio-emotional skills. Socio-emotional (or non-cognitive) skills encompass various concepts such as emotional intelligence, locus of control, personality traits (e.g., conscientiousness), and preferences (e.g., patience). They are often considered a residual dimension of skills not captured by standardized tests (Humphries and Kosse, 2017). Economic research has increasingly focused on these skills as they are highly predictive of important life outcomes, including health (Almlund et al., 2011; Savelyev, 2022), education (Almås et al., 2016; Papageorge et al., 2019), family formation (Dupuy and Galichon, 2014; Serra-Garcia, 2021), and earnings (Cubel et al., 2016; Deming, 2017). Notably, the predictive power of socio-emotional skills emerges during childhood, suggesting that changes to these skills early in life may have lasting consequences in the long-run (Attanasio et al., 2020b; Sorrenti et al., 2025).

I leverage a combination of survey and administrative data from Germany to analyze the link between the PWG and children's socio-emotional skills. Germany is an interesting setting in which to study the effect of the PWG on child development. On the one hand, the institutional context broadly represents other industrialized countries in Europe and the OECD. On the other hand, the country is characterized by substantial regional heterogeneity in gender gaps, a legacy of the 41-year division into the communist East and the capitalist West (Boelmann et al., 2025; Lippmann et al., 2020). Specifically, I use the 2005–2019 waves of the German Socio-economic Panel (GSOEP) to construct a sample of $5,579$ siblings aged 2–10 for whom I observe measures of socio-emotional skills at the same age but in different calendar years. Furthermore, I use administrative wage data from the Federal Employment Agency of Germany and working time data from the German Microcensus to construct measures of potential hourly wages for mothers and fathers. The combination of these different data sources allows the analysis of within-family changes in children's socio-emotional skills and living environments as a function of changes in the PWG.

There are two main challenges to identifying the causal effect of the PWG on children's development. First, we need measures of potential wages that are unaffected by the endogenous labor supply decisions of parents. For example, consider parents who respond to the behavioral problems of their child by switching to less time-consuming but lower-paying jobs. In such cases, observed wages are endogenous to the outcome of interest, and therefore biased measures of the earnings potential of parents. To address this concern, I use a shift-share design to construct measures of potential wages for mothers and fathers (Goldsmith-Pinkham et al., 2020). These measures are weighted averages of wages paid in different sectors of the economy ("shift"), where weights are given by the historic employment exposure of specific groups to these sectors ("share"). The resulting measure of the PWG reflects demand-driven temporal variation in labor market incentives for mothers and fathers that is unaffected by the individual labor supply decisions of parents.

Second, there are unobserved joint determinants of parental earnings potential and child outcomes. For example, consider two families with different underlying ability. Since both parental earnings potential and the socio-emotional skills of children are affected by parental ability (e.g., Buser et al., 2024; Houmark et al., 2024b), a comparison across families would be confounded by omitted variable bias. I address such concerns by implementing a within-family comparison that rules out any confounding effects through time-constant factors specific to families when their children are of a particular age.

Thus, the identification strategy combines a within-family sibling comparison with a shift-share design to measure parental earnings potential. I validate the underlying identification assumptions as follows. First, the measures of potential wages must be orthogonal to intra-family variation in child characteristics. Therefore, I show that within-family differences in potential wages are uncorrelated with a large set of child characteristics that predict their socio-emotional skills and childhood environments. Second, the estimates would be susceptible to violations in the identification assumption if the identifying variation originated from a few economic sectors. Therefore, I show that the Rotemberg weights associated with maternal and paternal potential wages are widely dispersed across different sectors of the economy (Goldsmith-Pinkham et al., 2020). Lastly, potential wages must be good proxies for mothers' and fathers' actual labor market incentives. Therefore, I show that within-person changes in potential wages are highly predictive of within-person changes in observed wages of mothers and fathers.

The results of the analysis are threefold. First, I show that both mothers and fathers respond to increases in their potential wages by increasing their working time: a 10% increase in the potential wages of mothers (fathers) increases their working time by 1.2 (0.4) hours per day. For both mothers and fathers, these increases are mostly accounted for by reductions in personal time for hobbies and education. The time they devote to childcare remains unaffected. Furthermore, mothers and fathers react asymmetrically to changes in the potential wages of their partners. Fathers are unresponsive to the wage changes of mothers. Mothers, however, substitute market work with childcare if the wages of their partners increase: a 10% increase in the potential wages of fathers decreases (increases) mothers' working time (childcare time) by 0.5 hours per day. These results confirm that decreases in the PWG, either through increases in maternal wages or decreases in paternal wages, have significant consequences for parental time allocations and the environments in which children grow up.

Second, I find that these changes in children's living environments do not affect their socio-emotional skill development. In particular, I show that a 10% decrease in the PWG does not affect children's openness, conscientiousness, agreeableness, neuroticism, externalizing, and internalizing behavior. To assess the economic magnitude of these findings, I translate the changes in socio-emotional skills into the implied earnings effects at age 50. Considering the 95% confidence intervals as credible effect regions, I can exclude earnings increases/decreases that are larger than 1% per year for six out of seven considered dimensions of children's socio-emotional skills. Furthermore, I compare these implied magnitudes against those from other interventions in the existing literature. This comparison shows that the effects of a 10% decrease in the PWG are small compared to other interventions and that I can exclude the majority of their effect sizes from the credible effect regions of my estimates.

Third, I show that these null effects may be explained by the opposing forces that changing PWGs exert on childcare arrangements and family finances. On the one hand, a 10% decrease in the PWG increases children's time in informal childcare by 19% and the number of non-parental carers the child is exposed to regularly by 10% relative to the sample mean. Since informal childcare is often considered inferior to maternal childcare at home and "carer multiplicity" is found to decrease the stability of childhood environments, these changes are likely to exert negative effects on children's socio-emotional skills (Bernal and Keane, 2011; Datta Gupta and Simonsen, 2010; Duncan et al., 2023; Morrissey, 2009). On the other hand, a 10% decrease in the PWG increases disposable household income by 2.01 Thsd. € per year and increases the total share of resources controlled by mothers by 6.90 percentage points. Since money is an important input into child development and mothers have a higher propensity to spend their money on their children, these changes are likely to exert positive effects on children's socio-emotional skills (Agostinelli and Sorrenti, 2022; Akee et al., 2018; Dahl and Lochner, 2012; Duflo, 2012; Løken et al., 2012; Lundberg et al., 1997; Nicoletti et al., 2023). I furthermore support an explanation based on these offsetting factors by ruling out plausible alternative mechanisms (e.g., parental conflict, parenting styles) and by conducting heterogeneity analyses. While the general evidence for heterogeneous treatment effects is limited, I show that decreases in the PWG can lead to detrimental effects on children if the changes in care arrangements are not compensated by increases in household income or the maternal income share. For example, families with less educated mothers, react to decreasing PWGs with a stronger increase in the use of non-parental care providers and a stronger increase in the multiplicity of care arrangements. At the same time, these changes in childcare arrangements are not offset by corresponding increases in household income or the maternal income share, leading to decreases in socio-emotional skills in response to the PWG among children from these families.

These results are robust to various sensitivity checks, including alternative constructions of potential wages, alternative sample restrictions, and additional control variables to account for differences in sibling characteristics and differential time trends by labor market regions and education groups. Furthermore, I show that the identifying variation is orthogonal to the recent expansion of public childcare in Germany (Felfe and Lalive, 2018). I also replicate the main findings using a first-difference estimator that uses within-child variation over time instead of within-family variation across siblings (Agostinelli and Sorrenti, 2022; Dahl and Lochner, 2012). Moreover, I show that these null effects persist in the long run and that other child outcomes like BMI, delayed school entry, school tracking, and GPAs remain unaffected.

This study contributes to three strands of the literature. First, I contribute to the literature on socio-emotional skills. Next to cognitive skills and health, socio-emotional skills are a dimension of human capital that matters for various important life outcomes. Therefore, social scientists have increased their attention on the causal factors underlying the formation of these skills. These factors include genetics (Demange et al., 2021), home environments (Carneiro et al., 2013; García-Miralles and Gensowski, forthcoming), monetary resources (Akee et al., 2018), parental time investments (Fiorini and Keane, 2014; Houmark et al., 2024a), parenting styles (Falk et al., 2021), the quality of schools (Jackson, 2019), and child peers (Golsteyn et al., 2021). I contribute to this literature by investigating how changes in relative labor market incentives for mothers and fathers and the associated changes in children's living environments influence their socio-emotional development.

Second, I contribute to the literature on family decision-making and parental investments in child development. Previous work in this area predominantly focuses on mothers as the primary caretaker (Agostinelli and Sorrenti, 2022; Dahl and Lochner, 2012; Nicoletti et al., 2023). Therefore, this literature, by and large, neglects the dynamics of family decision-making within the context of two-parent households. However, the investigation of these dynamics is important. Even in an age of declining marriage and increasing divorce rates, 68% of all

German (65% of all American) children live in households with two married parents (Federal Statistical Office, 2023; Livingston, 2018). Furthermore, the well-documented changes in relative labor market incentives for men and women suggest substantial shifts in parental resource allocations and the environments in which children grow up. In this paper, I close this gap by studying how changes in the labor market incentives of both mothers and fathers influence changes in children's living environments, and the extent to which these changes influence the socio-emotional skill development of their children. Furthermore, in comparison to existing literature, that predominantly infers parental time investments from labor supply data, I can leverage detailed time-use data to provide a richer description of these intra-family adjustments.

Third, this study relates to the literature on the impact of children on gender gaps in the labor market. Recent papers have documented pronounced and long-lasting disparities in mothers' and fathers' labor market outcomes after their first child's arrival (Cortés and Pan, 2023; Kleven et al., forthcoming, 2019; Kuziemko et al., 2018). Since this "child penalty" cannot be explained "economically," i.e., by differences in (pre-birth) wages between mothers and fathers, nor "biologically," i.e., by the demands of birth and breastfeeding (Andresen and Nix, 2022; Kleven et al., 2021), researchers conjecture that gender norms are a driving force behind this pattern. Gender norms can be understood as a system of informal rules and shared beliefs about the appropriate behavior of men and women. For example, in many countries, including Germany, there is considerable concern that children suffer if mothers work (Figure S.1). This paper provides evidence that such shared beliefs may be misguided and that gender equality in the labor market does not necessarily come at the cost of detrimental effects on child development.

The remaining paper is organized as follows. In Section 2, I describe the institutional context of Germany, introduce the primary data sources, and describe the relevant samples and variables. The identification strategy is outlined in Section 3, and I present results in Section 4. Section 5 concludes the paper.

2 CONTEXT AND DATA

2.1 *Institutional context*

The institutional context of Germany is broadly comparable to other industrialized countries (OECD, 2016). In 2021, the median wage difference between full-time employed men and women was 14.2%, putting the gender pay gap in Germany slightly above the OECD average (11.9%) and slightly below the US (16.9%, OECD, 2023).[1] To foster gender equality and to support the reconciliation of family and work, Germany has implemented several policy reforms in recent years. In 2007, Germany introduced a new parental leave benefit with a 67% replacement rate for pre-birth earnings. The duration is 12 months with an additional two months—the so-called "daddy months"—reserved for the partner of the primary caretaker (Raute, 2019). In addition, Germany has expanded the provision of center-based childcare significantly. In 2013, the legal claim for publicly subsidized childcare was extended from children older than three to children above age one (Felfe and Lalive, 2018). As of the school year 2026/27, public childcare provision will also include a legal claim for afternoon care in elementary schools (Federal Government of Germany, 2019). In contrast to these reforms, the German tax code disincentivizes gender equality by imposing high marginal tax rates on the secondary earner of the household, i.e., females in the majority of cases (Bick and Fuchs-Schündeln, 2017).

Figure S.1 documents the evolution of gender differences in wages, working hours, and gender role attitudes in East and West Germany. Following the outlined policy reforms and a shift in public attitudes towards a more gender-egalitarian allocation of work and home production, labor market outcomes for men and women in Germany have converged in recent decades (Olivetti and Petrongolo, 2016). Nevertheless, even today, marked differences remain. Furthermore, even three decades after reunification in 1990, gender roles differ strongly between East and West Germany (Boelmann et al., 2025; Lippmann et al., 2020). While the Communist East encouraged female labor force participation through the early adoption of gender-equalizing

[1] In Germany, wages are mostly set through collective bargaining agreements between employers' associations and trade unions. For jobs not covered by such agreements, wages are typically negotiated individually (Dustmann et al., 2009). Since 2015, there is a statutory minimum wage, which is likely to have reduced the gender wage gap as women are disproportionally found in the lower tail of the wage distribution (Caliendo and Wittbrodt, 2022).

policies, the West promoted a traditional male-breadwinner model. As a result, East Germany is characterized by less traditional gender role attitudes and less pronounced household specialization patterns than West Germany.

2.2 Data

My empirical strategy combines a within-family sibling comparison with a shift-share design to capture changes in the relative labor market incentives of mothers and fathers. To implement this identification approach, I use three data sources. The primary analysis is conducted on the German Socio-economic Panel (GSOEP). This data source allows for tracing families over time and constructing time-variant measures of children's socio-emotional skills and their living environments. The GSOEP sample, however, is too small to calculate potential wages based on a shift-share design. Therefore, I use the Sample of Integrated Labor Market Biographies (SIAB) and the German Microcensus (MZ) to calculate hourly potential wages, which are then matched to the GSOEP based on observable individual characteristics.

Analysis sample. The GSOEP is an annual, nationally representative survey that covers approximately 15,000 private households and 25,000 individuals in Germany (Goebel et al., 2019). It collects detailed information on socio-economic and demographic characteristics, income, and time-use of households. Furthermore, it contains a mother-and-child questionnaire that collects information on children's socio-emotional skills. In the analysis, I focus on the following variables.

Socio-emotional skills of children. I measure children's socio-emotional skills using the Big Five personality traits (openness, conscientiousness, extraversion, agreeableness, and neuroticism) and proxies for externalizing and internalizing behavior.[2]

The Big Five model is the most common taxonomy to describe personality traits and has gained widespread traction in economics (Almlund et al., 2011; Borghans et al., 2008). The Big Five personality traits are highly predictive of important life outcomes, including education

[2] See also Table S.1 for short descriptions of all considered socio-emotional skill measures. Note that the existing literature does not provide clear-cut predictions which dimensions of children's socio-emotional skills would be particularly sensitive to changes in the PWG (Table S.2). Therefore, I consider a broad set of potential measures.

and earnings (Akee et al., 2018; Almlund et al., 2011; Mueller and Plug, 2006). For example, Andersen et al. (2020) show that conscientiousness predicts academic performance already in fourth grade. The findings of Akee et al. (2018) suggest that 1 SD changes in conscientiousness, agreeableness, and neuroticism at age 16 increase educational attainment by 0.517, 0.236, and 0.297 years, respectively. In addition, personality traits are malleable during childhood but become more stable during young adulthood (Baker et al., 2019; Fitzenberger et al., 2021; Roberts and DelVecchio, 2000).[3] This suggests that changes to childhood personality may have lasting effects on an individual's long-term life outcomes. In the GSOEP, information on the Big Five is collected via a validated short scale administered to mothers of children aged 2–3, 5–6, and 9–10 (Asendorpf and Van Aken, 2003; Weinert et al., 2007). In particular, mothers separately rate each of their children in the relevant age range regarding various behaviors on an 11-point Likert scale. Each question can be mapped into one of the Big Five dimensions—see Table S.3. For each Big Five dimension, I sum the relevant responses such that higher values correspond to higher expressions of the underlying trait.[4] To account for gender-specific personality changes as children grow up, I standardize the resulting variables by child sex and age group (2–3, 5–6, and 9–10) on the full sample of children in the GSOEP. I also construct a "personality index" by aggregating all items of the Big Five questionnaire using the GLS weighting procedure of Anderson (2008). The resulting index is standardized by child sex and age. It loads positively on openness, conscientiousness, extraversion, agreeableness, and negatively on neuroticism (Table S.5).

In addition to the Big Five personality traits, I consider two alternative measures for socio-emotional skills that capture how children react to stressors: externalizing and internalizing behavior. Externalizing behavior is characterized by actions in the external world, i.e., aggressive or antisocial behavior. Internalizing behavior describes inward-looking processes, i.e., anxiety or depression. Externalizing and internalizing behaviors are highly predictive of important

[3] See Figure S.2 for estimates of rank stability in children's socio-emotional skills. In line with existing literature, rank stability is low for young children (Ages 3–6) and increases slightly for older children (Ages 6–10). Table S.4 also presents estimates of intertemporal persistence in children's socio-emotional skills using a value-added approach (Del Bono et al., 2016). Persistence parameters are substantially lower than one, emphasizing the malleability of socio-emotional skills in the considered age range.

[4] Bond and Lang (2019) show that treatment effects on outcomes measured based on Likert scales may be sensitive to alternative cardinalizations. In Figure S.3, I implement the sensitivity checks suggested in Lindqvist et al. (2020) and show that my baseline estimates are robust to a wide range of smooth convex and concave monotonic transformations of children's socio-emotional skills.

life outcomes. For example, Attanasio et al. (2020b) show that externalizing and internalizing behaviors measured at ages 5, 10, and 16 predict future smoking, employment, and earnings. Furthermore, Papageorge et al. (2019) show that externalizing behaviors increase earnings despite adverse effects on educational attainment. In the GSOEP, information on externalizing and internalizing behaviors is collected through the Strength and Difficulty Questionnaire (SDQ), answered by mothers of children aged 5–6 and 9–10. The SDQ is one of the most prevalent screening instruments for child mental health and contains 18 questions related to five sub-scales (hyperactivity, emotional problems, prosocial behavior, conduct problems, and peer problems)—see Table S.3. The sub-scales of hyperactivity and conduct problems (peer and emotional problems) are further aggregated into scales for externalizing (internalizing) behavior (Goodman, 2001). In analogy to the Big Five personality traits, I construct summary indexes by adding relevant responses for each dimension and standardizing the resulting variables by child sex and age group (5–6 and 9–10) on the full sample of children in the GSOEP. Similar to the "personality index", I also construct a "behavioral problems index" based on all items underpinning externalizing/internalizing behavior using the GLS weighting procedure of Anderson (2008, see also Table S.5).

The measures for the Big Five personality traits and externalizing/internalizing behaviors rely on subjective assessments of mothers. Therefore, one may worry that different reporting standards of mothers, e.g., the willingness to portray their children in a positive/negative light, could confound the results. However, since my identification approach compares siblings at the same chronological age, such persistent differences in maternal reports are unlikely to bias the results. A remaining concern is that maternal assessments could change in response to the PWG. In a recent study, Del Bono et al. (2020) propose to address this concern using measurements from multiple evaluators. Unfortunately, GSOEP does not provide sufficient data for this approach. Instead, I also consider more objective measures of child outcomes that are closely related to socio-emotional skills but less susceptible to reporting biases, including children's BMI, whether they entered school on time, and whether they attended the high academic track in secondary school. The results closely replicate my main findings, bestowing confidence that maternal reporting biases do not drive my results.[5]

[5] Furthermore, Del Bono et al. (2020) conduct a simulation based on Baker et al. (2008) to quantify the extent of bias due to reporting artifacts in the estimated effects of universal childcare on children's socio-emotional skills. They

Children's living environments. To study the pathways by which the PWG influences children's socio-emotional skills, I construct indicators for childcare arrangements and the financial situation of households.

First, I focus on the total amount of time parents devote to childcare. Evidence suggests that parental childcare is important for developing cognitive and socio-emotional skills, especially if used for educational activities (Del Boca et al., 2017; Del Bono et al., 2016; Fiorini and Keane, 2014; Hsin and Felfe, 2014). The GSOEP provides self-reported information on the number of hours mothers and fathers devote to childcare activities for all their children on a typical day in a work week. I sum across both parents to capture the total amount of childcare provided by both parents.

Second, I consider whether children are exposed to non-parental childcare. I distinguish between formal and informal childcare. Existing literature suggests that substituting parental care with non-parental childcare may impact child development. However, effects are heterogeneous and vary with child and family characteristics and the quality of the non-parental care provider—see Duncan et al. (2023) for a comprehensive review of the literature. In the GSOEP, information on non-parental childcare is collected as part of the mother-and-child questionnaire and measured in hours per day. Formal childcare includes trained childminders outside the parental household, center-based childcare for children below age six, and after-school care for children aged six and above. Informal childcare includes care provided by the extended family (incl. grandparents, siblings, relatives), friends (incl. neighbors and non-specified others), and in-home babysitters (paid and unpaid). I also count the number of non-parental carers the child is exposed to in a typical week to capture the "multiplicity of care arrangements" (Morrissey, 2009).

Third, I use the total disposable family income after taxes and transfers as a proxy for the financial situation of households. Family income may influence the development of children by allowing families to purchase child-centered goods and reducing parental stress. Indeed, existing evidence shows that disposable family income causally influences the cognitive and socio-emotional development of children (Agostinelli and Sorrenti, 2022; Akee et al., 2018; Dahl and Lochner, 2012; Løken et al., 2012; Nicoletti et al., 2023). In the GSOEP, household heads

find that bias is at most 0.03 SD, which is small enough not to overturn the main conclusions of this study.

report monthly net family income. I use this information and convert it to annual family income in 2015 prices.

Fourth, I consider the maternal share of household earnings as a proxy for the monetary resources controlled by mothers. Existing research shows that mothers allocate a higher share of their resources to children than fathers (Duflo, 2012; Lundberg et al., 1997). Therefore, a shift in mothers' share of monetary resources may spur additional investments in children. In the GSOEP, individual earnings are self-reported by mothers and fathers and include all income from employment and self-employment. I use this information to compute the earnings share of mothers relative to both parents' total labor market earnings.

Sample restrictions. This study focuses on the relative earnings potential of mothers and fathers. Therefore, I restrict the sample to intact families with two resident working-age parents (18–63 years).[6] The empirical strategy is based on a sibling design. Therefore, I further restrict the sample to families with at least two children, and for whom I observe information on children's socio-emotional skills and their living environments at the same chronological age. One may worry that these sample selection criteria are endogenous to the treatment of interest. For example, it could be the case that decreases in the PWG increase the likelihood of parental separation or decrease the likelihood of having a sibling. In Table S.6, I show that this is not the case: in my sample 4% (13%) of families separate (have additional children) within the next 5 years. However, the likelihood of separation (additional children) is not affected by the PWG.

Lastly, I restrict the analysis to the years 2005–2019. 2005 marks the first year GSOEP collected data on children's socio-emotional skills; 2019 marks the last year before the outbreak of the COVID-19 pandemic.

Descriptive statistics for the resulting sample are provided in Table 1. I report descriptive statistics separately for children below and above age 6 to capture differences between pre-school and school-aged children. The core analysis sample comprises $5,579$ child-year observations. The sample is gender-balanced, and 20% of children reside in East Germany. The average child

[6] I define intact families as follows: children must be the biological or adopted child of the mother, or the mother's partner. The two parent figures in the household have to be the same individuals across the time period of the sibling comparison. Hence, I allow for non-biological family relationships and disregard parents' marital status. In Section 4.4, I show that my results are unchanged when focusing on biological families or married parents only.

Table 1 – Summary statistics

	All children N=5,579				Child age < 6 N=1,921		Child age≥ 6 N=3,658	
	Mean	SD	Min	Max	Mean	SD	Mean	SD
Panel (a): Children's characteristics								
Female	0.49	0.50	0.00	1.00	0.49	0.50	0.48	0.50
Migration background	0.01	0.12	0.00	1.00	0.00	0.05	0.02	0.14
East Germany	0.20	0.40	0.00	1.00	0.22	0.41	0.19	0.39
Age	6.13	2.85	2.00	10.00	2.90	0.29	7.83	1.99
Birth rank	2.08	1.13	1.00	12.00	2.13	1.20	2.05	1.08
Panel (b): Children's socio-emotional skills								
Openness	0.05	0.96	-4.24	1.28	-0.01	0.96	0.08	0.95
Conscientiousness	0.07	0.95	-2.58	2.09	0.07	0.96	0.08	0.95
Extraversion	-0.02	0.99	-3.93	1.27	-0.01	0.97	-0.03	1.00
Agreeableness	0.01	0.97	-3.31	2.08	0.02	1.00	0.01	0.95
Neuroticism	-0.01	0.98	-1.64	3.01	–	–	-0.01	0.98
Externalizing	-0.12	0.95	-1.77	3.66	–	–	-0.12	0.95
Internalizing	-0.08	0.97	-1.55	3.89	–	–	-0.08	0.97
Panel (c): Children's living environments								
Parental care (hours/day)	9.90	5.16	0.00	32.00	11.46	5.28	9.08	4.90
Formal care (hours/day)	2.71	2.26	0.00	16.43	2.28	2.31	2.93	2.21
Informal care (hours/day)	0.63	1.09	0.00	20.00	0.71	1.13	0.59	1.06
No. of carers	1.55	0.99	0.00	6.00	1.37	0.85	1.64	1.04
Total disp. family income (in Thsd. €)	46.14	25.88	6.54	568.49	41.56	21.52	48.54	27.60
Share maternal earnings (in %)	19.32	22.93	0.00	99.08	16.43	23.36	20.83	22.56

Data: GSOEP.
Note: Own calculations. This table shows summary statistics for the core analysis sample. The sample spans the years 2005 to 2019. It includes two-parent households aged 18–63 with at least two resident children aged 2–10. The sample only includes child-year observations with at least one valid measurement of socio-emotional skills (see Panel [b]) and valid measurements of all indicators for children's living environments (see Panel [c]).

in the sample is 6.1 years old and the second-born in its family. The sample shows a slightly positive selection in terms of child outcomes. For example, the sampled children are more conscientious and show less externalizing and internalizing behavior than the average child in the population. Mothers and fathers devote 9.9 hours to childcare on a typical workday, while children spend 2.7 (0.6) hours per day in formal (informal) childcare regularly, and are exposed to 1.5 non-parental carers on average.[7] Mothers contribute 19% of household earnings,

[7] In Table S.7, I compare childcare time in the GSOEP with measures of childcare time in the German Time-Use Study (GTUS). The GTUS distinguishes between childcare as a primary activity, e.g., homework, reading, sports and play, and any activities where the child is present. The comparison suggests that childcare time in the GSOEP is best understood as a broad measure capturing any activity where the child is present. See also Guryan et al. (2008) for a discussion of "primary" and "secondary" childcare and their impact on child development.

which reflects their lower labor market participation and the continued existence of gender wage gaps in Germany (Figure S.1). In Table S.8, I compare the families of my core sample to alternative samples that are not restricted to (i) the availability of children's socio-emotional skills, and (ii) the availability of sibling data. This comparison shows that my core sample is broadly comparable to these less restricted samples in terms of the characteristics of children and their families.

Potential wages. I approximate the differential changes in labor market incentives for mothers and fathers by calculating potential wages for different socio-demographic groups in Germany. These potential wages are constructed using two data sources.

The Sample of Integrated Labor Market Biographies (SIAB). The SIAB is an administrative data set compiled by the research institute of the Federal Employment Agency of Germany. It contains a 2% random sample of Germans who are either employed, recipients of social benefits, or job-seeking. It does not include self-employed workers and civil servants (Froderman et al., 2021). The SIAB provides information on daily wages that are right-censored at the cap for social security contributions. In my baseline analyses, I follow Dustmann et al. (2009) and impute the upper tail of the wage distribution by draws from a truncated log-normal distribution (Gartner, 2005).[8] The data are organized in spells, allowing researchers to trace the labor market biographies of individuals. I use information about an individual's establishment to aggregate employment spells to job cells where each cell represents one job per individual in a given year.

I restrict the SIAB to working-age individuals (18–63 years) who pay social security contributions. As a result, I obtain a data set with $\approx 595,000$ job observations per year. For each job, I observe daily wages, the sector, and the worker's socio-demographic characteristics.

The German Microcensus (MZ). The MZ is an annual household survey covering 1% of all German households and collects information on family socio-demographics, income, and living conditions (GESIS, 2020). In contrast to the SIAB, it also has information on working hours.

To match the sample composition of the SIAB, I restrict the MZ to employed individuals of working age (18–63 years) and exclude individuals who are either self- or marginally employed

[8] In Section 4.4, I show the robustness of my results to different imputation assumptions.

(<10h/week).[9] I obtain a data set with $\approx 174,000$ job observations per year. For each job, I observe working hours, the sector, and the worker's socio-demographic characteristics.

Constructing potential wages. The general idea of my shift-share design is to predict group-specific potential wages based on sectoral shocks and the group's exposure to such shocks. Specifically, I calculate the potential wage of group g in year t as follows:

$$\hat{w}_{gt} = \sum_{s} \underbrace{\frac{E^{s}_{g,1995}}{E_{g,1995}}}_{(1)} \times \underbrace{w^{s}_{t}}_{(2)} . \tag{1}$$

Term (1) of equation 1 indicates the employment share of sector s in group g in the base year 1995. Term (2) of equation 1 indicates the average hourly wage paid in sector s at the national level in year t. Hence, the group-specific potential wage $\hat{w}_{gt}$ is a weighted average of wages paid in different sectors of the economy where weights are given by the historic employment exposure of groups to these sectors in 1995.

Groups g are defined by partitioning the German population into 576 cells. These cells are pinned down by two expressions of gender, three education levels, and 96 regional units. The low-education group includes individuals who have, at most, a low-track secondary degree and no vocational training. The intermediate education group includes individuals with a low-track secondary degree plus vocational training, and individuals with a high-track secondary degree but no further tertiary education. The high-education group consists of people with tertiary education at the university level. The 96 regional units correspond to Germany's spatial planning regions. Spatial planning regions describe economic centers and their surroundings nested within the 16 federal states of Germany. Since commuter flows are an essential criterion for defining spatial planning regions, I refer to them as commuting zones (CZ).

Employment sectors s are defined by grouping employed individuals into 22×14 occupation-industry cells based on the German Classification of Occupations 2010 (KldB10) and the German Classification of Activities 2008 (WZ08).

Based on these definitions, I calculate potential wages as follows. First, I compute historic

[9] Tables S.9 and S.10 show that the resulting samples of the SIAB and the MZ are comparable in terms of industries, occupations, and the socio-demographic composition of workers.

employment shares for groups g in 1995 using data from the SIAB (Term [1] of equation 1).[10] Second, I calculate sector-specific hourly wages in year t combining data from the SIAB and the MZ (Term [2] of equation 1).[11] Specifically, I divide the average daily wage in sector s at time t (calculated from the SIAB) by the corresponding average daily working hours (calculated from the MZ): $w_t^s = d_t^s / h_t^s$. These averages are computed by excluding the CZ of interest ("leave-one-out") to avoid mechanical relationships.[12]

Sample restrictions. I match potential wages to the GSOEP based on an individual's gender, education, and CZ of residence. To ensure that the wage shock had been realized when parents answered the GSOEP survey, I match them to their potential wage in $t-1$. As a result, I obtain a dataset of potential wages that covers 576 socio-demographic groups over the period 2004–2018.

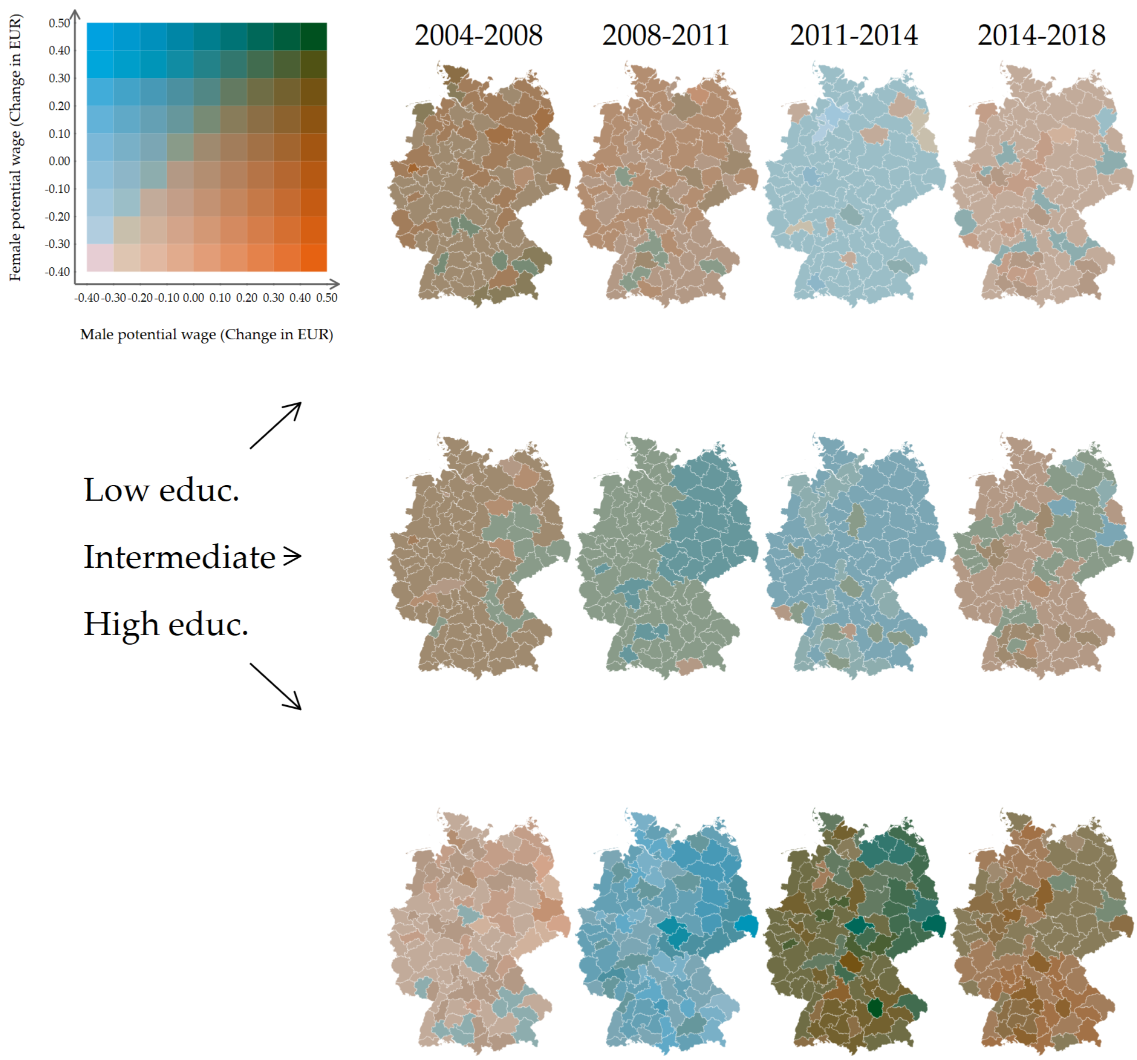
Figure 1 displays changes in potential wages by gender and education group across CZs in Germany throughout this period. All figures are normalized by the period-specific average growth rate to account for secular wage trends that affect all socio-demographic groups in a given period. Blue (red) areas indicate changes in favor of female (male) potential wages. Darker (lighter) colors indicate more (less) positive changes for both genders. Figure 1 shows substantial heterogeneity in the evolution of male and female potential wages across regions and education groups. For example, in the aftermath of the financial crisis (2008–2011), low-educated women experienced lower potential wage gains than low-educated men. In contrast, high-educated women experienced higher potential wage gains than high-educated men. Furthermore, we observe marked regional heterogeneity in wage growth patterns across CZs for all years and education groups.

[10] Tables S.11 and S.12 document the sorting of gender and education groups into industries and occupations in 1995.

[11] Figure S.4 shows distributions of cell sizes for the calculation of Terms (1) and (2) of equation 1.

[12] The MZ provides geographic identifiers at the level of federal states only. Therefore, I match average daily wages at the national level that leave out a particular CZ with average daily working hours at the national level that leave out the entire federal state in which the CZ is nested.

FIGURE 1 – Change in potential hourly wages of men and women by education and commuting zone, 2004–2018



Data: SIAB, MZ.
Note: Own calculations. This figure shows changes in the potential wages of men and women by education level and commuting zone. For each time period, changes are normalized by the period-specific average growth rate. Potential wages are calculated according to equation 1. The 96 commuting zones are defined by the official territory definition of spatial planning regions of the Federal Office for Building and Regional Planning. Education is classified as follows: Lower secondary degree without tertiary education (*Low*), lower secondary degree with vocational training or higher secondary degree without vocational training (*Intermediate*), university qualification (*High*).

3 EMPIRICAL STRATEGY

Identification strategy. I am interested in the causal effect of maternal and paternal potential wages on the development of socio-emotional skills in children, as well as the changes in children's living environments through which parents may influence the production of these skills. Given the panel structure of the GSOEP, the unit of observation is child i in year t.

I estimate the following model:

$$y_{it} = \alpha + \beta^m \ln \hat{w}^m_{it-1} + \beta^p \ln \hat{w}^p_{it-1} + \gamma_{f(i)a(it)} + \tau_t + X'_{it}\delta + \epsilon_{it}. \tag{2}$$

where $\hat{w}^m_{it-1}$ and $\hat{w}^p_{it-1}$ are lagged potential wages of mothers and fathers. Potential wages capture wage variation due to group-specific labor demand rather than to endogenous individual labor supply decisions (Bartik, 1991).[13]

I include a vector of family times child age fixed effects, $\gamma_{f(i)a(it)}$, that absorbs all confounding factors nested in differences across families at a specific child age a. For example, one may worry about confounding via time-constant family differences in ability (Demange et al., 2021), gender norms (Boelmann et al., 2025; Lippmann et al., 2020), assortative matching of parents (Eika et al., 2019), but also family differences that are specific to different child ages such as the productivity of parental time investments (Del Boca et al., 2014). The inclusion of $\gamma_{f(i)a(it)}$ takes care of such concerns. Also note that potential wages *in levels* are unlikely to be orthogonal to such unobserved time-constant family differences because they reflect variation in parent's educational attainment, region of residence, and biological sex (Equation 1). Therefore, Goldsmith-Pinkham et al. (2020) recommend using shift-share variables *in changes*. The inclusion of $\gamma_{f(i)a(it)}$ ensures that the identifying variation comes from within-family changes over time.

Furthermore, I include a vector of year fixed effects, τ_t, to control for secular trends such as the decline of gender wage gaps in Germany (Figure S.1). For example, one might be concerned that the within-family sibling comparison confounds the effect of changes in the PWG with children's birth cohort and parental age effects.[14] This concern would be relevant if the PWG was smaller for children from later birth cohorts (or for older parents at the time of birth) than for their siblings from earlier cohorts (or for younger parents at the time of birth). Including τ_t

[13] Shift-share (or Bartik) designs are widely used in the literature on household decision-making (Anderberg et al., 2015; Autor et al., 2019; Bertrand et al., 2015; Bruins, 2017; Schaller, 2016; Shenhav, 2021) and child development (Agostinelli and Sorrenti, 2022; Aizer, 2010; Lindo et al., 2018; Page et al., 2019).

[14] See for example Tables S.13 and S.14, where I show that the labor supply and childcare decisions of parents varies systematically by the birth order of their children.

in addition to $\gamma_{f(i)a(it)}$ takes care of such concerns. To see this, note that the child's birth cohort is a linear combination of age a and year t. Analogously, parental age is a linear combination of the parental birth cohort and year t. $\gamma_{f(i)a(it)}$ fixes both the child age and the birth cohort of parents while τ_t fixes the year of comparison. Therefore, the joint inclusion of $\gamma_{f(i)a(it)}$ and τ_t holds the child's birth cohort and parental age constant (Black et al., 2018; McGrath et al., 2014). This rules out any confounding factors related to parental experience, parental learning, etc.

While the inclusion of $\gamma_{f(i)a(it)}$ and τ_t are important for identification, one may worry that these high-dimensional fixed effects absorb much of the variation and lead to non-random selection into the identifying sample (Miller et al., 2023). The scope of this concern is limited in this study since the treatment variables are continuous, assuring sufficient intra-family variation in the right-hand side variables. I will report R^2-statistics in all regression tables showing considerable variation in the outcomes of interest even after conditioning on $\gamma_{f(i)a(it)}$ and τ_t.[15]

Equation 2 can be easily transformed to capture changes in the relative earnings potentials of mothers and fathers:

$$y_{it} = \alpha + \beta^{\Delta}\underbrace{(\ln \hat{w}^{m}_{it-1} - \ln \hat{w}^{p}_{it-1})}_{=\hat{w}^{\Delta}_{it-1}} + \beta^{\Sigma}\underbrace{(\ln \hat{w}^{m}_{it-1} + \ln \hat{w}^{p}_{it-1})}_{=\hat{w}^{\Sigma}_{it-1}} + \gamma_{f(i)a(it)} + \tau_t + X'_{it}\delta + \epsilon_{it}, \quad (3)$$

where $\hat{w}^{\Delta}_{it-1}$ represents the PWG and $\hat{w}^{\Sigma}_{it-1}$ is an essential control to isolate the effect of relative earnings potentials net of differences in wage levels. The baseline specification, does not include additional time-varying individual-level controls X'_{it}. However, in Section 4.4, I show that the results are robust to richer specifications of X'_{it}.

All specifications are estimated by OLS, and standard errors are clustered by family f. In Section 4.4, I show that the resulting standard errors are not systematically different from standard errors based on alternative cluster definitions.[16]

[15]See also Figure S.5 for raw data plots after residualizing a selection of outcomes and the treatment variables of interest from $\gamma_{f(i)a(it)}$ and τ_t.

[16]An alternative research design would instrument observed wages with potential wages. To do so, one needs to restrict the sample to mothers and fathers with available wage information in all relevant periods. This restriction is prohibitive since many young mothers transition in and out of the labor force when their children are young. For example, in my core analysis sample only 59% of mothers work. Additionally, the exclusion restriction is unlikely to hold since potential wages are important determinants of bargaining power within households, and therefore influence family outcomes through channels other than realized wages (Aizer, 2010; Pollak, 2005; Ponthieux and

Identification assumption. The econometric properties of shift-share designs have been investigated in several recent methodological papers (Adão et al., 2019; Borusyak et al., 2022, 2025; Goldsmith-Pinkham et al., 2020; Jaeger et al., 2018). Causal identification in shift-share designs can either be based on the exogenous assignment of the "shares," i.e., term (1) of equation 1, or the "shifters," i.e., term (2) of equation 1. In the case of exogenously assigned "shares," the shift-share design is reminiscent of a difference-in-differences design with many treatments: the "shares" define the treatment assignment, and the "shifters" define the treatment. In this paper, I follow the "share"-interpretation suggested by Goldsmith-Pinkham et al. (2020) and discuss the identification assumption in terms of exogenously assigned sector shares in the base year 1995. Therefore, in analogy to a difference-in-differences design, the identification assumption can be stated as follows:

$$\begin{aligned} & Cov\left(\epsilon_{it}, \frac{E^s_{g,1995}}{E_{g,1995}} \middle| \gamma_{f(i)a(it)}, \tau_t\right) = 0, \\ & \forall\, s \in S, \\ & \forall\, t \geq 1995 + 10. \end{aligned} \tag{4}$$

Note that the base year 1995 precedes the time frame of my analysis (2005–2019) by at least ten years. Furthermore, due to the inclusion of $\gamma_{f(i)a(it)}$, the identifying variation comes from within-family changes over time. Hence, the identification assumption in equation 4 implies that group-specific sector shares in 1995 need to be uncorrelated to *sibling differences* in the error term a decade later or more. This identification assumption would be violated if the historic sector shares correlated with other factors that predict contemporaneous intra-family variation in children's socio-emotional skills.

I assess the plausibility of this identification assumption as follows. First, following standard procedures for sibling fixed effect designs (e.g., Black et al., 2020; Deming, 2009), I show in Table 2 that the within-family treatment variation is uncorrelated with a large set of child characteristics that predict their socio-emotional skills and living environments (Table S.15). For this illustration, I restrict my analysis sample to sibling pairs, i.e., I exclude triplets and higher-order sibling groups. Then, I assign siblings to a "High-PWG" ("Low-PWG") group if

Meurs, 2015; Shenhav, 2021).

their PWG at age a is higher (lower) than the corresponding PWG of their sibling. Panel (a) of Table 2 contrasts the "High-PWG" and the "Low-PWG" groups in terms of their observable characteristics. Columns 1–3 show differences in observable characteristics after netting

TABLE 2 – Within-family variation of child characteristics by treatment status

		Family $\times$ child age FE			Family $\times$ child age FE + Year FE		
	N	High-PWG (1)	Low-PWG (2)	Δ (3)	High-PWG (4)	Low-PWG (5)	Δ (6)
Panel (a): Sibling characteristics							
Female	4,344	0.472	0.488	0.015 (0.016)	0.476	0.489	0.013 (0.017)
Born before October	4,344	0.791	0.780	-0.011 (0.012)	0.780	0.777	-0.003 (0.014)
Birth year	4,344	2006.633	2007.329	0.696*** (0.070)	2007.677	2007.677	–
Firstborn	4,344	0.582	0.430	-0.152*** (0.019)	0.364	0.357	-0.007 (0.014)
# of siblings	4,344	2.535	2.575	0.040*** (0.009)	2.609	2.600	-0.009 (0.009)
Birth height (cm)	2,326	50.926	50.956	0.030 (0.101)	51.088	51.010	-0.078 (0.108)
Birth weight (kg)	2,340	3.272	3.298	0.026 (0.018)	3.310	3.311	0.001 (0.018)
Days in hospital (3 months post-birth)	2,324	2.167	2.205	0.038 (0.285)	1.968	2.138	0.171 (0.278)
Age at birth (Mother)	4,344	28.894	29.590	0.696*** (0.070)	29.938	29.938	–
Age at birth (Father)	4,344	32.207	32.903	0.696*** (0.070)	33.251	33.251	–
Panel (b): Treatment variables							
Potential wage (Father)	4,344	15.066	14.897	-0.169*** (0.017)	15.097	14.907	-0.190*** (0.017)
Potential wage (Mother)	4,344	13.897	13.931	0.034** (0.014)	13.899	13.932	0.032*** (0.006)
PWG	4,344	-1.169	-0.966	0.203*** (0.012)	-1.198	-0.976	0.222*** (0.018)

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows differences in sibling characteristics conditional on different controls. All coefficients are estimated on the core sample described in Table 1 (restricted to sibling pairs). Siblings are allocated to the *High-PWG* (*Low-PWG*) group if they are subject to a higher (lower) value of the PWG than their sibling. The left-hand panel controls for family times child age fixed effects. The right-hand panel additionally controls for year fixed effects. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

out family times child age fixed effects $\gamma_{f(i)a(it)}$. As expected, both groups are comparable in characteristics assigned independently of their birth cohort, e.g., gender and birth month. However, on average, children of the "Low-PWG" group are born later, are less likely to be the firstborn, and have more siblings and older parents. These differences reflect the concern that a simple within-family sibling comparison confounds the effect of changes in the PWG with birth cohort and parental age effects. To address this concern, I additionally partial out time fixed effects τ_t. Columns 4–6 show that the joint inclusion of $\gamma_{f(i)a(it)}$ and τ_t make siblings comparable in all considered dimensions: as the child's birth cohort (parental age) is a linear combination of child age a (parental birth cohort) and year t, sibling differences related to their birth cohort and parental age at birth vanish. Importantly, Panel (b) of Table 2 shows that even after conditioning on this rich set of fixed effects, there remains sizable within-family variation in the treatment variables: the PWG difference between the "High-PWG" and the "Low-PWG" groups amounts to roughly 20% of the sample mean. These within-family differences in the treatment variables provide the identifying variation for my estimates.

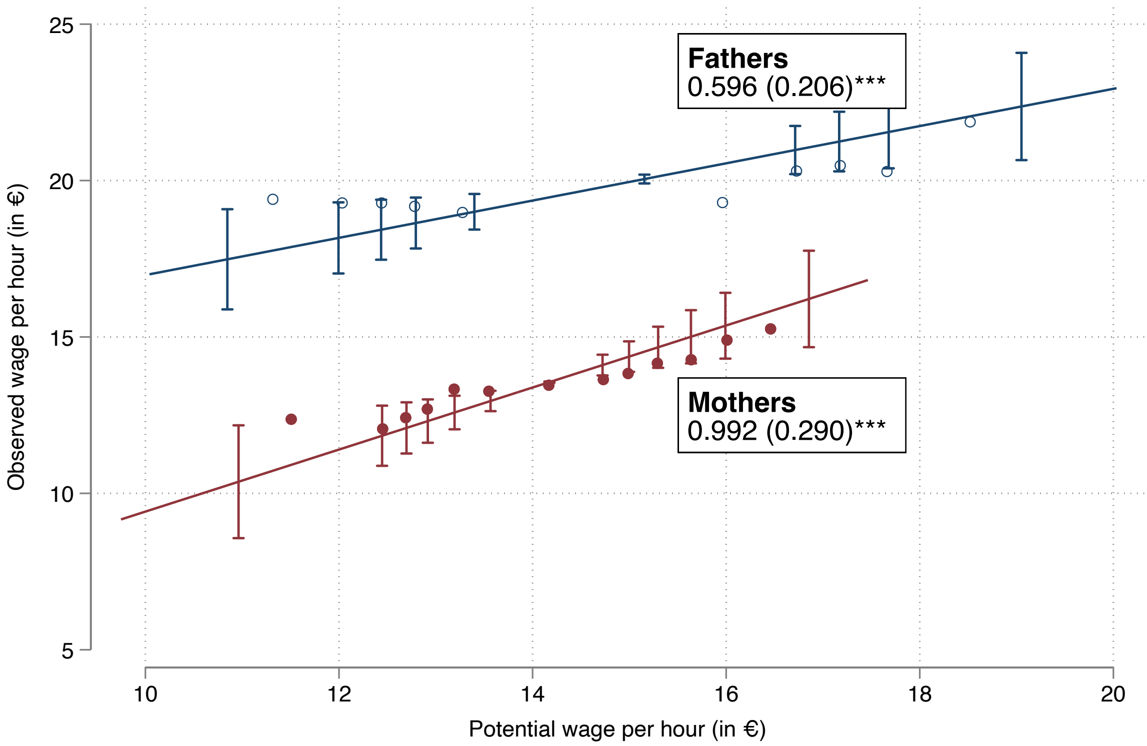
Second, I assess the sensitivity of my estimates to violations of the identification assumption concerning particular sectors of the economy. Goldsmith-Pinkham et al. (2020) show that shift-share estimates can be decomposed into just-identified, group-specific instrumental variable coefficients and their corresponding Rotemberg weights.[17] Rotemberg weights are helpful indicators to make the origin of the identifying variation transparent. Intuitively, if Rotemberg weights are highly concentrated in one sector, estimates may be biased by other shocks affecting groups specializing in this sector. Table S.16 provides an overview of the top ten economic sectors for mothers and fathers ranked by their Rotemberg weights. For mothers, most of the identifying variation comes from low-skill purchasing and sales occupations in wholesale and retail ($\approx$ 11%), low-skill logistics occupations in business services ($\approx$ 7%), and education and social care occupations ($\approx$ 7%). For fathers, most identifying variation comes from high-skill machine-building occupations in the manufacturing sector ($\approx$ 17%), low-skill workers in the construction sector ($\approx$ 11%), as well as high-skill IT occupations in business services ($\approx$ 4%). In general, the relatively wide dispersion of Rotemberg weights shows that my results are driven by many different sectors of the economy, suggesting a low sensitivity of my estimates to

[17] Thus, my identification relies on 308 instruments ($= 22 \times 14$ occupation-industry cells) for each group.

sector-specific violations of the identification assumption stated in equation 4.

Lastly, I confirm that $\hat{w}^m_{it-1}$ and $\hat{w}^p_{it-1}$ are good proxies for the earnings potential of mothers and fathers. While the actual earnings potential of mothers and fathers are unobserved, I can compare $\hat{w}^m_{it-1}$ and $\hat{w}^p_{it-1}$ to the corresponding observed wages w^m_{it} and w^p_{it} in the analysis sample. If potential wages capture relevant information on earnings potential, we expect them to be strongly predictive of their observed analogs. Figure 2 shows the residual correlation of potential wages and observed wages after accounting for individual and year fixed effects. There is a strong correlation between within-person changes in potential and observed wages. Furthermore, potential wages remain predictive for observed wages up to three years into the future (Figure S.6). This result shows that estimates of potential wages are good proxies for the actual earnings potential of mothers and fathers.

FIGURE 2 – Within-parent correlation of potential and observed wages



Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows the relationship between within-person changes in potential wages and within-person changes in observed wages for mothers and fathers. The sample spans the years 2005 to 2019 and includes two-parent households aged 18–63 with a resident child aged 2–10. Solid lines show estimates from a linear regression of actual wages on potential wages controlling for individual fixed effects and year fixed effects. Whiskers show 95% confidence intervals; standard errors are clustered at the individual level. Binned scatters are constructed using the optimal binning procedure of Cattaneo et al. (2024).

To summarize the previous discussion, my identifying variation comes from within-family changes in potential wages. These changes in potential wages are uncorrelated to a wide array of characteristics of children and their families. Additionally, the identifying variation is spread over many sectors of the economy, mitigating the risk that sector-specific violations of the identification assumption bias the results.

4 RESULTS

I present the results in four steps. First, I illustrate how mothers and fathers allocate their time to different activities in response to changes in their potential wages. This step provides a proof of concept showing that German parents respond to labor market incentives. Furthermore, it suggests changes in children's living environment that may affect their socio-emotional development. Second, I present the effects of changes in the PWG on the socio-emotional skills of children. Third, I analyze the mechanisms through which changes in the PWG affect children's socio-emotional skills by analyzing its effect on childcare arrangements and family finances, and by conducting a heterogeneity analysis. Lastly, I assess the robustness of my findings.

4.1 Parental time allocation

Table 3 presents the effects of changes in maternal and paternal potential wages on four categories of parental time-use during a regular work week: work for pay (incl. travel time to and from work), childcare, housework activities (incl. repairs and errands), and personal time (incl. hobbies and education). Outcomes are measured in hours per day. For ease of interpretation, I rescale the coefficients from all regressions to represent the effect of a 10% increase in potential wages of mothers and fathers.

Mothers have a positive own-wage elasticity of labor supply: a 10% increase in maternal potential wages increases their work time by 1.2 hours per day, i.e., a 35% increase in comparison to the sample mean (Column 1).[18] The implied total hours elasticity is large, which is consistent

[18]This effect reflects strong increases at the extensive margin whereas the effect on mothers who are in work already is not distinguishable from zero; however, due to the underlying selection into work, the intensive margin

TABLE 3 – Parental potential wages and parental time allocations

	Mother (hours/day)				Father (hours/day)			
	Work for pay (1)	Child-care (2)	House-work (3)	Personal time (4)	Work for pay (5)	Child-care (6)	House-work (7)	Personal time (8)
Effect of 10% ↑ in parental potential wages								
Mother	1.226*** (0.363)	0.004 (0.496)	-0.415 (0.342)	-0.700*** (0.247)	-0.261 (0.546)	0.226 (0.318)	0.112 (0.243)	-0.279 (0.272)
Father	-0.537*** (0.148)	0.622** (0.245)	0.212* (0.127)	-0.064 (0.066)	0.440** (0.201)	0.164 (0.181)	-0.028 (0.110)	-0.275* (0.148)
Family × child age FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
N	5,579	5,579	5,579	5,579	5,579	5,579	5,579	5,579
R^2	0.794	0.749	0.777	0.653	0.771	0.716	0.723	0.689
Outcome Mean	3.434	7.537	4.805	1.195	8.806	2.366	2.101	1.181
Outcome SD	3.458	4.272	2.819	1.285	3.149	2.371	1.872	1.367

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in parental time allocations in response to changes in maternal and paternal potential wages. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

with the well-documented sensitivity of young mothers to temporal changes in their wages. For example, Attanasio et al. (2018) show that the labor supply elasticity in the US increases from < 1 for women who work full time (40h), to ≈ 2 for women who work part-time (20h), to ≈ 4 for women working around 15 hours per week, which is roughly the average for mothers in my sample. The increase in work for pay does not lead to downward revisions in the time mothers allocate to childcare (Column 2). Instead, most of the increase in labor market activity is accounted for by an (insignificant) decrease of time for housework and decreased time for hobbies and education: a 10% increase in maternal potential wages decreases personal time by 0.7 hours per day (Column 4). These patterns suggest that German mothers respond to increased labor market opportunities by spending more time at work while protecting the overall time with their children. This conclusion is further supported by descriptive evidence from German time-use diaries. In Figure S.8, I compare the share of mothers at work with the share of mothers spending time with their children for each 10-minute window of the day across the survey

effect cannot be interpreted causally (Table S.17). Quantile regressions show that the effects are evenly distributed across the hours distribution, suggesting that mothers who are shifted into employment take up both part-time and full-time jobs (Figure S.7).

waves 2001/02 and 2012/13. Over time, there has been an increasing share of mothers at work during business hours (8 am–4 pm) and a corresponding decrease in the share of mothers who spend time with their children. However, this trend is offset by an increase in the share of mothers spending time with their children in the late afternoon and evening hours (4 pm–8 pm). This evidence suggests that mothers compensate their children for their absence during the day with increased interactions after they return from work. In Table S.18, I complement the descriptive evidence from time-use diaries with causal evidence on the impact of parental wages on children having joint lunches with their families during the week and during weekends. Results show that increases in maternal wages decrease the likelihood of joint family lunches during weekdays, but increase the likelihood of joint family lunches during weekends. This pattern again is consistent with mothers reacting to increases in their potential wages by shifting the timing of childcare activities.

Fathers also have a positive but smaller own-wage elasticity of labor supply: a 10% increase in paternal potential wages increases their work time by 0.4 hours per day, i.e., a 5% increase in comparison to the sample mean (Column 5). This effect reflects increases at the intensive margin whereas the effect on the extensive margin is not distinguishable from zero (Table S.17). Like mothers, their increased labor market activity is accounted for by decreased time for hobbies and education: a 10% increase in paternal potential wages decreases personal time by 0.3 hours per day (Column 8).

Furthermore, Table 3 shows that mothers and fathers react asymmetrically to changes in the potential wage of their partners. On the one hand, mothers respond to increases in paternal wages by reallocating time from work to childcare: holding their own potential wages constant, a 10% increase in paternal potential wages decreases maternal working time by 0.5 hours per day (Column 1), allowing mothers to increase childcare activities by a similar amount (Column 2). On the other hand, fathers' response to changes in their partner's potential wages is more attenuated and cannot be statistically distinguished from zero.

These analyses show that parents respond to labor market incentives by adjusting their time allocations with likely consequences for the environment in which children grow up.[19] Further-

[19]One may suspect that the extent of the adjustments varies with the youngest child in the household—see Tables

more, the responsiveness of maternal time allocations to changes in the potential wages of their partner illustrates the importance of considering the labor market incentives of both mothers and fathers—an aspect that is underrepresented in the current literature on child development where the exclusive focus on mothers as primary caretakers is prevalent. I now turn to the main question of this paper: the impact of changes in the PWG on children's socio-emotional skills.

4.2 Children's socio-emotional skills

The upper panel of Table 4 displays the effects of maternal and paternal potential wages on children's socio-emotional skills (see equation 2). Measures for socio-emotional skills are standardized on the estimation sample to have a mean of zero and an SD of one. I again rescale the coefficients to represent the effect of a 10% increase in potential wages of mothers and fathers.[20]

In general, there is limited evidence for parental potential wages to affect children's socio-emotional skills. 13 of the 14 estimated coefficients cannot be distinguished from zero at conventional levels of statistical significance. An exception is the effect of maternal potential wages on children's extraversion: a 10% increase in maternal potential wages increases children's extraversion by 0.17 SD (Column 3). However, the significance of this result vanishes once we account for multiple hypothesis testing. Using the Romano-Wolf step-down procedure of Clarke et al. (2020) to control for the family-wise error rate (FWER) of the 14 tested hypotheses, the p-value for the effect of maternal potential wages on extraversion drops from 0.09 to 0.71. An alternative way of accounting for multiple hypothesis testing is focusing on the summary indexes for children's personality (Column 6) or behavioral problems (Column 9). The conclusions of the analysis remain unchanged.

The lower panel of Table 4 displays the effect of the PWG on children's socio-emotional skills. The PWG is calculated as the log ratio of maternal and paternal potential wages. To isolate the

S.13 and S.14 for descriptive evidence on differences in parental time use by parity. However, this conjecture does not hold in my sample. Figure S.9 shows that the causal effect of potential wages for the labor supply of parents does not vary with the age of the youngest child in the household.

[20]Note that the sample sizes are slightly different from the sample sizes in Table 1. This is a consequence of some mothers completing the Big Five questionnaire but not the SDQ, and vice versa.

TABLE 4 – Parental potential wages and children's socio-emotional skills

	Big Five						SDQ		
	Open. (1)	Consc. (2)	Extra. (3)	Agree. (4)	Neuro. (5)	Index (6)	Extern. (7)	Intern. (8)	Index (9)
Panel (a): Effect of 10% ↑ in parental potential wages									
Mother	-0.150	-0.027	0.173*	-0.056	0.130	-0.016	0.282	0.110	0.172
	(0.113)	(0.122)	(0.101)	(0.108)	(0.168)	(0.084)	(0.257)	(0.136)	(0.113)
	[0.187]	[0.824]	[0.088]	[0.605]	[0.439]	–	[0.273]	[0.418]	–
	{0.900}	{1.000}	{0.706}	{1.000}	{0.995}		{0.970}	{0.995}	
Father	-0.050	0.022	0.003	0.002	0.070	0.034	-0.101	0.106	0.001
	(0.061)	(0.052)	(0.066)	(0.065)	(0.143)	(0.146)	(0.109)	(0.121)	(0.095)
	[0.414]	[0.673]	[0.959]	[0.981]	[0.626]	–	[0.354]	[0.383]	–
	{0.995}	{1.000}	{1.000}	{1.000}	{1.000}		{0.995}	{0.995}	
Panel (b): Effect of 10% ↓ in PWG									
PWG	-0.050	-0.025	0.085	-0.029	0.030	-0.025	0.192	0.002	0.085
	(0.065)	(0.067)	(0.060)	(0.064)	(0.111)	(0.085)	(0.146)	(0.091)	(0.073)
	[0.440]	[0.712]	[0.157]	[0.653]	[0.787]	–	[0.190]	[0.981]	–
	{0.935}	{0.980}	{0.642}	{0.980}	{0.980}		{0.682}	{0.990}	
Family × child age FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	5,531	5,531	5,531	5,531	3,610	3,610	2,310	2,310	2,310
R^2	0.553	0.561	0.499	0.544	0.509	0.586	0.614	0.617	0.650
Outcome Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Outcome SD	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in children's socio-emotional skills in response to changes in maternal and paternal potential wages. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects. Regressions in Panel (b) also control for the sum of maternal and paternal potential wages. Standard errors (in parentheses) are clustered at the family level. p-values are presented in brackets. p-values that control the family-wise error rate (FWER) are presented in curly brackets. FWER-adjusted p-values are calculated based on the Romano-Wolf step-down procedure using 200 bootstrap replications (Clarke et al., 2020). Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

effect of the PWG from the effects of wage levels, I control for the sum of maternal and paternal potential wages in all regressions ($\hat{w}^{\Sigma}_{it-1}$, see equation 3). Coefficients are scaled to reflect a 10% decrease in the PWG.

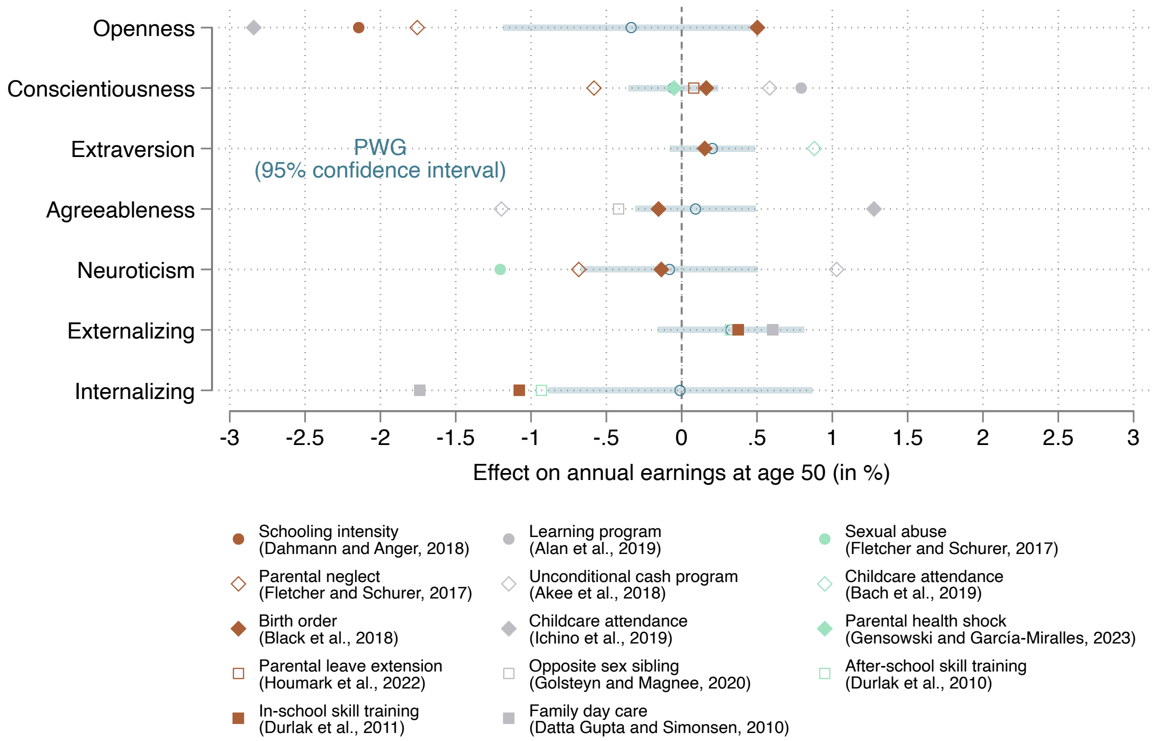
There is limited evidence that reducing the PWG exerts substantial effects on children's socio-emotional skills. Point estimates are close to zero and cannot be statistically distinguished from zero regardless of whether we consider individual skill dimensions or summary indexes.

Contextualizing effect sizes. Whether these null effects are informative depends on the study design's ability to rule out meaningful effect sizes. I assess this question in two steps. First, I calculate minimum detectable effect (MDE) sizes at 80% power. Figure S.10 shows the results of these power calculations: MDEs at sample sizes of $2,000$, $4,000$, and $6,000$ observations are 0.21, 0.15, and 0.13 SD, respectively. To put these MDEs into perspective, a recent overview article by Schurer (2017) assesses the impact of various educational interventions on different measures of socio-emotional skills. Absolute effect sizes range between zero and 0.7 SD. Furthermore, 26 out of the 34 estimates are larger than 0.1 SD. This pattern suggests that my study design is well-powered to detect the existence of prevalent effect sizes that have been established in the current literature on socio-emotional skills.

Second, I perform a back-of-the-envelope calculation of how the estimates translate into later-life earnings. In particular, I multiply the 95% confidence intervals of my estimates with the corresponding effects of Big Five personality traits and externalizing/internalizing behavior on annual earnings at age 50 as estimated in Papageorge et al. (2019). Figure 3 shows that the range of implied earnings changes is small. For conscientiousness, extraversion, agreeableness, neuroticism, and internalizing/externalizing behavior, I can exclude earnings increases/decreases larger than 1% per year. The credible effect range for openness is only marginally larger. To put these implied earnings effects into perspective, I again compare them to those of other interventions analyzed in the existing literature. For example, in a recent paper, Fort et al. (2020) show that a substitution from family care to public daycare in Bologna significantly decreases the openness and agreeableness of the affected children. The implied earnings effect of their estimates correspond to earnings changes of -2.8% (openness) and 1.3% (agreeableness) per year. These implied effect sizes can be comfortably ruled out for a 10% decrease in the PWG in Germany. While these back-of-the-envelope calculations arguably rely on strong assumptions, they support the conclusion that equalizing labor market opportunities between mothers and fathers does not lead to changes in children's socio-emotional skills that are large enough to have meaningful consequences for their long-term life outcomes.[21]

[21] A core assumption for this exercise is that the short-run changes in socio-emotional skills from Table 4 persist into adulthood. This assumption is supported by Figure 4, where I show that effects remain near zero over until age 10. Furthermore, I have to assume that the effect sizes of Papageorge et al. (2019) are causally identified and externally valid for other cohorts and countries.

FIGURE 3 – Implied effects on earnings in comparison to other interventions

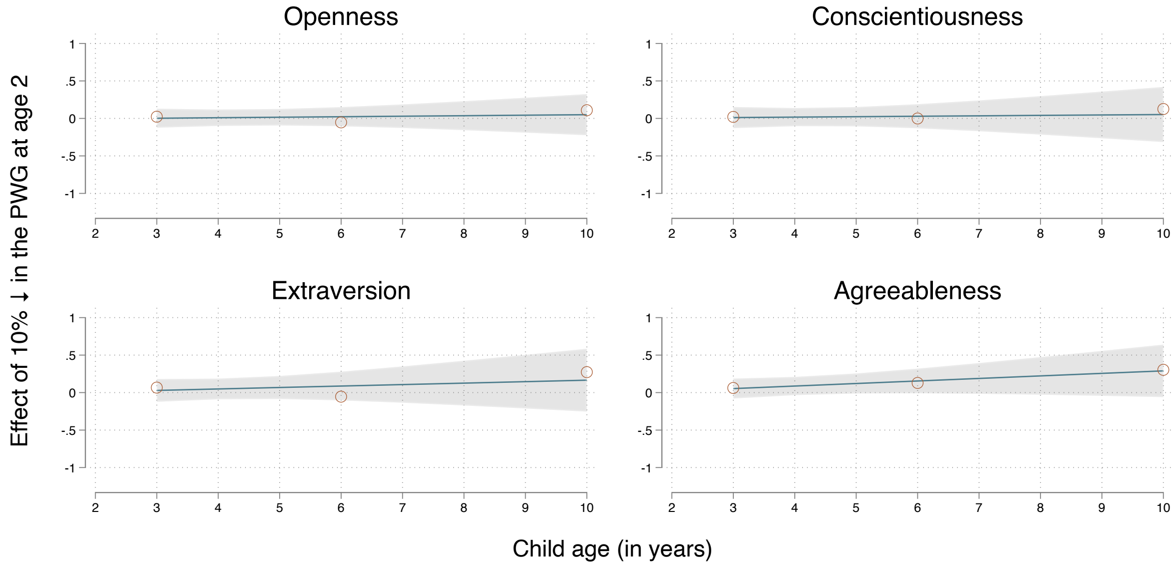


Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows the implied effects of changes in children's socio-emotional skills on annual earnings at age 50. Point estimates for a 10% decrease in the PWG and associated 95% confidence intervals are taken from Table 4. Effect sizes for other interventions are taken from the studies listed in the legend. All data points are multiplied with the effect sizes for 1 SD increases in socio-emotional skills on log-weekly earnings at age 50 (Papageorge et al., 2019, Column 3 of Table D.11): 0.067 (Openness), 0.023 (Conscientiousness), 0.024 (Extraversion), -0.032 (Agreeableness), -0.027 (Neuroticism), 0.017 (Externalizing behavior), -0.049 (Internalizing behavior).

Long-run analysis. The previous discussion considered the short-term effect of the PWG on children's socio-emotional skills. However, it could be the case that small short-run effects accumulate over time into sizable long-run effects. The potential for such a pattern is highlighted by Table S.4, where I use value-added models to show that socio-emotional skills of children are self-productive. To investigate the possibility of long-run effects, I modify the baseline estimation as follows: I fix the PWG at child age two. Then, I use split sample analyses to estimate the effect of the early-life PWG on children's socio-emotional skills at ages 3, 6, and 10. If it was the case that small short-run effects accumulate over time, we should see increasing effect sizes as children grow up. Note that I omit neuroticism, externalizing/internalizing behaviors from this analysis as data on these skills is only available for ages 6 and 10 (Table 1).

Figure 4 suggests that the null effects persist in the long run. The effect sizes for the early-life

FIGURE 4 – Long-term effects of the PWG at age 2 on children's socio-emotional skills



Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows long-term changes in children's socio-emotional skills in response to a 10% decrease of the PWG at child age 2. The circles indicate treatment effects for children's socio-emotional skills measured at ages 3, 6, and 10 based on split sample analyses. The solid lines indicate linear predictions across the age range 3-10. The gray shaded areas mark 95% confidence intervals. All regressions control for family fixed effects, and the sum of maternal and paternal wages. Standard errors are clustered at the family level.

PWG on children's Big Five personality traits are always close to zero and frequently change signs as children grow up. Therefore, the gradients for predicted effects across the considered age range are flat and do not point to an increasing importance of early-life PWGs for children's socio-emotional skills until age 10.

Furthermore, in Table 5, I show that the PWG at age 2 does not affect other outcomes related to children's socio-emotional skills and long-term life outcomes.[22]

First, I consider children's BMI at age 6 as a proxy for their health. Existing literature suggests that personality and externalizing/internalizing behaviors correlate strongly with the BMI (Attanasio et al., 2020a; Conti and Hansman, 2013). Furthermore, early-life health is an important determinant of the long-term life outcomes of individuals (Conti et al., 2010). In this analysis, I classify children as underweight (overweight) if their BMI is below (above) the 10th (90th) percentile of the age-specific BMI distribution in Germany (Schaffrath Rosario et al., 2010). Column 1 of Table 5 shows that we cannot reject the null hypothesis that the PWG has no impact

[22]Table S.19 shows that children's socio-emotional skills measured at different ages predict the considered outcomes in my sample even conditional on a rich set of controls.

TABLE 5 – Long-term effects of PWG at age 2 on other child outcomes

	BMI at age 6: Under/Overweight (yes/no) (1)	Delayed school entry (yes/no) (2)	Upper secondary school track (yes/no) (3)
Effect of 10% ↑ in parental potential wages at age 2			
Mother	0.030 (0.159)	-0.107 (0.114)	0.036 (0.049)
Father	0.056 (0.060)	-0.021 (0.028)	0.009 (0.029)
Panel (b): Effect of 10% ↓ in PWG at age 2			
PWG	-0.013 (0.083)	-0.043 (0.060)	0.013 (0.031)
Family FE	✓	✓	✓
Year FE	✓	✓	✓
N	2,794	4,140	5,772
R^2	0.500	0.518	0.737
Outcome Mean	0.383	0.116	0.445
Outcome SD	0.486	0.320	0.497

Data: GSOEP.
Note: Own calculations. This table shows long-term changes in other child outcomes in response to changes in maternal and paternal potential wages. All regressions control for family times child age fixed effects and year fixed effects. Regressions in Panel (b) also control for the sum of maternal and paternal potential wages. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

on whether children are underweight or overweight.

Second, I consider the age of school entry as another proxy for developmental problems of the child. In Germany, all children complete a compulsory school readiness examination the year before their scheduled school entry. These examinations are conducted by pediatricians who assess children's language, motor, and socio-emotional skills (Cornelissen et al., 2018; Felfe and Lalive, 2018). Children's school entry may be delayed if they perform poorly in the school readiness examination. Therefore, I construct an indicator for whether children entered school after their scheduled school starting age which is typically at age 6. Column 2 of Table 5 shows that the PWG does not impact children's age of school entry.

Lastly, I consider whether children attend the high academic track in secondary school. In Germany, children transition to secondary school at ages 10–12 depending on the federal state. They are tracked based on teacher grades and teacher recommendations, both of which are likely influenced by student's socio-emotional skills (e.g., Jackson, 2019; Sorrenti et al., 2025). Furthermore, this tracking decision has important long-run implications since only the high academic track leads to a school-leaving certificate that grants access to university. Column 3 of Table 5 shows that the PWG does not influence whether children attend the high academic track in secondary school or not.

In summary, these analyses support the conjecture that PWG changes do not have significant consequences for children's socio-emotional skills and long-term life outcomes. In complementary analyses, I show that the null effect of the PWG on child development also pertains to the cognitive domain, i.e., the language development of children aged 2-3 as measured by the corresponding component of the Vineland Adaptive Behavior Scale (Sparrow and Cicchetti, 1996) and GPAs in Math and German of children aged 9–10 (Table S.20). While data limitations prevent a more comprehensive analysis of the cognitive domain, these results suggest that the PWG does not affect child development in a broader sense that goes beyond their socio-emotional skills.

4.3 Mechanisms

Children's living environments. The previous sections have shown that changes in the labor market incentives of mothers and fathers lead to important changes in parents' time allocations. However, these changes do not affect children's socio-emotional skills. To understand this finding, I investigate the impact of changes in the PWG on proxies for childcare arrangements (parental care, formal/informal care, number of regular carers) and the financial situation of families (disposable family income, share of resources controlled by mothers).

The choice of these indicators is motivated by existing literature. In terms of childcare arrangements, the evidence of substituting parental with non-parental care on child development is mixed, especially for the substitution between parental and formal care. This heterogeneity of results is driven by cross-study differences in the quality of these programs, the socio-economic composition of study samples, the considered child outcomes, etc. For example, consider the evidence for Germany: Cornelissen et al. (2018) show that attending childcare from ages 3–6 increases school readiness for boys and children with migration background. Felfe and

Zierow (2018) go beyond the extensive margin and investigate the effects of transitioning from half-day care to full-day care in the same age range. They also find strong positive effects on school readiness of immigrant children; yet they also document negative effects on children's socio-emotional skills, especially for children of low-educated, single, and immigrant mothers. Felfe and Lalive (2018) focus on childcare attendance before age 3 and also show heterogeneous marginal effects across different outcomes and subgroups: while boys benefit from early childcare more strongly than girls across the board, children from high-educated mothers benefit more than children from low-educated mothers only in terms of motor skills. In comparison to formal care, the literature on the effects of informal care is more parsimonious. Yet, existing literature suggests that a substitution from maternal to informal care is likely to exert a negative effect on children's development, and vice versa (Bernal and Keane, 2011; Danzer et al., 2020; Datta Gupta and Simonsen, 2010; Duncan et al., 2023; Gathmann and Sass, 2018). I corroborate these findings from the literature by corresponding analyses in the GSOEP. In Table S.21, I show associations of children's socio-emotional skills with the time-share they spend in formal and informal care, while treating parental care as the omitted care category and conditioning on a rich set of controls. On the one hand, consistent with the mixed findings on the effects of formal care, the results show that increases in the share of formal care do not predict children's socio-emotional skills. On the other hand, increases in the share of informal care are consistently negatively associated with children's socio-emotional skills. Next to the time children spend in different care arrangements, existing literature suggests that the number of carers a child is exposed to exert a negative effect on child development. This is likely driven by the increased instability in the day-to-day living environment and the child's ensuing difficulties to build relationships with carers and peers (Morrissey, 2009). Increases in the number of carers may be particularly detrimental in the short-run as children have to adjust to new routines, but may be less important if "carer multiplicity" stabilizes in the long-run (Pilarz and Hill, 2014).

In terms of the financial situation of families, existing literature shows that increased monetary resources promote child development by allowing families to purchase child-centered goods and by reducing parental stress (Agostinelli and Sorrenti, 2022; Akee et al., 2018; Dahl and Lochner, 2012; Løken et al., 2012; Nicoletti et al., 2023). Furthermore, mothers have a higher propensity to use available financial resources to benefit their children (Duflo, 2012; Lundberg et al., 1997). Therefore, increases in the disposable income of families and an increased share of resources controlled by mothers are likely to exert a positive effect on children's development, and vice versa.

The upper panel of Table 6 displays the effects of maternal and paternal potential wages on children's living environments. I again rescale the coefficients to represent the effect of a 10% increase in potential wages of mothers and fathers.

TABLE 6 – Parental potential wages and children's living environment

	Childcare arrangements				Financial resources	
	Parental care (hours/day) (1)	Formal care (hours/day) (2)	Informal care (hours/day) (3)	No. of carers (4)	Family inc. (in Thsd. €) (5)	Inc. share mother (in %) (6)
Panel (a): Effect of 10% ↑ in parental potential wages						
Mother	0.231	0.073	0.178*	0.175	3.309**	9.507**
	(0.470)	(0.236)	(0.096)	(0.137)	(1.580)	(3.947)
Father	0.785**	-0.235**	-0.062	-0.143*	-0.715	-4.284***
	(0.325)	(0.119)	(0.065)	(0.081)	(0.484)	(1.373)
Panel (b): Effect of 10% ↓ in PWG						
PWG	-0.277	0.154	0.120**	0.159**	2.012**	6.895***
	(0.285)	(0.133)	(0.058)	(0.081)	(0.834)	(2.165)
Family × child age FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	5,579	5,579	5,579	5,579	5,579	5,579
R^2	0.749	0.676	0.674	0.702	0.920	0.800
Outcome Mean	9.903	2.707	0.631	1.547	46.138	19.315
Outcome SD	5.159	2.262	1.087	0.986	25.884	22.932

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in childcare arrangements and financial resources in response to changes in maternal and paternal potential wages. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects. Regressions in Panel (b) also control for the sum of maternal and paternal potential wages. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

First, a 10% increase in maternal potential wages does not affect the total care by parents (Column 1) but increases the time children spend in both formal and informal childcare. The effect on formal care is small and insignificant (Column 2) while the time in informal childcare increases by 0.18 hours per day—a 26% increase compared to the sample mean (Column 3). This pattern echoes that mothers protect their overall time with children by increasing their childcare activities after work (see the discussion above). It also suggests that families especially increase the use of informal childcare arrangements when mothers increase their working time, i.e., by increasingly relying on the extended family which is the most frequent form of informal care in Germany (Table S.22). The elevated use of informal childcare is consistent with access barriers to formal care in Germany. For pre-school children (< 6) spaces are scarce, and the allocation of slots is often based on preferential treatment (e.g., enrolled siblings and religious affiliations). Recent calculations show that in the period 2012-2016, only 71% of pre-school childcare demand in Germany was met with a corresponding slot (Jessen et al., 2020). Furthermore, the application system is complicated and creates de facto barriers for many families (Hermes et al., forthcoming). For school-aged children (≥ 6), there is no legal claim for after-school care. As a consequence, less than 20% of elementary school children in Germany were enrolled in after-school care in 2014, while 70% of parents indicated demand for such a service (OECD, 2016). Therefore, publicly subsidized childcare for pre-school and school-aged children remains unavailable for many families who want to expand their labor supply, nudging them towards informal childcare as a more flexible alternative. Consistent with these patterns, increases in maternal potential wages increase the number of non-parental carers the child is exposed to on a regular basis; however, the estimate is too imprecise to attain statistical significance (Column 4). Next to changes in childcare arrangements, the labor supply responses of mothers also have substantial effects on the availability of monetary resources within households: a 10% increase in maternal potential wages increases total disposable family income by 3.31 Thsd. €, which amounts to a 8% increase compared to the sample mean (Column 5). It also increases the maternal share of earnings by 9.51 percentage points. This increase is particularly substantial and corresponds to 49% compared to the sample mean, reflecting the low labor market participation of mothers in Germany (Column 6).

Second, a 10% increase in paternal potential wages increases total parental care by 0.79 hours per day (Column 1). This increase is driven by mothers who withdraw from the labor market and increase their provision of in-home childcare (Table 3). At the same time, families especially decrease the use of formal care: a 10% increase in paternal potential wages decreases the use of formal childcare by 0.23 hours per day—a 9% increase compared to the sample mean of 2.7 hours per day (Column 2). It is interesting to observe the different margins of adjustment for increases in paternal and maternal potential wages. While barriers to formal childcare drive parents towards informal care when maternal potential wages increase, these constraints are not binding when mothers withdraw from the labor market in response to increases in paternal potential wages, allowing for stronger substitution between formal and in-home care. In line with the substitution from formal to in-home care, a 10% increase in paternal potential wages decreases the number of non-parental carers by 0.14 (Column 4). In terms of financial resources, increases in paternal potential wages do not affect total disposable family income (Column 5). This null effect arises because fathers' increased income is offset by mothers' simultaneous withdrawal from the labor market (Table 3). However, the increased earnings of fathers and decreased earnings of mothers lead to a 4.28 percentage points decline in the share of resources controlled by mothers (Column 6).

Finally, the lower panel of Table 6 displays the effects of a 10% decline in the PWG on children's living environments. Again, I control the sum of maternal and paternal wages in all regressions to isolate the effect of relative earnings potentials from the effects of wage levels. Consistent with the individual effects of maternal and paternal wages, a 10% decrease in the PWG increases the use of informal childcare by 0.12 hours per day (19%, Column 3), increases the number of regular carers by 0.16 (10%, Column 4), increases disposable household income by 2.01 Thsd. € per year (4%, Column 5), and increases the total share of resources controlled by mothers by 6.90 percentage points (36%, Column 6). In sum, these findings suggest: on the one hand, decreases in the PWG trigger adverse effects on childcare arrangements as they increase children's exposure to informal care and increase the number of care arrangements the child is exposed to. On the other hand, these changes are compensated by positive effects in the monetary domain as decreases in the PWG increase household income, with an increasing share of these resources controlled by mothers.

Alternative mechanisms. Until now, I have analyzed mechanisms related to childcare arrangements and the financial situation of families. In Table 7, I consider several alternative mechanisms that may influence children's socio-emotional skills.

TABLE 7 – Parental potential wages and alternative mechanisms

	Joint activities	Parenting styles			Satisfaction (family life)	
		Warmth	Control	Monitor	Mother	Father
	(1)	(2)	(3)	(4)	(5)	(6)
Panel (a): Effect of 10% ↑ in parental potential wages						
Mother	-0.064	0.075	-0.103	-0.105	0.118	0.200*
	(0.125)	(0.106)	(0.130)	(0.099)	(0.133)	(0.109)
Father	-0.029	-0.024	-0.093	-0.086	0.044	0.069
	(0.072)	(0.173)	(0.185)	(0.105)	(0.053)	(0.052)
Panel (b): Effect of 10% ↓ in PWG						
PWG	-0.018	0.049	-0.005	-0.009	0.037	0.065
	(0.071)	(0.100)	(0.112)	(0.071)	(0.069)	(0.060)
Family × child age FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,940	3,185	3,185	3,185	5,421	5,421
R^2	0.705	0.741	0.712	0.715	0.711	0.733
Outcome Mean	0.000	0.000	0.000	0.000	0.000	0.000
Outcome SD	1.000	1.000	1.000	1.000	1.000	1.000

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in the frequency of joint mother-child activities, parenting styles, and parental satisfaction with family life in response to changes in maternal and paternal potential wages. All regressions control for family times child age fixed effects and year fixed effects. Regressions in Panel (b) also control for the sum of maternal and paternal potential wages. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

First, as discussed in Section 2, the baseline measure of parental care is best understood as a broad measure capturing any activity where the child is present and not necessarily joint activities dedicated to the child. Therefore, it may miss important changes in parental time investments, especially with respect to high-quality interactions between children and their parents. To investigate this possibility, I construct an index of joint activities between mothers and children at ages 3 and 6. This index is based on 13 variables in which mothers record the frequency of joint activities such as reading, shopping, artistic activities, etc., in the previous two weeks. These variables are aggregated into an index using the GLS weighting procedure of Anderson (2008). Results show that a 10% reduction in the PWG reduces the index of joint activities by an insignificant 0.02 SD (Column 1). This finding suggests that the null effect of the PWG on children's socio-emotional skills is not driven by a reduction of joint activities between mothers and children. Furthermore, this finding aligns with the previously presented evidence showing that mothers maintain their childcare engagement despite increasing working hours by shifting the timing of their childcare activities to the late afternoon and evening hours as well as the weekends (Table 3, Figure S.8, Table S.18). It also echoes findings from Bastian and Lochner (2022) and Hsin and Felfe (2014), who show that mothers in the US especially protect time for quality interactions with their children.[23]

Second, existing research suggests that family socio-economic status influences child outcomes via parenting styles (Agostinelli et al., forthcoming; Falk et al., 2021). Therefore, I follow Falk et al. (2021) and construct indexes for three dimensions of parenting styles measured at child ages 8 and 10: parental warmth, parental control, and parental monitoring. These indexes are based on 3 variables each, recording mothers' reports about patterns in their parenting behavior (Anderson, 2008; Richter et al., 2017). Results show that a 10% reduction in the PWG leads to statistically insignificant changes in each index that correspond to less than 5% of a standard deviation (Columns 2–4), suggesting that parents do not adjust their parenting styles in response to changes in the PWG.

Lastly, the PWG may affect children through the quality of the relationship of parents. To investigate this possibility, I repeat the analysis using maternal and paternal satisfaction with family life as an outcome variable. Raw answers are recorded on an 11-point Likert scale, which I standardize by respondent sex. There is no effect of the PWG on the family life satisfaction of mothers or fathers (Columns 5 and 6)—a finding that is consistent with the zero effect of the PWG on fertility decisions and parental separation in the following years (Table S.6).

In sum, changes in joint activities, parenting styles, or parental relationship quality remain unaffected by changes in the PWG, making them unlikely mechanisms through which the PWG affects children's skills.

Heterogeneity analysis. I conclude the investigation of mechanisms with a heterogeneity analysis. On the one hand, children may differ in how they react to a given change in living environments. On the other hand, families may differ in how strongly they adjust to changes in the PWG. Therefore, I consider six heterogeneity dimensions: child sex (Baker and Milligan,

[23]Kalil et al. (2022) shows that mothers in the US especially protect cognitively stimulating activities, while allowing for decreases in emotional support when expanding their labor supply. This suggests a further channel how the PWG could negatively affect children's socio-emotional skills, which I, however, cannot test in the GSOEP data.

2016; Bertrand and Pan, 2013), birth order (Black et al., 2018), and child age (Del Boca et al., 2017; Heckman and Mosso, 2014), maternal education (Agostinelli and Sorrenti, 2022; Carneiro et al., 2013), regional differences between East and West Germany (Boelmann et al., 2025; Lippmann et al., 2020), and poverty status (Akee et al., 2013; Løken et al., 2012). To strengthen statistical power and to alleviate concerns about multiple hypothesis testing, I present heterogeneity analyses for the "personality index" and the "behavioral problems index."

Table 8 presents the results for a 10% decrease in the PWG on children's socio-emotional skills for different population subgroups. There are no detectable differences by child sex, birth order,

TABLE 8 – PWG and children's socio-emotional skills by subgroup

Panel (a): Effect of 10% ↓ in PWG on Personality Index								
Child sex			Birth order			Age of youngest child		
Male	Female	Diff.	First	Higher	Diff.	< 6	≥ 6	Diff.
-0.035	-0.012	0.023	-0.026	-0.054	-0.029	-0.064	-0.023	0.041
(0.085)	(0.086)	(0.031)	(0.086)	(0.088)	(0.028)	(0.084)	(0.084)	(0.029)
Education (Mother)			Region of residence			At risk of poverty		
Low	High	Diff.	West	East	Diff.	No	Yes	Diff.
-0.263*	0.086	0.349**	0.025	-0.094	-0.119	-0.018	-0.038	-0.021
(0.155)	(0.089)	(0.148)	(0.098)	(0.149)	(0.181)	(0.085)	(0.113)	(0.079)
Panel (b): Effect of 10% ↓ in PWG on Behavioral Problems Index								
Child sex			Birth order			Age of youngest child		
Male	Female	Diff.	First	Higher	Diff.	< 6	≥ 6	Diff.
0.080	0.094	0.014	0.086	0.080	-0.006	0.090	0.083	-0.007
(0.074)	(0.077)	(0.037)	(0.074)	(0.078)	(0.032)	(0.077)	(0.080)	(0.035)
Education (Mother)			Region of residence			At risk of poverty		
Low	High	Diff.	West	East	Diff.	No	Yes	Diff.
0.151	-0.133	-0.284**	0.206**	-0.038	-0.245**	0.084	0.082	-0.002
(0.128)	(0.106)	(0.114)	(0.081)	(0.082)	(0.103)	(0.074)	(0.101)	(0.076)

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in children's socio-emotional skills in response to a 10% decrease in the PWG for different population subgroups. All regressions control for family times child age fixed effects and year fixed effects; plus the sum of maternal and paternal potential wages interacted with the corresponding heterogeneity variable. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

the age of the youngest child in the household, and whether the family is at risk of poverty.

However, the socio-emotional skills of children of low-educated mothers are more negatively affected by narrowing PWGs: a 10% decrease in the PWG decreases (increases) their "personality index" ("behavioral problems index") by 0.35 SD (0.28 SD) more than of children from mothers with high education. We can link this finding back to the heterogeneous effects of the PWG on children's living environments.[24] Table S.26 shows that decreases in the PWG lead children from less educated mothers to spend more time in both formal and informal childcare, and "carer multiplicity" increases by more. At the same time, their households experience a smaller increase in disposable income and smaller increases in the share of resources controlled by mothers. In line with the previous interpretation, this pattern suggests that the negative effect of increased exposure to non-parental childcare is less counterbalanced by increased financial resources, leading to more negative effects of the PWG on the socio-emotional development of these children.

In addition, the closing PWG leads to higher levels of behavioral problems in West Germany than in East Germany: a 10% decrease in the PWG increases the total difficulty score of children in the West by 0.24 SD more than of children in the East. Table S.27 shows that parents in the West react to decreases in the PWG with a stronger expansion of non-parental childcare, which also translates to stronger increases in the multiplicity of non-parental care arrangements. While decreases in the PWG also lead to higher increases in financial resources for families in the West, the nominal figures likely overstate the real difference due to the pronounced differences in the cost of living between East and West Germany (BBSR, 2023). At the same time, the increases in maternal income shares are less pronounced, leading to less concentration of economic resources in the hands of mothers in West Germany.

In summary, these results suggest that the small average effects of the PWG on children's socio-emotional skills are not an artifact of masked heterogeneity but apply broadly across various population groups. However, they also illustrate that children's socio-emotional development is more likely adversely affected in subgroups where families cannot compensate the substitution to less conducive childcare arrangements with increased financial resources (or vice versa).

[24] See Tables S.23–S.28 for heterogeneity analyses on childcare arrangements and the financial resources of families.

4.4 Robustness

In this subsection, I probe the sensitivity of my findings using a large battery of robustness checks. All checks are presented for children's socio-emotional skills, as well as the indicators for childcare arrangements and the financial situation of families.

Alternative construction of potential wages. In Panel (a) of Table S.29 and S.30, I show the robustness of my findings to alternative ways of constructing potential wages.

First, in the baseline, I impute daily wages above the social security contribution limit by wage draws from a truncated log-normal distribution (Dustmann et al., 2009; Gartner, 2005). Results remain unaffected when (i) using censored wages without any imputation, or (ii) uniformly replacing censored wages with 150% of the social security contribution cap—an imputation technique commonly employed for top coded incomes in the Current Population Survey (CPS, Autor et al., 2008; Shenhav, 2021).

Second, in the baseline specification, I calculate sector shares for the base year 1995 and keep them fixed over time. This may compromise the external validity of my findings if closing gender wage gaps are especially driven by changes in education, occupation, or industry choices of men and women over time. To address this concern, I compute alternative shares allowing (i) for an updating term that accounts for intra-industry shifts in the occupation structure (Shenhav, 2021), and (ii) floating sector shares evaluated at $t-10$, e.g., using $\hat{w}_{g,2017} = \sum_s \frac{E^s_{g,2007}}{E_{g,2007}} w^s_{2017}$ instead of $\hat{w}_{g,2017} = \sum_s \frac{E^s_{g,1995}}{E_{g,1995}} w^s_{2017}$. My results remain unaffected.

Lastly, the baseline analysis is based on hourly potential wages. This may have two shortcomings: (i) one may submit that the relevant variation is not hourly wages but wage-time schedules (e.g., Francesconi, 2002); (ii) one may be concerned that misreports in working hours lead to measurement error in parent's potential wages (e.g., Borjas and Hamermesh, 2024). I address both concerns by replacing hourly potential wages with daily potential wages. The latter capture variation in the available wage-time schedules of parents, as they reflect variation in both hourly wages and working hours, including the availability of part- and full-time jobs. Furthermore, daily wages are based on administrative wage data from the SIAB only. These data are less prone to measurement error since they are the legal basis for employer's social security contributions. Results remain unaffected when using daily potential wages instead of hourly potential wages.

Alternative control variables. In Panel (b) of Tables S.29 and S.30, I show the robustness of my findings to alternative specifications of X'_{it}.

First, in the baseline specification, I control for family times child age fixed effects $\gamma_{f(i)a(it)}$ and time fixed effects τ_t (as well as $\hat{w}^{\Sigma}_{it-1}$ when estimating effects of the PWG). My results remain unaffected when expanding X'_{it} by measures for the child's birth rank, biological sex, month of birth, and the number of children in the household. This result highlights the orthogonality of wage shocks to intra-family variation in sibling and family characteristics after conditioning on $\gamma_{f(i)a(it)}$ and τ_t (see also Table 2).

Second, my identification strategy assumes that group-specific sector shares in the base year 1995 do not correlate with other factors that predict intra-family changes in the outcomes of interest. To support the validity of this assumption, I show that results remain unaffected when allowing for (i) time trends by CZ and (ii) time trends by the education level of the highest-educated parent. These results also rule out concerns about sorting into local labor markets and the selective acquisition of education across the period of the sibling comparison.

Lastly, the expansion of publicly subsidized childcare in Germany was characterized by strong regional heterogeneity. Such heterogeneity would undermine the identification assumption if intra-family variation in potential wages correlated with changes in the availability and quality of public childcare slots. To address this concern, I show that results remain unchanged when adding controls for (i) the CZ- and year-specific ratio of enrolled children to available slots and (ii) the CZ- and year-specific ratio of enrolled children to pedagogical personnel.[25]

Alternative sample restrictions. In Panel (c) of Table S.29 and S.30, I show the robustness of my findings to alternative sample restrictions.

First, my baseline estimates are derived from a sample of intact families where I allow non-

[25]Demand for public childcare strongly exceeds supply. Therefore, actual enrollment is a suitable proxy for the availability of childcare slots (Felfe and Lalive, 2018; Jessen et al., 2020).

biological parent-child relationships and non-married parental couples. My results remain unaffected when restricting the sample to (i) biological parents or (ii) married parents.[26]

Second, my empirical strategy is based on a sibling comparison and excludes single children from the analysis. To accommodate single children, I change my identification strategy to a within-child comparison. The sample for this analysis differs from my core analysis sample in two ways: it includes single children without siblings and excludes children for which I do not have multiple observations over time. In particular, I follow Agostinelli and Sorrenti (2022) and Dahl and Lochner (2012) and estimate a first-difference model using child-specific outcomes and parental potential wages at ages 3, 6, and 10. I include non-parametric controls for year, child age, sex, CZ of residence, and education level of the highest educated parent, allowing for differential trends in child outcomes by these characteristics. Results are again similar to my baseline estimates. The similarity of results between the sibling fixed effects model and the within-child estimation also addresses concerns that null effects in the siblings model are driven by attenuation bias due to sibling spillovers.

Alternative standard errors. In Table S.31, I show the robustness of my statistical inferences to alternative ways of calculating standard errors. In my baseline analysis, I cluster standard errors at the family level, i.e., I allow for correlation of error terms across children from the same parents over time. However, alternative levels of clustering are conceivable. Therefore, I follow MacKinnon et al. (2023) and test for the equality of the error variance matrix of my baseline estimates with estimates that assume alternative levels of clustering. Results show we can reject the null hypothesis of equality when comparing the error variance matrix without clustering to the error variance matrix with clustering at the family level. This result shows that standard errors need to be clustered. However, comparing family-level clustering to clustering by (i) maternal education times paternal education times CZ cells, (ii) maternal education cells, (iii) paternal education cells, or (iii) CZ cells, we cannot reject the null in the overwhelming majority of cases at conventional levels of statistical significance. These results suggest that I am unlikely to over-reject (under-reject) null hypotheses based on optimistic (pessimistic) standard errors.

Furthermore, measures of children's socio-emotional skills are based on maternal reports and

[26]In Table S.32, I furthermore show that results are robust to the exclusion of large families with many children.

may be prone to measurement error. While measurement error in the dependent variable does not bias point estimates, it may inflate standard errors. Therefore, I outline a measurement error correction procedure and provide estimates of confidence intervals under credible assumptions about the extent of measurement error in children's socio-emotional skills (Appendix C). The results of this exercise show that the null effects in Table 4 persist even after correcting for measurement error in the outcomes of interest.

5 CONCLUSION

In this paper, I study how changes in the pay gap of mothers and fathers affect the skill development of their children. Drawing on survey and administrative data from Germany, I combine a within-family sibling comparison with a shift-share design to estimate the causal effects of the PWG on children's socio-emotional development.

I find that changes in the PWG do not affect children's socio-emotional skills. These null effects are estimated precisely enough to imply modest earnings effects in the future and to exclude the effect sizes of various interventions analyzed in the existing literature. Furthermore, these null effects persist in the long-run and are consistently observed for other important outcomes such as children's BMI and the school track attended by them. The null effect of the PWG can be rationalized by the offsetting impacts of changes in childcare arrangements and the financial situation of families. While increases in the PWG lead to increases in children's exposure to non-parental care and an increase in the number of carers, they also lead to increases in the disposable income of households and the share of financial resources controlled by mothers.

Fostering gender equality and promoting the development of children are important goals of public policy. However, these goals are often thought to conflict with each other. For example, the former Vice President of the US, Michael Pence, once warned of children's "stunted emotional growth" if two parents work. Even today, most Americans say children are better off with one parent at home (Graf, 2016). In contrast to such concerns, the evidence presented in this study suggests that strides toward gender equality do not imply adverse effects on the skill development of the next generation.

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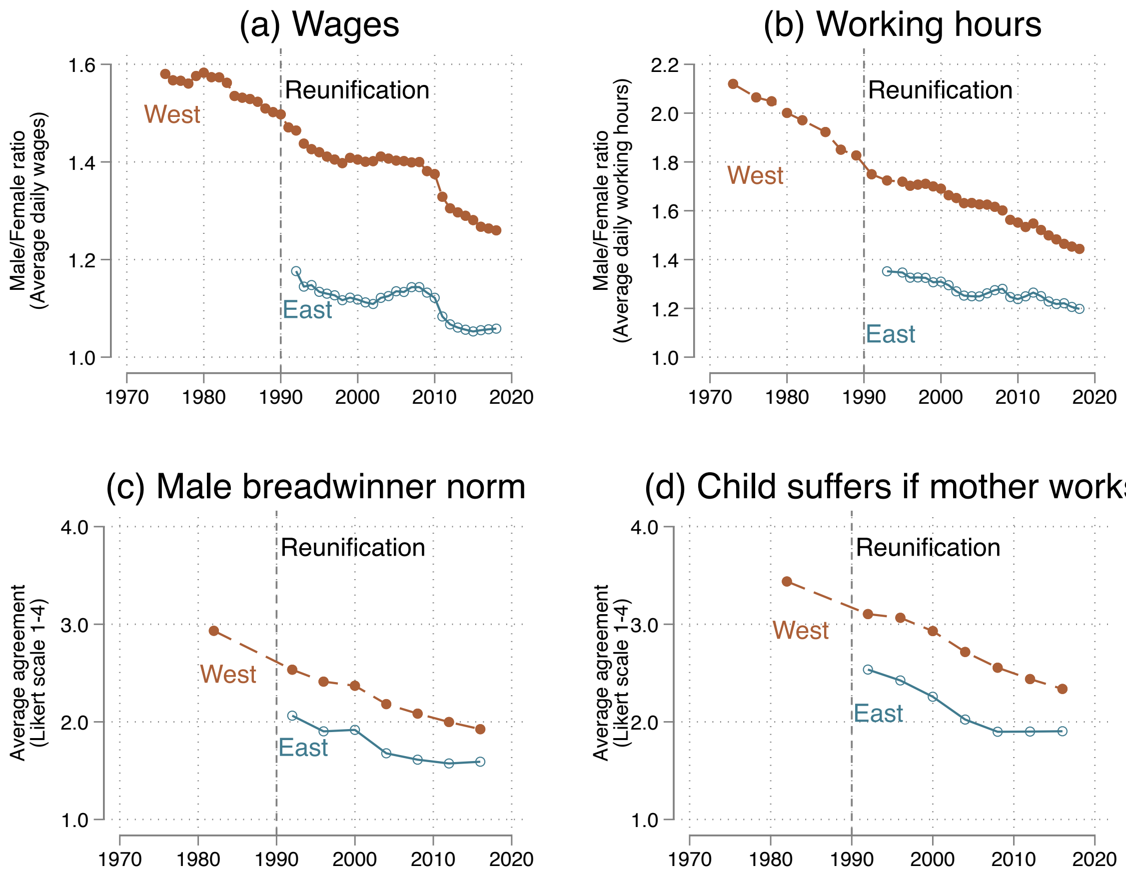
The Parental Wage Gap and the Development of Socio-emotional Skills in Children

Paul Hufe

Supplementary Material for Online Publication
May 28, 2025

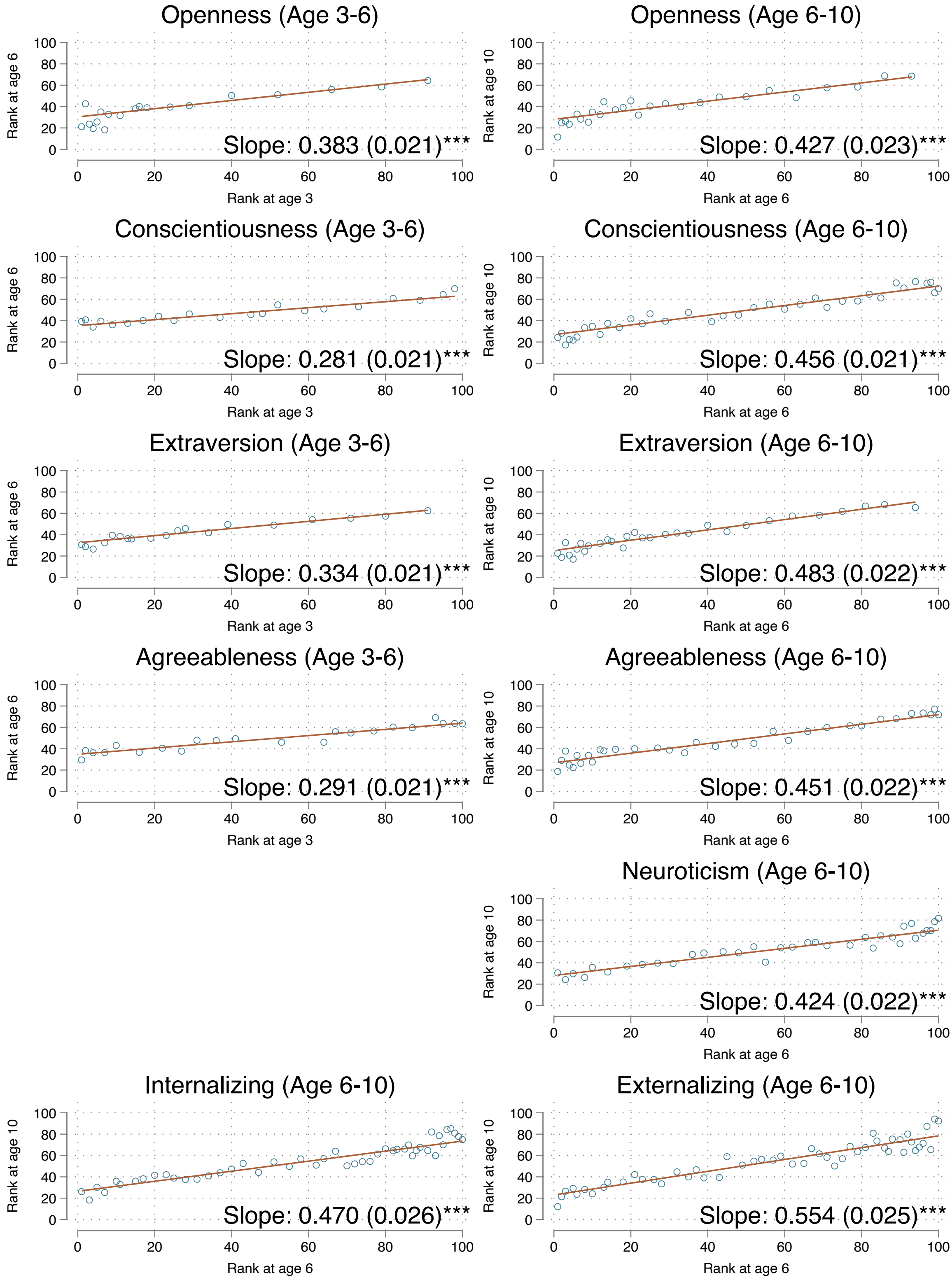
A ADDITIONAL FIGURES

FIGURE S.1 – Gender gaps and gender role attitudes in Germany by region, 1973–2019



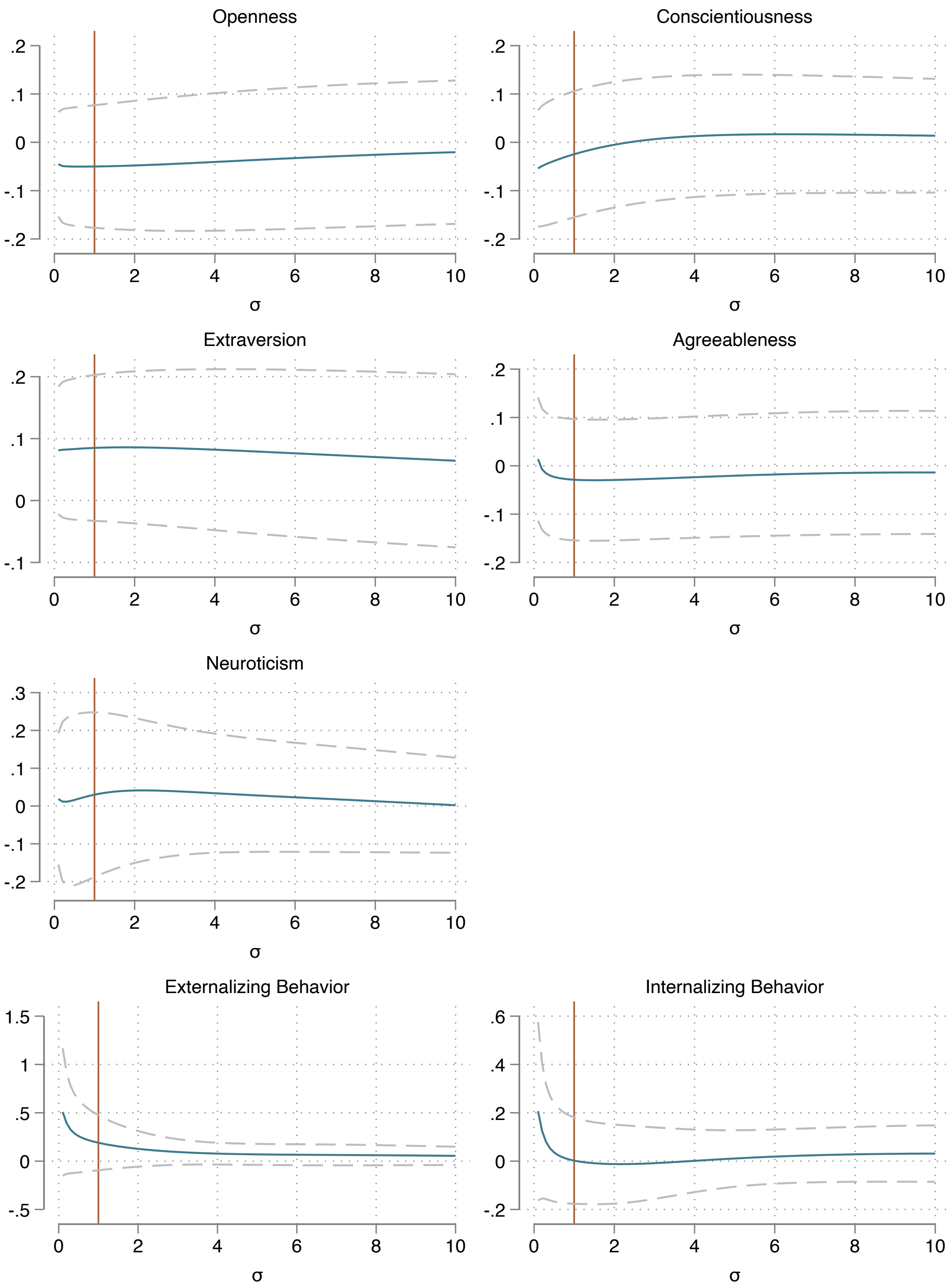
Data: SIAB, MZ, ALLBUS.
Note: Own calculations. Panel (a) shows the male-to-female ratio in mean daily wages from 1975 to 2019. Daily wages are calculated for all SIAB observations aged 18–63 that are subject to social security contributions. Panel (b) shows the male-to-female ratio in daily working hours from 1973 to 2019. Daily working hours are calculated for all MZ observations aged 18–63 by dividing their working hours in a typical work week by five. Panel (c) and (d) show the average agreement of ALLBUS respondents aged 18–63 to the following statements: (c) It is much better for everyone concerned if the man goes out to work and the woman stays at home and looks after the house and children; (d) A small child is bound to suffer if his or her mother goes out to work.

FIGURE S.2 – Rank stability of children's socio-emotional skills



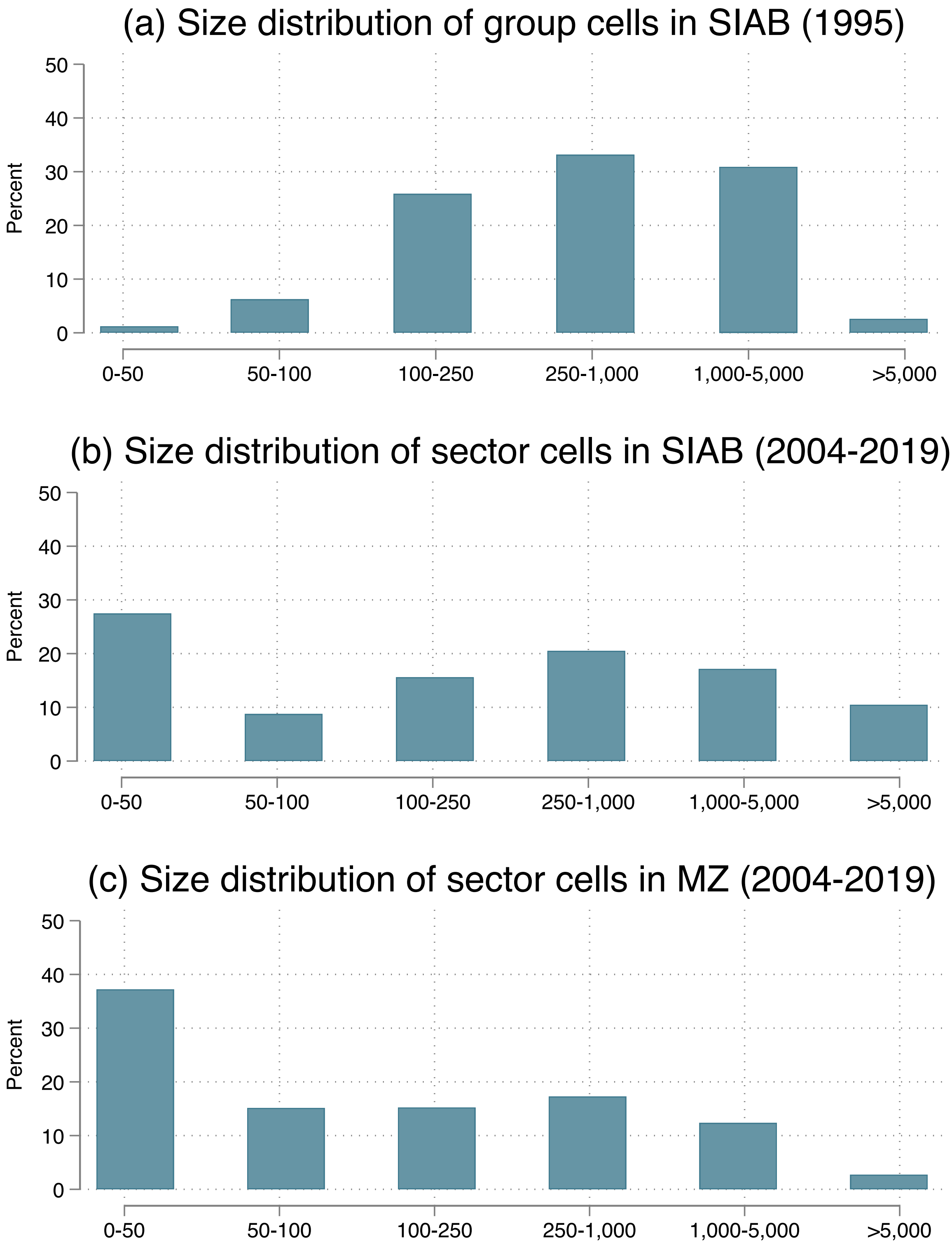
Data: GSOEP, SIAB, MZ.
Note: Own calculations. This graph shows rank-rank correlations of children's socio-emotional skills at different ages. This sample differs from the core analysis sample: I do not restrict the sample to the availability of data on siblings and children's living environments. Furthermore, the sample is restricted to children with observations in socio-emotional skills at ages 3/6 and 6/10, respectively. Standard errors (in parentheses) are heteroskedasticity-robust. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

FIGURE S.3 – Robustness to monotonic transformations of the outcome variable



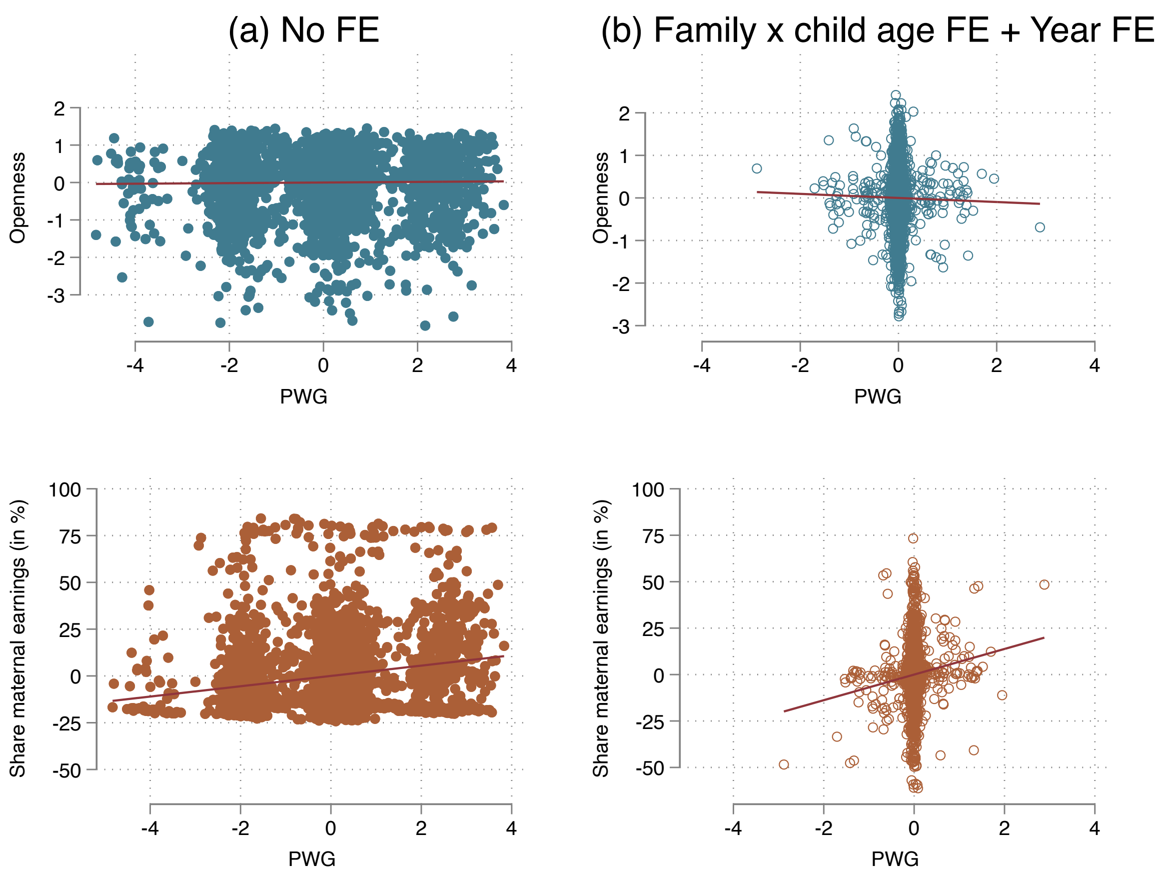
Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows standardized treatment effects of a 10% decrease in the PWG using monotonic transformations of children's socio-emotional skills. Outcomes are transformed as follows: $f(y) = y^{\sigma}$, where σ is taken over the interval [0.1(0.1)10]. Vertical lines show the baseline estimate with $\sigma = 1$ (see equation 3). Dashed lines show the corresponding 95% confidence intervals; standard errors are clustered at the family level. All regressions control for family times child age fixed effects and year fixed effects, and the sum of maternal and paternal potential wages. All coefficients are estimated on the core sample described in Table 1.

FIGURE S.4 – Cell sizes for the construction of potential wages



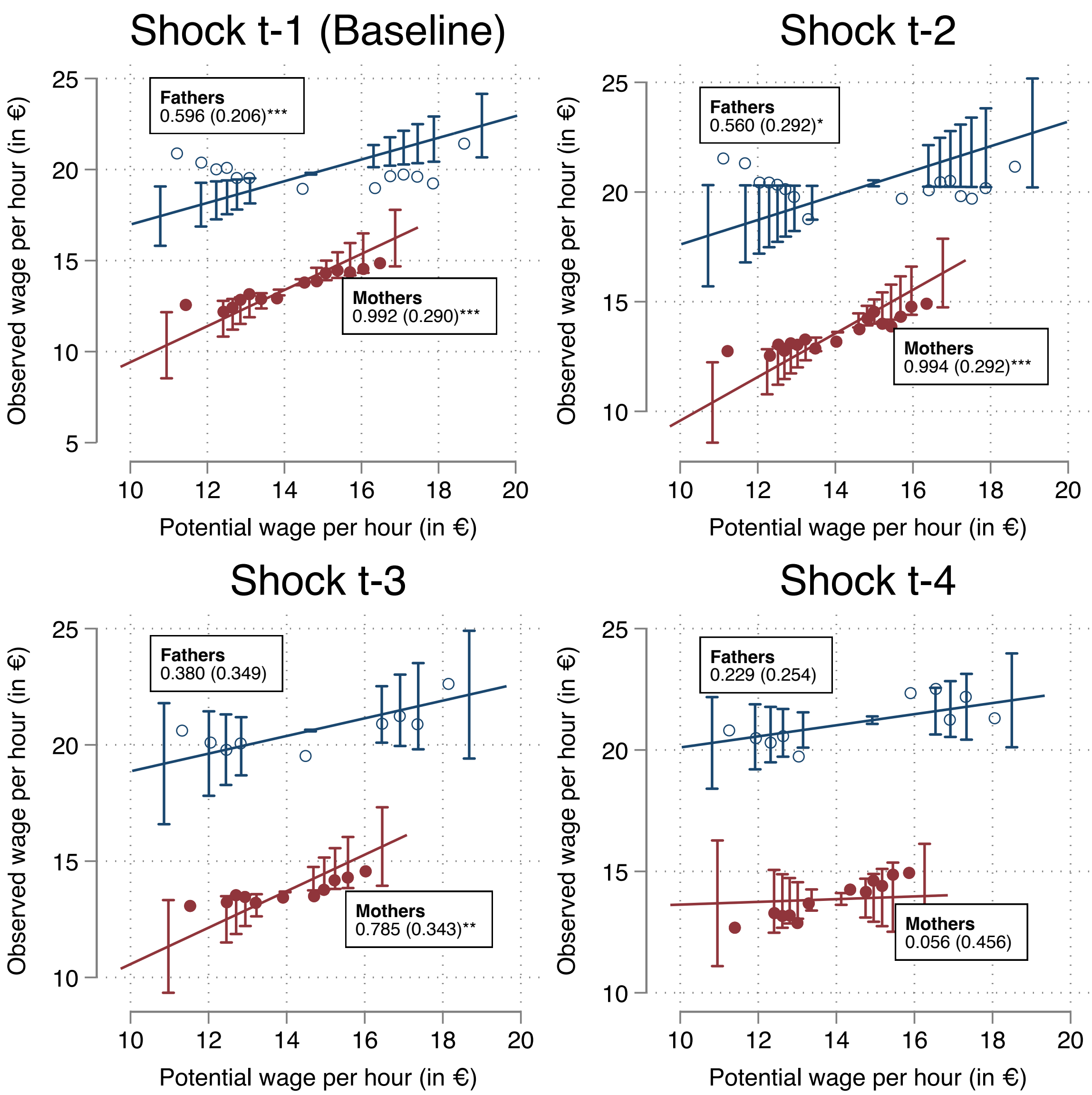
Data: SIAB, MZ.
Note: Own calculations. This figure shows the distribution of cell sizes for the construction of potential wages. Panel (a) refers to cells of groups g in base year 1995 (Term [1] of equation 1). Panel (b) refers to cells of sectors s in the years 2004-2019 used for measuring daily wages (Term [2] of equation 1). Panel (c) refers to cells of sectors s in the years 2004-2019 used for measuring daily working hours (Term [2] of equation 1).

FIGURE S.5 – Graphical display of identifying variation



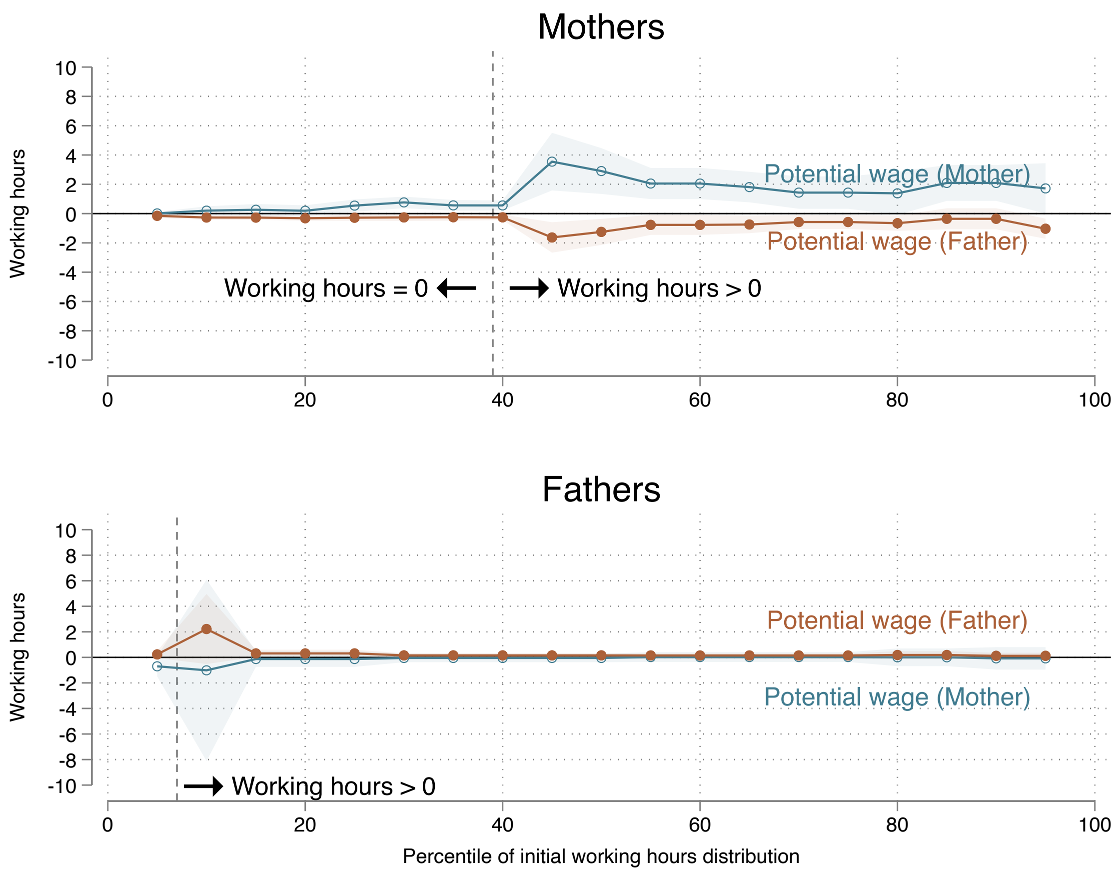
Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows raw data for the relationships of at 10% decrease in the PWG with children's openness and the share of maternal earnings, respectively. Panel (a) shows data after controlling for the sum of maternal and paternal potential wages. Panel (b) shows data after additionally controlling for family times child age fixed effects and year fixed effects (see equation 3). Solid lines show the best linear fit. 389 observations have a constant PWG within child age fixed effect groups. These observations do not contribute to the identification. All coefficients are estimated on the core sample described in Table 1.

FIGURE S.6 – Within-parent correlation of potential and observed wages over time



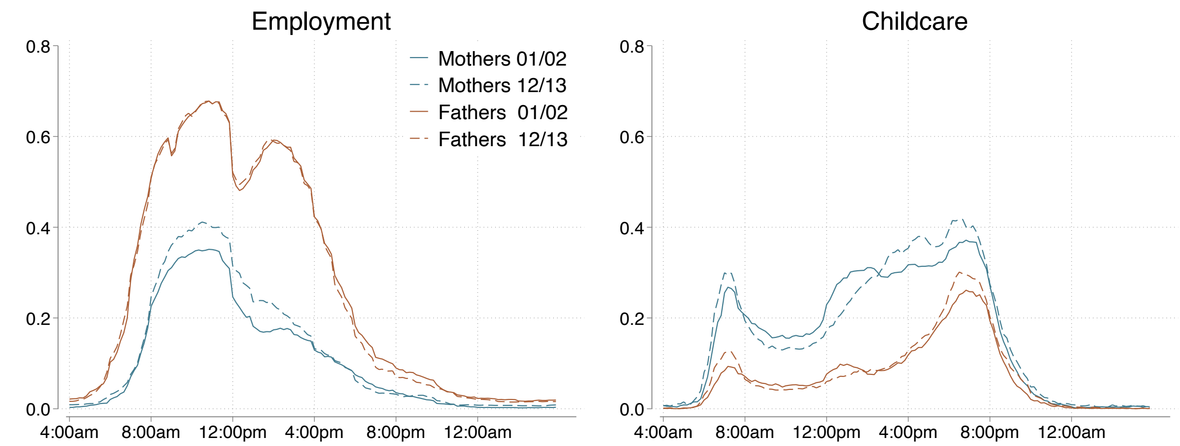
Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows the relationship between within-person changes in potential wages and within-person changes in observed wages for mothers and fathers using different lags of the labor market shocks. The sample spans the years 2005 to 2019 and includes two-parent households aged 18–63 with a resident child aged 2–10. The assumed lag structure is indicated in the figure titles. Solid lines show estimates from a linear regression of actual wages on potential wages controlling for individual fixed effects and year fixed effects. Whiskers show 95% confidence intervals; standard errors are clustered at the individual level. Binned scatters are constructed using the optimal binning procedure of Cattaneo et al. (2024).

FIGURE S.7 – Parental potential wages and parental working hours by vingtile



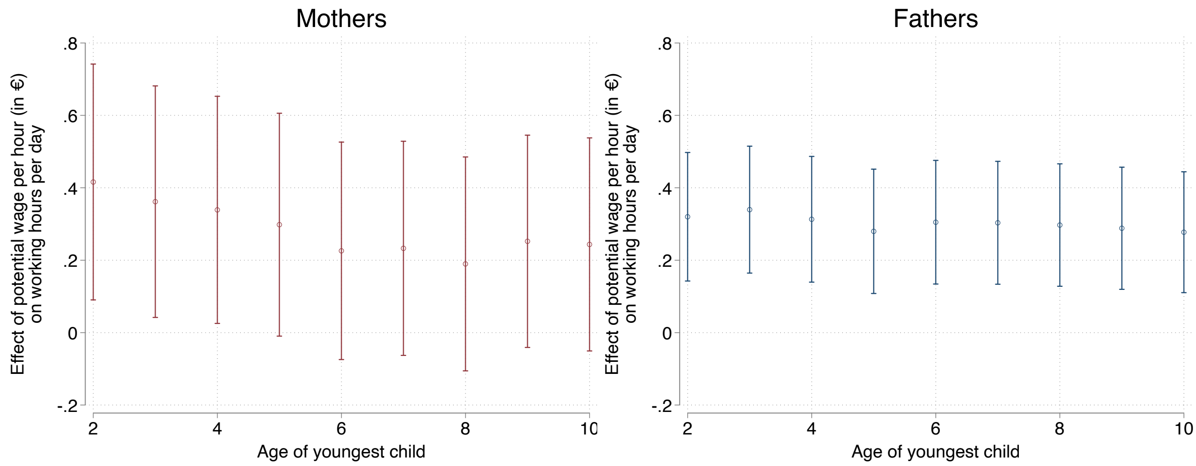
Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows estimates for the impact of a 10% increase of maternal (paternal) potential wages on maternal and paternal working hours at different vingtiles of the corresponding hours distribution. Point estimates for maternal (paternal) potential wages are derived from unconditional quantile regressions (Firpo et al., 2009). Shaded areas show the corresponding 95% confidence intervals. Dashed vertical lines show the extensive labor supply margin in the unconditional initial working hours distribution. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects. Standard errors are clustered at the family level.

FIGURE S.8 – Time-use of mothers and fathers in Germany, 2001/02 and 2012/13



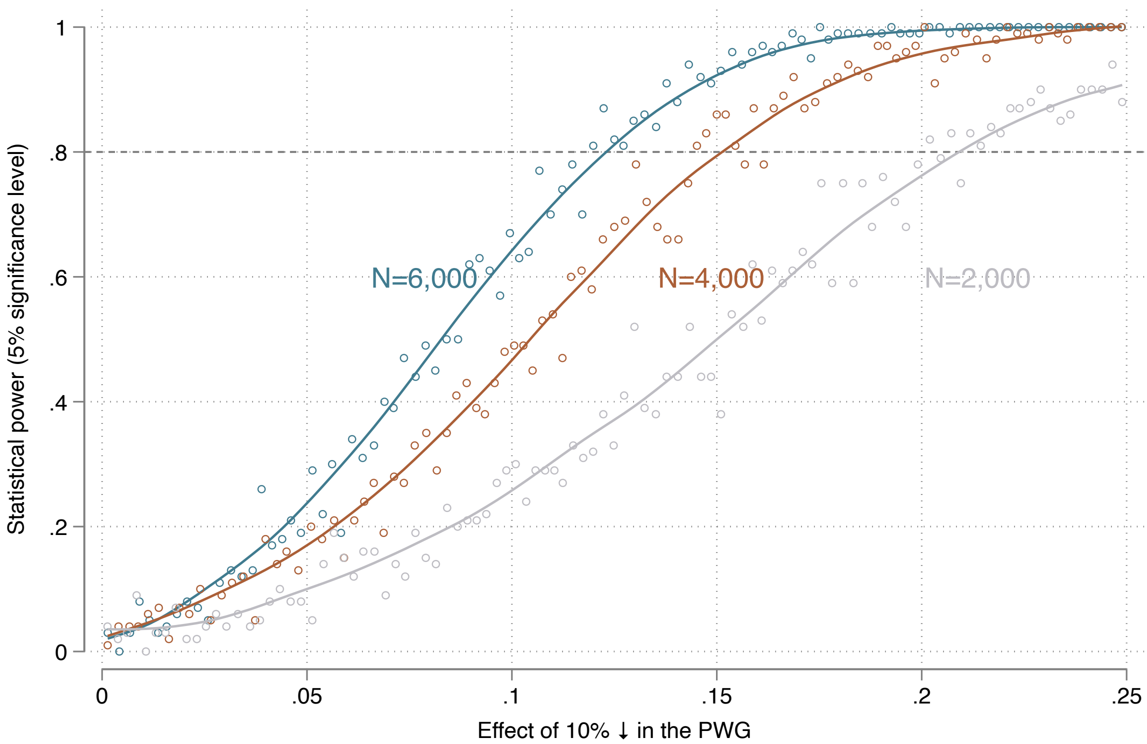
Data: GTUS.
Note: Own calculations. This figure shows the share of mothers and fathers involved in employment and childcare activities for each 10-minute time window of the day. The samples include two-parent households aged 18–63 with at least one resident child below age 17. All variables refer to week days (Monday–Friday).

FIGURE S.9 – Within-parent correlation of potential wages and working hours by age of youngest child



Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows the relationship between within-person changes in potential wages and within-person changes in working hours per day for mothers and fathers. The sample spans the years 2005 to 2019 and includes two-parent households aged 18–63 with a resident child aged 2–10. Circles show point estimates for effects of potential wages on daily working hours by the age of the youngest resident child controlling for individual fixed effects and year fixed effects. Whiskers show 95% confidence intervals; standard errors are clustered at the individual level.

FIGURE S.10 – Ex-post power calculations



Data: Simulation.
Note: Own calculations. This figure shows power curves for three different sample sizes. Simulations are based on an error term with $\mathcal{N} = (0.00, 0.67)$ and a regressor with $\mathcal{N} = (0.00, 0.19)$. These specifications correspond to Openness and the PWG after residualizing them from family times child age fixed effects and year fixed effects. For each sample size, I estimate 10,000 regressions where the coefficient is drawn from a uniform distribution across the interval [0.00, 0.25]. The graph is constructed after ordering estimations by the assumed effect size and binning 10,000 estimations into percentiles. Lowess plots are fitted using a bandwidth of 0.3.

B ADDITIONAL TABLES

TABLE S.1 – Definition of socio-emotional skills

Panel (a): Big Five Personality Traits	
Openness	... the tendency to be open to new aesthetic, cultural, or intellectual experiences.
Conscientiousness	... the tendency to be organized, responsible, and hardworking.
Extraversion	... the tendency to be outgoing, gregarious, sociable, and openly expressive.
Agreeableness	... the tendency to act in a cooperative, unselfish manner.
Neuroticism	... a chronic level of emotional instability and proneness to psychological distress.
Panel (b): Externalizing-Internalizing Behavior	
Externalizing	... reactions to stressors through actions in the external world, such as acting out, antisocial behavior, hostility, and aggression.
Internalizing	... reactions to stressors through processes within the self, such as anxiety, somatization, and depression.

Note: Short definitions from the APA Dictionary of Psychology.

TABLE S.2 – Literature overview of children's living environments and their socio-emotional skills

	Sample (1)	Treatment (2)	Counterfactual care (3)	Research design (4)	Effect (5)
Panel (a): Childcare arrangements					
Fort et al. (2020)	Italy (High-SES children) (Age 0-2)	Time in public daycare (1 month)	Parental/informal care	RDD (Admission cut-offs)	↓ Open. ≈ Consc. ≈ Extra. ↓ Agree. ↑ Neuro.
Agostinelli and Sorrenti (2022)	US (EITC eligible children) (Age 4-16)	Maternal labor supply (EITC) (≈ 100 h/year)	Undefined	IV (EITC expansion, shift-share)	↑ Behav. Prob. Index
Bach et al. (2019)	West Germany (Age 3-4)	Time in public daycare (1 year)	Undefined	IV (Regional childcare availability)	≈ Open. ≈ Consc. ↑ Extra. ≈ Agree. ≈ Neuro.
Houmark et al. (2024)	Denmark (Age 0-1)	Time in parental care (1 month)	Formal care	RD-DiD (Parental leave reform, birth month)	↑ Consc. ≈ Agree. ↓ Neuro.
Datta Gupta and Simonsen (2010)	Denmark (Age 3)	Formal/informal care (Yes/No)	Parental care	Selection on obs., IV (Regional childcare availability)	≈ Behav. Prob. Index (Formal) ↑ Behav. Prob. Index (Informal)
Heisig and Zierow (2021)	East Germany (Age 0-1)	Time in parental care (7 months)	Formal care	DiD (Parental leave reform, birth order)	≈ Open. ≈ Consc. ≈ Extra. ≈ Agree. ↑ Neuro.
Chor et al. (2016)	Australia (Age 4)	Time in formal care (5 months)	Parental/informal care	DiD (Federal state, birth cohort)	≈ Behav. Prob. Index
Herbst and Tekin (2010)	USA (Single mothers) (Age 0-4)	Childcare subsidy (Yes/No)	Formal care	IV (Regional rationing of subsidy)	≈ Intern. ≈ External.

Continued on next page

Table S.2 (continued)

	Sample (1)	Treatment (2)	Counterfactual care (3)	Research design (4)	Effect (5)
Kühnle and Oberfichtner (2020)	Germany (Age 3-4)	Formal care (4 months)	Parental/informal care	RDD (Birthday eligibility)	≈ Open. ≈ Consc. ≈ Extra. ≈ Agree. ≈ Neuro.
Magnuson et al. (2007)	USA (Age 4)	Formal care (Yes/No)	Parental care	IV (Regional variation in spending)	↑ External.
Morando and Platt (2022)	Ireland (Age 0-3)	Formal care (Yes/No)	Informal care	Value-added estimates	≈ Internal. ↑ External.
Panel (b): Financial resources					
Akee et al. (2018)	US (Native American children) (Age 9-16)	Unconditional cash transfer (≈ 3,500 USD)	—	DiDiD (age, cohort, race)	↑ Consc. ↑ Agree. ↑ Neuro.
Agostinelli and Sorrenti (2022)	US (EITC eligible children) (4-16 years)	Family income (EITC) (≈ 1,000 USD)	—	IV (EITC expansion, shift-share)	≈ Behav. Prob. Index
Clark et al. (2021)	UK (0-11 years)	Financial difficulties (No. of years)	—	Value-added estimates	↑ Intern. ↑ Extern.

Note: This table provides an overview of the effects of childcare arrangements (Panel [a]) and financial resources (Panel [b]) on children's socio-emotional skills. The overview is restricted to studies that (i) employ quasi-experimental research designs, (ii) investigate effects on the socio-emotional skill measures considered in this paper.

TABLE S.3 – Socio-emotional skill scales in the GSOEP by age group

Age group/ (Likert scale)	Dimension	Questions
2–3 years (11-point Likert)		*How would you rank your child in comparison to other children of the same age? My child is ...*
	Openness	quick at learning new things – needs more time
	Conscientiousness	focused – easily distracted
	Extraversion	shy – outgoing
	Agreeableness	obstinate – obedient
	Neuroticism	–
5–6 years 9–10 years (11-point Likert)		*How would you rank your child in comparison to other children of the same age? My child is ...*
	Openness	not that interested – hungry for knowledge understands quickly – needs more time
	Conscientiousness	tidy – untidy focused – easy to distract
	Extraversion	talkative – quiet withdrawn – sociable
	Agreeableness	good-natured – irritable obstinate – compliant
	Neuroticism	self-confident – insecure fearful – fearless
5–6 years 9–10 years (7-point Likert)		*To what extent do the following statements apply to your child?*
	Externalizing	Often has tantrums, has a temper Quarrels a lot with other children, picks on them Is agitated, hyperactive, cannot sit still Is fidgety Is easily distracted and lacks concentration Finishes tasks, is able to concentrate Thinks before acting
	Internalizing	Is often unhappy or dejected Is nervous or clingy in new situations, loses self-confidence easily Has many fears, becomes frightened easily Is a loner, usually plays by him/herself Is popular with other children Is often made fun of or picked on by other children Gets along better with adults than with other children

TABLE S.4 – Inter-temporal persistence of children's socio-emotional skills

	Big Five					SDQ	
	Openness (1)	Conscientiousness (2)	Extraversion (3)	Agreeableness (4)	Neuroticism (5)	Externalizing (6)	Internalizing (7)
Panel (a): Ordinary least squared							
Lagged skill	0.386*** (0.023)	0.365*** (0.021)	0.427*** (0.022)	0.402*** (0.021)	0.414*** (0.020)	0.570*** (0.028)	0.496*** (0.029)
Controls	✓	✓	✓	✓	✓	✓	✓
N	2,551	2,551	2,551	2,551	2,456	1,300	1,300
R^2	0.218	0.188	0.237	0.219	0.219	0.398	0.299
Outcome Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Outcome SD	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Panel (b): IV (2SLS)							
Lagged skill	0.763*** (0.078)	0.660*** (0.073)	0.691*** (0.051)	0.783*** (0.070)	–	–	–
Controls	✓	✓	✓	✓	–	–	–
N	2,551	2,551	2,551	2,551	–	–	–
R^2	0.007	0.042	0.110	0.014	–	–	–
Outcome Mean	0.000	0.000	0.000	0.000	–	–	–
Outcome SD	1.000	1.000	1.000	1.000	–	–	–

Data: GSOEP.
Note: Own calculations. This table shows inter-temporal correlations of children's socio-emotional skills. All skill measures are standardized on the estimation sample. This sample differs from the core analysis sample: I do not restrict the sample to the availability of data on siblings and children's living environments. Furthermore, the sample is restricted to children with 3 (Columns [1]–[4]) and 2 (Columns [5]–[7]) measures of socio-emotional skills. Panel (a) shows results from OLS regressions of children's socio-emotional skills on 1-period lags of the same skill. Panel (b) shows results from 2SLS regressions of children's socio-emotional skills on 1-period lags of the same skill. The 1-period lags are instrumented with 2-period lags of the same skill. All regressions control non-parametrically for maternal/paternal education, birth order, number of siblings, biological sex, birth month, CZ of residence, and year fixed effects. Standard errors (in parentheses) are clustered at the child level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.5 – Decomposition of Personality Index and Behavioral Problems Index

	Personality Index (1)	Behavioral Problems Index (2)
Openness	0.192*** (0.004)	–
Conscientiousness	0.390*** (0.004)	–
Extraversion	0.413*** (0.004)	–
Agreeableness	0.348*** (0.004)	–
Neuroticism	-0.198*** (0.004)	–
Externalizing behavior	–	0.485*** (0.004)
Internalizing behavior	–	0.672*** (0.004)
N	3,610	2,310
R^2	0.952	0.968
Outcome Mean	0.001	-0.003
Outcome SD	1.000	0.995

Data: GSOEP.
Note: Own calculations. This table shows the correlations of the aggregate personality index and the aggregate Behavioral Problems Index with the underlying dimensions of socio-emotional skills. All skill measures are standardized on the estimation sample. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.6 – Parental potential wages and family formation

	Parental separation within 5 years		Maternal fertility within 5 years	
	Sibling model (1)	Child model (2)	Sibling model (3)	Child model (4)
Effect of 10% ↑ in parental potential wages				
Mother	0.045 (0.036)	0.007 (0.019)	-0.014 (0.050)	-0.018 (0.046)
Father	0.012 (0.011)	0.010 (0.010)	-0.044* (0.026)	-0.027 (0.024)
Panel (b): Effect of 10% ↓ in PWG				
PWG	0.016 (0.019)	-0.002 (0.011)	0.015 (0.028)	0.005 (0.028)
Family × child age FE	✓	×	✓	×
First differences	×	✓	×	✓
Year FE	✓	✓	✓	✓
N	5,579	7,036	5,579	6,324
Outcome Mean	0.036	0.033	0.128	0.113
Outcome SD	0.186	0.179	0.334	0.316

Data: GSOEP.
Note: Own calculations. This table shows changes in family outcomes in response to changes in maternal and paternal potential wages. Columns (1) and (2) consider whether the parents of the child will separate within the next 5 years. Columns (3) and (4) consider whether the mother of the child will have another child within the next 5 years. The sibling models are estimated using the specifications of equations 2 and 3, respectively. The child models are estimated in first differences across the child ages of 3, 6, and 10, and include non-parametric controls for year, child age, child sex, CZ of residence, and education level of the highest educated parents. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.7 – Comparison GSOEP and GTUS: Work and childcare in 2001/02 and 2012/13

	GSOEP		GTUS	
	2001/02	2012/13	2001/02	2012/13
Panel (a): Mothers				
Work (hours/day)	3.2	2.9	2.7	3.4
Childcare (hours/day)	5.8	5.7	4.6	4.7
Time investment (hours/day)	–	–	1.5	1.5
Panel (b): Fathers				
Work (hours/day)	8.9	7.9	7.2	7.3
Childcare (hours/day)	1.5	1.8	2.0	2.1
Time investment (hours/day)	–	–	0.5	0.6

Data: GSOEP, GTUS.
Note: Own calculations. This table compares time-use variables in the GSOEP and the GTUS. The samples include two-parent households aged 18–63 with at least one resident child below age 17. All variables refer to week days (Monday–Friday). In the GTUS, *Childcare (hours/day)* capture any activity with the child present. *Time investment (hours/day)* capture any time when respondents consider childcare as their primary activity.

TABLE S.8 – Summary statistics by sample restriction

	All children N=14,874		All siblings N=6,539		Core sample N=5,579	
	Mean	SD	Mean	SD	Mean	SD
Panel (a): Child characteristics						
Age	6.13	2.78	6.36	2.73	6.13	2.85
Birth rank	1.99	1.10	2.08	1.13	2.08	1.13
East Germany	0.20	0.40	0.20	0.40	0.20	0.40
Female	0.49	0.50	0.49	0.50	0.49	0.50
Migration background	0.04	0.20	0.02	0.14	0.01	0.12
Panel (b): Family characteristics						
Formal care (hours/day)	2.71	2.28	2.75	2.25	2.71	2.26
Informal care (hours/day)	0.65	1.10	0.62	1.08	0.63	1.09
No. of carers	1.60	1.01	1.60	1.02	1.55	0.99
Parental care (hours/day)	9.56	5.09	9.88	5.18	9.90	5.16
Share maternal earnings (in %)	20.74	23.90	19.73	23.34	19.32	22.93
Total disp. family income (in Thsd. €)	43.37	24.66	46.28	26.73	46.14	25.88

Data: GSOEP.
Note: Own calculations. This table shows summary statistics for different data restrictions. All samples span the years 2005 to 2019 and include two-parent households aged 18–63 with a resident child aged 2–10. The left panel restricts the sample to families with valid measurements of the variables shown in this table. The central panel further restricts the sample to families with at least two siblings who are observed at the same chronological age. The right panel further restricts the sample to observations with at least one valid measurement of children's socio-emotional skills. This is the core analysis sample.

TABLE S.9 – Comparison SIAB and MZ: Employment structure by year

	1995		2005		2015	
	SIAB	MZ	SIAB	MZ	SIAB	MZ
Panel (a): Occupation (employment share, in %)						
Farming/Gardening Occ. (Low)	1.9	2.2	1.5	1.7	1.2	1.4
Construction Occ. (High)	0.9	1.6	0.7	1.3	1.2	1.5
Science/IT Occ. (Low)	1.3	1.0	1.1	0.9	1.2	1.2
Science/IT Occ. (High)	1.5	1.7	2.4	2.7	2.4	3.1
Logistics Occ. (Low)	13.8	11.7	13.7	11.0	13.4	11.3
Logistics Occ. (High)	0.1	0.9	0.2	0.9	0.7	1.1
Purchasing/Sales (Low)	9.2	8.5	9.8	10.0	10.0	10.5
Purchasing/Sales (High)	0.8	1.9	0.8	2.0	2.5	2.5
Administrative Occ. (All)	21.7	22.9	23.6	23.3	21.7	22.9
Medical Care Occ. (Low)	5.5	6.8	6.6	8.9	7.6	6.7
Medical Care Occ. (High)	1.0	1.4	1.5	1.9	2.7	2.4
Farming/Gardening Occ. (High)	0.2	0.1	0.1	0.1	0.2	0.3
Education/Social Care Occ. (All)	5.5	5.1	6.9	5.9	7.3	6.6
Creative Occ. (Low)	0.5	0.3	0.5	0.3	0.3	0.3
Creative Occ. (High)	0.4	0.6	0.5	0.7	0.6	0.8
Raw Material Processing Occ. (Low)	8.2	8.8	7.2	6.7	6.0	4.9
Raw Material Processing Occ. (High)	0.1	0.3	0.1	0.2	0.3	0.4
Machine-Building Occ. (Low)	10.0	11.1	9.1	10.3	8.5	9.5
Machine-Building Occ. (High)	4.8	3.5	5.1	4.1	4.3	5.3
Commodity Prod. Occ. (All)	3.9	3.1	3.4	2.8	2.9	2.5
Commodity Prod. Occ. (High)	0.0	0.1	0.0	0.1	0.2	0.3
Construction Occ. (Low)	8.7	6.3	5.3	4.1	4.8	4.6
Panel (b): Industry (employment share, in %)						
Agriculture/Mining/Utilities	3.2	4.3	2.8	3.2	2.3	2.9
Finance/Insurance	3.6	4.0	3.7	4.0	3.0	3.6
Public Administration	7.0	7.4	5.9	6.7	5.2	5.9
Education	3.2	3.9	3.5	4.3	3.7	4.5
Human Health Services	9.0	9.5	11.5	12.4	13.1	11.3
Other	3.7	2.5	4.0	2.8	3.7	3.9
Manufacturing: Food/Textiles	7.9	8.4	6.4	6.4	5.4	6.1
Manufacturing: Raw Materials/Metals/Chemicals	8.5	8.4	7.7	7.4	6.8	6.6
Manufacturing: Electronics/Vehicles/Machinery	9.4	8.3	9.5	9.1	8.7	11.0
Construction	10.6	11.2	6.4	7.3	5.5	6.8
Wholesale/Retail	15.2	15.6	15.0	15.4	14.0	15.4
Transportation/Storage	5.1	4.5	5.4	4.7	5.4	5.3
Accommodation/Food Services	2.8	2.3	3.1	3.0	3.5	3.3
Information/Communication/Business Services	10.9	9.7	15.3	13.3	19.7	13.3

Data: SIAB, MZ.
Note: Own calculations. This table shows the employment structure of the SIAB and the MZ in the years 1995, 2005, and 2015. All statistics are calculated on the sample of employees aged 18–63. The MZ is restricted to match the sample characteristics of the SIAB by excluding the marginally employed (<10h/week), civil servants, and self-employed individuals. Occupation classes are separated by their skill requirement (in parentheses).

TABLE S.10 – Comparison SIAB and MZ: Socio-demographics by year

	1995		2005		2015	
	SIAB	MZ	SIAB	MZ	SIAB	MZ
Panel (a): Age (average in employed population)						
Age	38.4	38.4	40.3	39.9	41.9	42.0
Panel (b): Sex (employment share, in %)						
Male	57.5	55.2	55.4	52.8	53.7	53.5
Female	42.5	44.8	44.6	47.2	46.3	46.5
Panel (c): Education (employment share, in %)						
Low	10.7	13.1	8.0	12.7	6.5	9.7
Intermediate	73.0	67.4	68.2	62.3	60.0	58.5
High	16.3	19.5	23.9	25.0	33.4	31.8
Panel (d): Federal state (employment share, in %)						
Schleswig-Holstein	2.9	3.3	2.9	3.5	3.0	3.0
Saarland	1.3	1.1	1.3	1.1	1.2	1.1
Berlin	4.7	4.3	4.0	3.8	4.4	3.8
Brandenburg	3.3	3.5	2.7	3.3	2.7	3.2
Mecklenburg-Vorpommern	2.4	2.5	2.0	2.0	1.8	1.8
Sachsen	6.2	6.2	5.2	5.8	5.1	5.1
Sachsen-Anhalt	3.7	3.7	2.9	3.3	2.6	2.9
Thüringen	3.3	3.6	2.8	3.1	2.6	2.9
Hamburg	2.7	2.0	2.9	2.1	3.0	1.8
Niedersachsen	8.2	8.4	8.5	7.8	8.7	10.2
Bremen	1.3	0.8	1.2	0.7	1.2	0.7
Nordrhein-Westfalen	20.5	19.9	21.1	19.5	20.6	19.2
Hessen	7.5	7.1	7.9	7.8	7.8	7.8
Rheinland-Pfalz	4.1	4.9	4.3	4.9	4.3	4.7
Baden-Württemberg	13.1	13.0	14.0	14.0	14.1	14.0
Bayern	15.0	15.6	16.2	17.1	16.9	17.7

Data: SIAB, MZ.
Note: Own calculations. This table shows the socio-demographic composition of the SIAB and the MZ in the years 1995, 2005, and 2015. All statistics are calculated on the sample of employees aged 18–63. The MZ is restricted to match the sample characteristics of the SIAB by excluding the marginally employed (<10h/week), civil servants, and self-employed individuals. Education is classified as follows: Lower secondary degree without tertiary education (*Low*), lower secondary degree with vocational training or higher secondary degree without vocational training (*Intermediate*), university qualification (*High*).

TABLE S.11 – Industry employment shares by gender and education, 1995

	Male			Female		
	Low	Inter–mediate	High	Low	Inter–mediate	High
Agriculture/Mining/Utilities	5.8	4.5	3.2	1.5	1.7	1.5
Manufacturing: Food/Textiles	11.4	8.5	4.6	13.3	7.4	3.3
Manufacturing: Raw Materials/Metals/Chemicals	19.2	11.5	7.7	8.7	3.7	3.3
Manufacturing: Electronics/Vehicles/Machinery	11.8	12.6	14.3	10.3	4.1	3.5
Construction	13.8	19.1	6.2	1.3	3.1	2.5
Wholesale/Retail	8.8	13.9	10.1	12.3	20.9	11.8
Transportation/Storage	6.5	7.1	3.3	2.1	3.7	2.3
Accommodation/Food Services	5.1	2.0	0.9	7.0	3.7	1.6
Information/Communication/Business Services	8.3	8.3	19.8	11.8	10.5	17.6
Finance/Insurance	0.6	2.4	6.2	2.5	4.5	6.9
Public Administration	4.3	4.7	6.2	8.3	9.9	10.3
Education	0.6	0.9	6.2	3.3	3.9	12.0
Human Health Services	1.7	2.5	7.2	12.8	17.5	17.5
Other	2.2	2.0	4.2	4.7	5.4	5.7

Data: SIAB.
Note: Own calculations. This table shows the employment share of each industry among employees aged 18–63 in 1995 by gender and education. Education is classified as follows: Lower secondary degree without tertiary education (*Low*), lower secondary degree with vocational training or higher secondary degree without vocational training (*Intermediate*), university qualification (*High*).

Table S.12 – Occupation employment shares by gender and education, 1995

	Male			Female		
	Low	Inter–mediate	High	Low	Inter–mediate	High
Farming/Gardening Occ. (Low)	4.5	2.2	0.7	1.6	1.7	0.4
Farming/Gardening Occ. (High)	0.1	0.1	0.5	0.1	0.1	0.2
Raw Material Processing Occ. (Low)	24.4	13.6	1.9	8.9	1.6	0.3
Raw Material Processing Occ. (High)	0.0	0.1	0.4	0.0	0.0	0.0
Machine-Building Occ. (Low)	8.8	17.7	4.0	9.4	3.4	1.6
Machine-Building Occ. (High)	0.9	5.2	20.5	0.4	0.9	3.4
Commodity Prod. Occ. (All)	6.9	3.5	0.6	13.1	4.2	0.6
Commodity Prod. Occ. (High)	0.0	0.0	0.0	0.0	0.0	0.0
Construction Occ. (Low)	16.1	17.3	2.1	0.6	0.7	0.2
Construction Occ. (High)	0.1	0.5	5.7	0.0	0.1	1.7
Science/IT Occ. (Low)	2.6	1.6	0.7	1.4	0.8	0.8
Science/IT Occ. (High)	0.3	0.9	8.4	0.2	0.4	3.0
Logistics Occ. (Low)	27.8	17.8	4.1	33.4	8.2	1.7
Logistics Occ. (High)	0.1	0.1	0.5	0.0	0.0	0.1
Purchasing/Sales (Low)	3.3	4.9	4.3	9.9	18.2	6.4
Purchasing/Sales (High)	0.1	1.2	1.8	0.0	0.2	0.6
Administrative Occ. (All)	2.7	10.4	27.3	11.4	36.8	41.2
Medical Care Occ. (Low)	0.4	1.2	1.2	3.0	13.7	7.8
Medical Care Occ. (High)	0.0	0.2	3.9	0.1	0.6	6.2
Education/Social Care Occ. (All)	0.5	0.9	9.2	6.4	7.9	21.6
Creative Occ. (Low)	0.4	0.6	0.4	0.3	0.4	0.9
Creative Occ. (High)	0.1	0.2	1.7	0.1	0.1	1.3

Data: SIAB.
Note: Own calculations. This table shows the employment share of each occupation among employees aged 18–63 in 1995 by gender and education. Education is classified as follows: Lower secondary degree without tertiary education (*Low*), lower secondary degree with vocational training or higher secondary degree without vocational training (*Intermediate*), university qualification (*High*). Occupation classes are separated by their skill requirement (in parentheses).

TABLE S.13 – Parental labor force participation by child age and parity

	Mother		Father	
Child age	Work (yes/no)	Work (hours/day)	Work (yes/no)	Work (hours/day)
Panel (a): All children (N=5,579)				
2	0.35	1.93	0.89	8.28
3	0.48	2.78	0.91	8.74
6	0.63	3.60	0.93	8.86
10	0.70	4.08	0.93	8.87
Panel (b): Only firstborns (N=1,847)				
2	0.37	2.12	0.82	7.63
3	0.45	2.65	0.91	8.69
6	0.61	3.46	0.94	8.96
10	0.67	3.94	0.93	8.85
Panel (c): Only lastborns (N=2,182)				
2	0.41	2.38	0.91	8.44
3	0.61	3.59	0.94	8.98
6	0.80	4.68	0.95	9.07
10	0.84	5.20	0.95	9.12

Data: GSOEP.
Note: Own calculations. This table shows summary statistics for the core analysis sample. The sample spans the years 2005 to 2019. It includes two-parent households aged 18–63 with at least two resident children aged 2–10. Panel (a) includes all children of the core analysis sample. Panel (b) includes the subsample of firstborns. Panel (b) includes the subsample of lastborns with at least one sibling.

TABLE S.14 – Childcare by child age and parity

	Mother		Father		Extra-parental care	
Child age	Childcare (yes/no)	Childcare (hours/day)	Childcare (yes/no)	Childcare (hours/day)	Formal care (hours/day)	Informal care (hours/day)
Panel (a): All children (N=5,579)						
2	1.00	9.89	0.89	3.05	1.39	0.86
3	1.00	8.71	0.92	2.60	2.38	0.70
6	0.99	7.62	0.92	2.41	2.96	0.63
10	0.97	5.96	0.86	2.00	2.89	0.54
Panel (b): Only firstborns (N=1,847)						
2	1.00	10.35	0.98	3.45	1.39	0.72
3	1.00	9.46	0.93	2.62	2.45	0.80
6	0.99	8.07	0.92	2.45	3.03	0.65
10	1.00	6.72	0.91	2.23	3.07	0.55
Panel (c): Only lastborns (N=2,182)						
2	1.00	9.26	0.91	3.31	1.43	0.93
3	0.99	7.75	0.93	2.47	2.48	0.66
6	0.99	6.40	0.91	2.13	3.00	0.60
10	0.95	4.24	0.79	1.57	2.74	0.56

Data: GSOEP.
Note: Own calculations. This table shows summary statistics for the core analysis sample. The sample spans the years 2005 to 2019. It includes two-parent households aged 18–63 with at least two resident children aged 2–10. Panel (a) includes all children of the core analysis sample. Panel (b) includes the subsample of firstborns. Panel (b) includes the subsample of lastborns with at least one sibling.

TABLE S.15 – Predictive power of pre-determined characteristics for children's socio-emotional skills

	Big Five					SDQ	
	Open-ness (1)	Conscientious-ness (2)	Extra-version (3)	Agreeable-ness (4)	Neuro-ticism (5)	External-izing (6)	Internal-izing (7)
Female	-0.067*	-0.002	0.050	-0.044	0.015	0.046	-0.035
	(0.038)	(0.038)	(0.038)	(0.038)	(0.053)	(0.055)	(0.054)
Born before October	-0.024	-0.010	0.012	-0.038	0.030	0.039	-0.086
	(0.045)	(0.046)	(0.044)	(0.046)	(0.060)	(0.066)	(0.066)
Birth year	-0.012*	-0.009	0.010	-0.003	0.013	0.026**	0.012
	(0.007)	(0.006)	(0.007)	(0.007)	(0.011)	(0.011)	(0.011)
Firstborn	0.166***	-0.046	-0.173***	0.139***	0.249***	-0.022	0.194***
	(0.046)	(0.047)	(0.048)	(0.048)	(0.067)	(0.071)	(0.071)
# of siblings	-0.033	-0.004	-0.030	0.050**	0.012	-0.016	0.022
	(0.022)	(0.022)	(0.022)	(0.022)	(0.030)	(0.033)	(0.033)
Birth height (cm)	-0.012	0.019*	-0.011	-0.001	-0.013	-0.008	-0.011
	(0.010)	(0.010)	(0.009)	(0.009)	(0.013)	(0.014)	(0.014)
Birth weight (kg)	0.155***	-0.031	0.059	0.033	0.030	-0.052	0.045
	(0.049)	(0.052)	(0.047)	(0.050)	(0.070)	(0.073)	(0.075)
Days in hospital (3 months post-birth)	-0.002	-0.001	-0.004	0.004**	0.007*	-0.004	0.002
	(0.003)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.005)
Age at birth (Mother)	0.021***	0.007	-0.001	0.008	-0.007	-0.043***	-0.027***
	(0.006)	(0.005)	(0.006)	(0.005)	(0.007)	(0.008)	(0.008)
Age at birth (Father)	-0.009*	0.006	-0.006	0.002	0.002	0.005	0.016**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)
N	2,866	2,866	2,866	2,866	1,507	1,380	1,380
R^2	0.021	0.008	0.010	0.007	0.019	0.042	0.019
Outcome Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Outcome SD	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Joint significance (p-value)	0.000	0.009	0.003	0.015	0.004	0.000	0.008

Data: GSOEP.
Note: Own calculations. This table shows the association of children's socio-emotional skills with pre-determined family and child characteristics. All coefficients are estimated on the sample of sibling pairs described in Table 2. The last row shows the p-value for an F-test of joint significance. Standard errors (in parentheses) are heteroskedasticity-robust. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.16 – Top 10 Rotemberg weights for mothers and fathers

Occupation/Industry	Rotemberg weights α_s	Rotemberg weights Share, in %	Coefficient β_s	Coefficient 95% CI
Panel (a): Mothers				
Purchasing/Sales (Low) in Wholesale/Retail	0.11	10.52%	6.65	[3.00,10.50]
Logistics Occ. (Low) in Information/Communication/Business Services	0.08	7.42%	2.69	[-2.50,5.00]
Education/Social Care Occ. (All) in Education	0.07	6.90%	6.79	[3.00,11.50]
Administrative Occ. (All) in Finance/Insurance	0.05	4.86%	5.35	[-5.50,14.00]
Logistics Occ. (Low) in Human Health Services	0.04	3.95%	4.98	[0.50,8.00]
Medical Care Occ. (High) in Human Health Services	0.03	3.22%	0.75	[-12.50,9.00]
Commodity Prod. Occ. (All) in Manufacturing: Food/Textiles	0.03	3.01%	8.19	[5.00,14.50]
Medical Care Occ. (Low) in Human Health Services	0.03	2.78%	9.17	[0.00,30.00]
Purchasing/Sales (Low) in Accommodation/Food Services	0.03	2.62%	6.37	[2.00,14.50]
Administrative Occ. (All) in Manufacturing: Electronics/Vehicles/Machinery	0.03	2.60%	3.53	[-2.50,12.00]
Panel (b): Fathers				
Machine-Building Occ. (High) in Manufacturing: Electronics/Vehicles/Machinery	0.17	16.62%	1.00	[-1.00,2.50]
Construction Occ. (Low) in Construction	0.11	10.95%	2.21	[1.00,3.50]
Science/IT Occ. (High) in Information/Communication/Business Services	0.05	4.41%	1.33	[0.00,3.00]
Logistics Occ. (Low) in Transportation/Storage	0.04	4.09%	1.90	[0.00,4.00]
Administrative Occ. (All) in Manufacturing: Electronics/Vehicles/Machinery	0.04	4.03%	1.04	[-1.00,3.00]
Machine-Building Occ. (High) in Information/Communication/Business Services	0.03	3.24%	2.25	[1.00,4.00]
Medical Care Occ. (High) in Human Health Services	0.03	2.73%	-0.06	[-3.50,3.00]
Administrative Occ. (All) in Finance/Insurance	0.03	2.50%	2.57	[-1.00,9.50]
Raw Material Processing Occ. (Low) in Manufacturing: Raw Materials/Metals/Chemicals	0.03	2.50%	2.90	[0.50,5.50]
Logistics Occ. (Low) in Information/Communication/Business Services	0.03	2.48%	1.82	[-1.50,5.50]

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows the 10 economic sectors with the highest Rotemberg weights for mothers and fathers. Rotemberg weights (α_s) are calculated on the core sample described in Table 1 using the programming routine provided by Goldsmith-Pinkham et al. (2020). The share of each Rotemberg weight is calculated by dividing α_s with $\sum_s[\alpha_s|\alpha_s \geq 0]$. β_s is the coefficient of $\hat{w}^m_{it-1}$ ($\hat{w}^p_{it-1}$) from a just-identified 2SLS regression of maternal (paternal) labor income on $\hat{w}^m_{it-1}$ ($\hat{w}^p_{it-1}$) where $\hat{w}^m_{it-1}$ ($\hat{w}^p_{it-1}$) is instrumented with the group-specific sector share in base year 1995 ($E^s_{g,1995}/E_{g,1995}$) while controlling for family times child age fixed effects and year fixed effects. The confidence interval is the weak instrument robust confidence interval of Chernozhukov and Hansen (2008) over the interval $[-30, 30]$.

Table S.17 – Parental potential wages and parental labor force participation

	Mother			Father		
	Hours per day (1)	Employed (yes/no) (2)	Hours per day if employed (3)	Hours per day (4)	Employed (yes/no) (5)	Hours per day if employed (6)
Panel (a): Effect of 10% ↑ in parental potential wages						
Mother	1.226*** (0.363)	0.141*** (0.044)	-0.093 (0.576)	-0.261 (0.546)	-0.048 (0.055)	0.090 (0.292)
Father	-0.537*** (0.148)	-0.064*** (0.024)	-0.138 (0.160)	0.440** (0.201)	0.016 (0.018)	0.376*** (0.143)
Family × child age FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	5,579	5,579	2,718	5,579	5,579	4,967
R^2	0.794	0.757	0.834	0.771	0.735	0.796
Outcome Mean	3.434	0.593	5.925	8.806	0.920	9.602
Outcome SD	3.458	0.491	2.506	3.149	0.271	1.807

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in parental labor force participation in response to changes in maternal and paternal potential wages. All coefficients are estimated on the core sample described in Table 1. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table S.18 – Parental potential wages and joint family lunches

	Weekdays (1)	Saturday (2)	Sunday (3)
Panel (a): Effect of 10% ↑ in parental potential wages			
Mother	-0.426** (0.189)	0.066* (0.037)	0.072* (0.042)
Father	-0.013 (0.016)	0.009 (0.009)	0.012 (0.011)
Panel (b): Effect of 10% ↓ in PWG			
PWG	-0.206** (0.097)	0.028* (0.016)	0.030 (0.020)
Family × child age FE	✓	✓	✓
Year FE	✓	✓	✓
N	1,093	1,093	1,093
R^2	0.848	0.664	0.628
Outcome Mean	0.649	0.973	0.968
Outcome SD	0.478	0.163	0.176

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in joint family lunches in response to changes in maternal and paternal potential wages. All regressions control for family times child age fixed effects and year fixed effects. Regressions in Panel (b) also control for the sum of maternal and paternal potential wages. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.19 – Predictive power of socio-emotional skills for other child outcomes

	BMI at age 6: Underweight (yes/no) (1)	BMI at age 6: Overweight (yes/no) (2)	Delayed school entry (yes/no) (3)	Upper secondary school track (yes/no) (4)
Panel (a): Effect of 1 SD ↑ in children's socio-emotional skills at age 3				
Openness	-0.010 (0.008) [3,374]	-0.001 (0.006) [3,374]	-0.017*** (0.006) [2,542]	0.048*** (0.014) [1,178]
Conscientiousness	0.006 (0.008) [3,374]	-0.009 (0.006) [3,374]	-0.008 (0.006) [2,542]	0.047*** (0.014) [1,178]
Extraversion	-0.010 (0.008) [3,374]	0.004 (0.006) [3,374]	-0.005 (0.006) [2,542]	-0.006 (0.014) [1,178]
Agreeableness	0.010 (0.008) [3,374]	0.001 (0.006) [3,374]	-0.013** (0.006) [2,542]	0.014 (0.014) [1,178]
Neuroticism	–	–	–	–
Externalizing behavior	–	–	–	–
Internalizing behavior	–	–	–	–
Panel (b): Effect of 1 SD ↑ in children's socio-emotional skills at age 6				
Openness	0.002 (0.006) [5,265]	-0.021*** (0.005) [5,265]	-0.021*** (0.005) [5,265]	0.094*** (0.010) [1,970]
Conscientiousness	0.007 (0.006) [5,265]	-0.011** (0.005) [5,265]	-0.028*** (0.005) [3,788]	0.072*** (0.010) [1,970]
Extraversion	-0.009 (0.006) [5,265]	0.002 (0.004) [5,265]	-0.013*** (0.005) [3,788]	0.026** (0.010) [1,970]
Agreeableness	0.005 (0.006) [5,265]	-0.009* (0.005) [5,265]	-0.011** (0.005) [3,788]	0.052*** (0.010) [1,970]
Neuroticism	0.015** (0.006) [5,265]	-0.001 (0.004) [5,265]	0.026*** (0.005) [3,788]	-0.041*** (0.010) [1,970]
Externalizing behavior	-0.003 (0.007) [3,782]	0.020*** (0.006) [3,782]	0.034*** (0.006) [2,508]	-0.096*** (0.015) [947]
Internalizing behavior	0.003 (0.007) [3,782]	0.004 (0.006) [3,782]	0.030*** (0.006) [2,508]	-0.039** (0.016) [947]

Data: GSOEP.
Note: Own calculations. This table shows cross-sectional associations between children's socio-emotional skills at ages 3 and 6 and other child outcomes. All skill measures are standardized on the estimation sample. In Panel (a), results for neuroticism, externalizing/internalizing behavior are omitted because these skills are first measured in the mother-and-child questionnaire at age 5-6. This sample differs from the core analysis sample: I do not restrict the sample to the availability of data on siblings and children's living environments. All regressions control non-parametrically for maternal/paternal education, birth order, number of siblings, child sex, birth month, CZ of residence, and year fixed effects. Sample sizes are reported in brackets. Standard errors (in parentheses) are heteroskedasticity-robust. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.20 – Effects of PWG on cognitive outcomes

	Language skills (Age 2-3) (1)	GPA Math (Age 9-10) (2)	GPA German (Age 9-10) (3)
Effect of 10% ↑ in parental potential wages			
Mother	0.292	0.174	0.192
	(0.294)	(0.186)	(0.147)
Father	0.038	-0.071	0.017
	(0.068)	(0.107)	(0.048)
Panel (b): Effect of 10% ↓ in PWG			
PWG	0.127	0.123	0.088
	(0.152)	(0.111)	(0.076)
Family FE	✓	✓	✓
Year FE	✓	✓	✓
N	1,485	1,423	1,423
R^2	0.646	0.641	0.700
Outcome Mean	0.000	2.182	2.245
Outcome SD	1.000	0.845	0.793

Data: GSOEP.
Note: Own calculations. This table shows changes in children's cognitive skills in response to changes in maternal and paternal potential wages. All regressions control for family times child age fixed effects and year fixed effects. Regressions in Panel (b) also control for the sum of maternal and paternal potential wages. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.21 – Childcare arrangements and children's socio-emotional skills

	Big Five						SDQ		
	Open. (1)	Consc. (2)	Extra. (3)	Agree. (4)	Neuro. (5)	Index (6)	Extern. (7)	Intern. (8)	Index (9)
Formal care	0.099	-0.127*	0.016	0.003	0.033	-0.098	0.046	-0.078	-0.018
(Share in %)	(0.080)	(0.077)	(0.079)	(0.078)	(0.097)	(0.097)	(0.118)	(0.121)	(0.120)
Informal care	-0.177	-0.407**	-0.041	-0.047	0.263	-0.432**	0.435	0.457*	0.555**
(Share in %)	(0.198)	(0.178)	(0.169)	(0.181)	(0.234)	(0.216)	(0.280)	(0.260)	(0.271)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	5,531	5,531	5,531	5,531	3,608	3,608	2,306	2,306	2,306
R^2	0.075	0.060	0.048	0.057	0.063	0.082	0.124	0.092	0.108
Outcome Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Outcome SD	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Data: GSOEP.
Note: Own calculations. This table shows correlations between children's socio-emotional skills and different childcare arrangements. All skill measures are standardized on the estimation sample. All regressions control non-parametrically for maternal/paternal education, birth order, number of siblings, biological sex, birth month, CZ of residence, and year fixed effects. Standard errors (in parentheses) are clustered at the child level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.22 – Parental potenial wages and informal care provider

	Informal care			
	Any (yes/no) (1)	Family (yes/no) (2)	Friends (yes/no) (3)	Babysitter (yes/no) (4)
Panel (a): Effect of 10% $\uparrow$ in parental potential wages				
Mother	0.089 (0.069)	0.073 (0.068)	-0.021 (0.029)	0.025 (0.020)
Father	-0.056* (0.031)	-0.068** (0.029)	-0.048 (0.032)	0.000 (0.001)
Panel (b): Effect of 10% $\downarrow$ in PWG				
PWG	0.073* (0.038)	0.070* (0.037)	0.014 (0.022)	0.012 (0.010)
Family $\times$ child age FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
N	5,579	5,579	5,579	5,579
R^2	0.686	0.710	0.636	0.750
Outcome Mean	0.585	0.527	0.098	0.022
Outcome SD	0.493	0.499	0.297	0.146

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in the use of informal care providers in response to changes in maternal and paternal potential wages. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects. Regressions in Panel (b) also control for the sum of maternal and paternal potential wages. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.23 – Heterogeneity in children's living environment by child sex

	Parental care (hours/day)		Formal care (hours/day)		Informal care (hours/day)	
	Male	Female	Male	Female	Male	Female
Effect of 10% ↑ in parental potential wages						
Mother	0.286	0.218	0.142	-0.006	0.191*	0.176*
	(0.479)	(0.461)	(0.238)	(0.237)	(0.100)	(0.097)
Father	0.715**	0.872***	-0.244**	-0.225*	-0.081	-0.039
	(0.325)	(0.326)	(0.119)	(0.119)	(0.067)	(0.066)
Effect of 10% ↓ in PWG						
	-0.215	-0.327	0.193	0.109	0.136**	0.108*
	(0.290)	(0.283)	(0.134)	(0.134)	(0.062)	(0.059)

	No. of carers		Family inc. (in Thsd. €)		Inc. share mother (in %)	
	Male	Female	Male	Female	Male	Female
Effect of 10% ↑ in parental potential wages						
Mother	0.195	0.159	3.143*	3.590**	9.516**	9.580**
	(0.136)	(0.135)	(1.608)	(1.622)	(3.959)	(3.939)
Father	-0.154*	-0.130	-0.896*	-0.512	-4.391***	-4.148***
	(0.081)	(0.081)	(0.499)	(0.487)	(1.379)	(1.388)
Effect of 10% ↓ in PWG						
	0.175**	0.144*	2.020**	2.051**	6.954***	6.864***
	(0.080)	(0.080)	(0.847)	(0.860)	(2.179)	(2.158)

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in children's living environment in response to changes in maternal and paternal potential wages for children of different sex. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects; plus the sum of maternal and paternal potential wages interacted with the corresponding heterogeneity variable, when estimating the effect of the PWG. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.24 – Heterogeneity in children's living environment by birth order

	Parental care (hours/day)		Formal care (hours/day)		Informal care (hours/day)	
	First	Higher	First	Higher	First	Higher
Effect of 10% ↑ in parental potential wages						
Mother	0.235 (0.460)	0.218 (0.470)	0.069 (0.235)	-0.000 (0.241)	0.179** (0.091)	0.151 (0.096)
Father	0.820** (0.321)	0.719** (0.329)	-0.239** (0.118)	-0.213* (0.122)	-0.059 (0.065)	-0.058 (0.066)
Effect of 10% ↓ in PWG						
	-0.293 (0.281)	-0.250 (0.292)	0.154 (0.133)	0.106 (0.138)	0.119** (0.056)	0.105* (0.059)

	No. of carers		Family inc. (in Thsd. €)		Inc. share mother (in %)	
	First	Higher	First	Higher	First	Higher
Effect of 10% ↑ in parental potential wages						
Mother	0.179 (0.134)	0.179 (0.138)	3.141** (1.502)	2.307 (1.538)	9.450** (3.843)	9.520** (3.934)
Father	-0.139* (0.082)	-0.137* (0.083)	-0.653 (0.494)	-1.274** (0.517)	-4.441*** (1.385)	-4.160*** (1.406)
Effect of 10% ↓ in PWG						
	0.159** (0.080)	0.158* (0.081)	1.897** (0.798)	1.791** (0.813)	6.945*** (2.116)	6.840*** (2.156)

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in children's living environment in response to changes in maternal and paternal potential wages for children of different birth order. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects; plus the sum of maternal and paternal potential wages interacted with the corresponding heterogeneity variable, when estimating the effect of the PWG. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.25 – Heterogeneity in children's living environment by age of youngest child

	Parental care (hours/day)		Formal care (hours/day)		Informal care (hours/day)	
	< 6	≥ 6	< 6	≥ 6	< 6	≥ 6
Effect of 10% ↑ in parental potential wages						
Mother	0.347	0.361	0.134	0.036	0.188*	0.159
	(0.466)	(0.451)	(0.241)	(0.241)	(0.102)	(0.100)
Father	0.735**	0.809**	-0.239**	-0.240**	-0.067	-0.052
	(0.317)	(0.321)	(0.120)	(0.122)	(0.066)	(0.068)
Effect of 10% ↓ in PWG						
	-0.194	-0.224	0.186	0.138	0.128**	0.105*
	(0.285)	(0.277)	(0.137)	(0.138)	(0.062)	(0.062)

	No. of carers		Family inc. (in Thsd. €)		Inc. share mother (in %)	
	< 6	≥ 6	< 6	≥ 6	< 6	≥ 6
Effect of 10% ↑ in parental potential wages						
Mother	0.178	0.175	2.842*	3.468**	9.846**	8.648**
	(0.138)	(0.138)	(1.553)	(1.504)	(3.857)	(3.852)
Father	-0.145*	-0.141*	-1.014**	0.119	-4.124***	-4.533***
	(0.080)	(0.084)	(0.496)	(0.528)	(1.403)	(1.391)
Effect of 10% ↓ in PWG						
	0.161**	0.158*	1.928**	1.675**	6.985***	6.591***
	(0.081)	(0.083)	(0.825)	(0.807)	(2.132)	(2.125)

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in children's living environment in response to changes in maternal and paternal potential wages for families where the youngest child is below 6 or not. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects; plus the sum of maternal and paternal potential wages interacted with the corresponding heterogeneity variable, when estimating the effect of the PWG. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.26 – Heterogeneity in children's living environment by maternal education

	Parental care (hours/day)		Formal care (hours/day)		Informal care (hours/day)	
	Low	High	Low	High	Low	High
Effect of 10% ↑ in parental potential wages						
Mother	-0.446	0.266	0.808**	0.013	0.451***	0.238**
	(0.883)	(0.589)	(0.373)	(0.251)	(0.152)	(0.104)
Father	0.930***	0.576	-0.457***	0.086	-0.143**	0.050
	(0.358)	(0.456)	(0.141)	(0.158)	(0.064)	(0.080)
Effect of 10% ↓ in PWG						
	-0.688	-0.155	0.632***	-0.037	0.297***	0.094
	(0.519)	(0.388)	(0.221)	(0.153)	(0.089)	(0.069)

	No. of carers		Family inc. (in Thsd. €)		Inc. share mother (in %)	
	Low	High	Low	High	Low	High
Effect of 10% ↑ in parental potential wages						
Mother	0.499***	0.153	-0.055	5.280***	6.584	10.492***
	(0.163)	(0.129)	(1.905)	(1.773)	(5.065)	(3.621)
Father	-0.279***	0.052	-0.561	-1.046	-1.763	-7.938***
	(0.079)	(0.080)	(0.545)	(0.754)	(1.409)	(2.347)
Effect of 10% ↓ in PWG						
	0.389***	0.051	0.253	3.163***	4.174	9.215***
	(0.098)	(0.080)	(1.000)	(1.038)	(2.859)	(2.360)

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in children's living environment in response to changes in maternal and paternal potential wages for children of high and low educated mothers. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects; plus the sum of maternal and paternal potential wages interacted with the corresponding heterogeneity variable, when estimating the effect of the PWG. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.27 – Heterogeneity in children's living environment by region of residence

	Parental care (hours/day)		Formal care (hours/day)		Informal care (hours/day)	
	West	East	West	East	West	East
Effect of 10% ↑ in parental potential wages						
Mother	-0.025	0.350	0.100	0.035	0.191	0.171
	(0.580)	(0.530)	(0.334)	(0.232)	(0.123)	(0.115)
Father	0.840**	0.665	-0.341**	-0.025	-0.093	0.003
	(0.360)	(0.476)	(0.137)	(0.163)	(0.068)	(0.100)
Effect of 10% ↓ in PWG						
	-0.433	-0.158	0.220	0.030	0.142*	0.084
	(0.368)	(0.391)	(0.194)	(0.151)	(0.075)	(0.083)

	No. of carers		Family inc. (in Thsd. €)		Inc. share mother (in %)	
	West	East	West	East	West	East
Effect of 10% ↑ in parental potential wages						
Mother	0.196	0.125	4.659**	2.122	7.728**	10.744**
	(0.179)	(0.138)	(2.020)	(1.459)	(3.814)	(4.566)
Father	-0.233***	0.020	-1.346**	0.252	-3.579**	-5.518**
	(0.085)	(0.082)	(0.548)	(0.801)	(1.565)	(2.310)
Effect of 10% ↓ in PWG						
	0.215**	0.053	3.003***	0.935	5.653***	8.131***
	(0.109)	(0.081)	(1.120)	(0.840)	(2.173)	(2.917)

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in children's living environment in response to changes in maternal and paternal potential wages for children in East and West Germany. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects; plus the sum of maternal and paternal potential wages interacted with the corresponding heterogeneity variable, when estimating the effect of the PWG. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.28 – Heterogeneity in children's living environment by at-risk-of-poverty status

	Parental care (hours/day)		Formal care (hours/day)		Informal care (hours/day)	
	No	Yes	No	Yes	No	Yes
Effect of 10% ↑ in parental potential wages						
Mother	-0.053 (0.457)	-0.188 (0.622)	0.017 (0.239)	-0.090 (0.308)	0.178* (0.100)	0.144 (0.150)
Father	0.818** (0.329)	0.639 (0.476)	-0.254** (0.119)	-0.082 (0.187)	-0.072 (0.065)	-0.033 (0.093)
Effect of 10% ↓ in PWG						
	-0.436 (0.281)	-0.414 (0.448)	0.136 (0.135)	-0.004 (0.199)	0.125** (0.060)	0.089 (0.098)

	No. of carers		Family inc. (in Thsd. €)		Inc. share mother (in %)	
	No	Yes	No	Yes	No	Yes
Effect of 10% ↑ in parental potential wages						
Mother	0.155 (0.138)	0.271* (0.160)	3.271** (1.523)	1.714 (2.016)	10.028*** (3.849)	8.997** (4.050)
Father	-0.143* (0.083)	-0.174* (0.091)	-0.435 (0.503)	-2.936** (1.204)	-4.422*** (1.350)	-3.043* (1.758)
Effect of 10% ↓ in PWG						
	0.149* (0.081)	0.222** (0.100)	1.853** (0.806)	2.325* (1.325)	7.225*** (2.117)	6.020*** (2.252)

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows changes in children's living environment in response to changes in maternal and paternal potential wages for children by poverty status of the family. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects; plus the sum of maternal and paternal potential wages interacted with the corresponding heterogeneity variable, when estimating the effect of the PWG. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.29 – Robustness: 10% decrease in the PWG and children's socio-emotional skills

	Big Five					SDQ	
	Open-ness (1)	Conscientious-ness (2)	Extra-version (3)	Agreeable-ness (4)	Neuro-ticism (5)	External-izing (6)	Internal-izing (7)
Baseline	-0.050 (0.065)	-0.025 (0.067)	0.085 (0.060)	-0.029 (0.064)	0.030 (0.111)	0.192 (0.146)	0.002 (0.091)
Panel (a): Alternative construction of potential wages							
No imputation	-0.069 (0.076) [5,531]	-0.020 (0.078) [5,531]	0.097 (0.073) [5,531]	-0.041 (0.077) [5,531]	0.051 (0.136) [3,610]	0.241 (0.181) [2,310]	0.004 (0.113) [2,310]
CPS imputation	-0.054 (0.065) [5,531]	-0.026 (0.067) [5,531]	0.080 (0.060) [5,531]	-0.033 (0.064) [5,531]	0.032 (0.113) [3,610]	0.196 (0.150) [2,310]	0.002 (0.093) [2,310]
Updating (Shenhav, 2021)	-0.042 (0.066) [5,531]	-0.027 (0.069) [5,531]	0.082 (0.061) [5,531]	-0.034 (0.066) [5,531]	0.037 (0.113) [3,610]	0.204 (0.151) [2,310]	0.007 (0.093) [2,310]
Updating ($t-10$)	-0.016 (0.062) [5,531]	0.011 (0.062) [5,531]	0.089 (0.059) [5,531]	-0.019 (0.061) [5,531]	-0.052 (0.112) [3,610]	0.083 (0.125) [2,310]	0.003 (0.090) [2,310]
Daily wages	-0.016 (0.062) [5,531]	-0.049 (0.065) [5,531]	0.055 (0.059) [5,531]	-0.020 (0.060) [5,531]	0.014 (0.109) [3,610]	0.173 (0.130) [2,310]	-0.016 (0.090) [2,310]
Panel (b): Alternative control variables							
Child characteristics	-0.057 (0.064) [5,531]	-0.025 (0.067) [5,531]	0.091 (0.058) [5,531]	-0.025 (0.065) [5,531]	0.046 (0.107) [3,608]	0.182 (0.134) [2,306]	0.008 (0.105) [2,306]
Formal childcare availability & quality	-0.058 (0.066) [5,319]	-0.039 (0.069) [5,319]	0.094 (0.061) [5,319]	-0.038 (0.065) [5,319]	0.026 (0.110) [3,610]	0.220 (0.145) [2,310]	0.016 (0.094) [2,310]
CZ trends	-0.077 (0.074) [5,531]	-0.079 (0.080) [5,531]	0.062 (0.067) [5,531]	-0.092 (0.076) [5,531]	0.011 (0.121) [3,610]	0.237 (0.145) [2,309]	-0.110 (0.087) [2,309]
Education trends	-0.012 (0.070) [5,531]	-0.057 (0.074) [5,531]	0.062 (0.064) [5,531]	-0.054 (0.070) [5,531]	-0.043 (0.116) [3,610]	0.187 (0.149) [2,310]	-0.001 (0.079) [2,310]
Panel (c): Alternative sample restrictions							
Married parents	-0.010 (0.069) [5,033]	-0.010 (0.073) [5,033]	0.098 (0.067) [5,033]	-0.006 (0.070) [5,033]	0.014 (0.115) [3,355]	0.181 (0.147) [2,147]	0.002 (0.093) [2,147]
Biological parents	-0.054 (0.065) [5,506]	-0.027 (0.067) [5,506]	0.088 (0.060) [5,506]	-0.032 (0.064) [5,506]	0.031 (0.111) [3,589]	0.194 (0.146) [2,295]	0.004 (0.091) [2,295]
Within-child estim.	-0.016 (0.047) [6,922]	-0.063 (0.053) [6,922]	0.052 (0.044) [6,922]	-0.006 (0.052) [6,922]	0.007 (0.062) [3,220]	0.104 (0.090) [2,050]	-0.135 (0.083) [2,050]

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows robustness checks for changes in children's socio-emotional skills in response to a 10% decrease in the PWG (see equation 3). All robustness checks are described in Section 4.4 of the paper. Sample sizes are reported in brackets. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE S.30 – Robustness: 10% decrease in the PWG and children's living environment

	Childcare arrangements				Financial resources	
	Parental care (hours/day) (1)	Formal care (hours/day) (2)	Informal care (hours/day) (3)	No. of carers (4)	Family inc. (in Thsd. €) (5)	Inc. share mother (in %) (6)
Baseline	-0.277 (0.285)	0.154 (0.133)	0.120** (0.058)	0.159** (0.081)	2.012** (0.834)	6.895*** (2.165)
Panel (a): Alternative construction of potential wages						
No imputation	-0.294 (0.344) [5,579]	0.192 (0.156) [5,579]	0.132* (0.072) [5,579]	0.193** (0.096) [5,579]	2.510** (0.995) [5,579]	8.347*** (2.562) [5,579]
CPS imputation	-0.274 (0.283) [5,579]	0.144 (0.134) [5,579]	0.124** (0.059) [5,579]	0.160* (0.082) [5,579]	1.915** (0.830) [5,579]	6.918*** (2.203) [5,579]
Updating (Shenhav, 2021)	-0.242 (0.281) [5,579]	0.156 (0.135) [5,579]	0.120** (0.060) [5,579]	0.162* (0.083) [5,579]	2.035** (0.852) [5,579]	6.918*** (2.250) [5,579]
Updating ($t-10$)	-0.278 (0.284) [5,579]	0.108 (0.129) [5,579]	0.123** (0.058) [5,579]	0.155** (0.076) [5,579]	1.655** (0.745) [5,579]	5.142*** (1.961) [5,579]
Daily wages	-0.398 (0.282) [5,579]	0.141 (0.133) [5,579]	0.129** (0.056) [5,579]	0.147* (0.079) [5,579]	1.704** (0.781) [5,579]	6.403*** (1.967) [5,579]
Panel (b): Alternative control variables						
Child characteristics	-0.163 (0.292) [5,579]	0.166 (0.135) [5,579]	0.110** (0.055) [5,579]	0.160** (0.077) [5,579]	2.040** (0.859) [5,579]	6.754*** (2.154)
Formal childcare availability & quality	-0.197 (0.286) [5,367]	0.163 (0.138) [5,367]	0.137** (0.060) [5,367]	0.169** (0.084) [5,367]	1.957** (0.845) [5,367]	6.961*** (2.228) [5,367]
CZ trends	-0.419 (0.328) [5,579]	0.182 (0.138) [5,579]	0.056 (0.065) [5,579]	0.098 (0.079) [5,579]	2.673** (1.047) [5,579]	6.723*** (2.194) [5,579]
Education trends	-0.284 (0.320) [5,579]	0.168 (0.144) [5,579]	0.126** (0.059) [5,579]	0.182** (0.074) [5,579]	1.839** (0.838) [5,579]	5.799*** (2.010) [5,579]
Panel (c): Alternative sample restrictions						
Married parents	-0.079 (0.292) [5,074]	0.168 (0.140) [5,074]	0.120* (0.067) [5,074]	0.168* (0.093) [5,074]	2.283** (0.981) [5,074]	6.277*** (2.387) [5,074]
Biological parents	-0.247 (0.283) [5,554]	0.163 (0.134) [5,554]	0.120** (0.058) [5,554]	0.160** (0.081) [5,554]	1.995** (0.833) [5,554]	6.894*** (2.167) [5,554]
Within-child estim.	0.081 (0.241) [7,031]	0.249* (0.136) [7,031]	0.024 (0.058) [7,031]	0.073 (0.062) [7,031]	2.221*** (0.620) [7,036]	6.201*** (1.644) [7,031]

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows robustness checks for changes in childcare arrangements and financial resources in response to a 10% decrease in the PWG (see equation 3). All robustness checks are described in Section 4.4 of the paper. Sample sizes are reported in brackets. Standard errors (in parentheses) are clustered at the family level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table S.31 – Tests for appropriate level of clustering

	No clustering	Clustering by ... Educ. (M.) × Educ. (F.) × CZ	Educ. (M.)	Educ. (F.)	CZ
	(1)	(2)	(3)	(4)	(5)
Panel (a): Big Five					
Openness	2.614 [0.004]	0.844 [0.199]	-0.022 [0.509]	-0.800 [0.788]	0.895 [0.185]
Conscientiousness	2.441 [0.007]	-1.563 [0.941]	-1.139 [0.873]	-0.899 [0.816]	-1.471 [0.929]
Extraversion	1.990 [0.023]	0.083 [0.467]	-1.013 [0.844]	-1.026 [0.848]	1.565 [0.059]
Agreeableness	3.475 [0.000]	-0.947 [0.828]	-0.188 [0.574]	-0.522 [0.699]	-0.241 [0.595]
Neuroticism	3.026 [0.001]	1.102 [0.135]	0.406 [0.343]	-0.331 [0.630]	2.235 [0.013]
Panel (b): SDQ					
Externalizing behavior	2.779 [0.003]	0.014 [0.494]	-1.206 [0.886]	-0.060 [0.524]	0.953 [0.170]
Internalizing behavior	2.795 [0.003]	1.086 [0.139]	1.425 [0.077]	-0.398 [0.655]	1.918 [0.028]
Panel (c): Children's living environment					
Parental care (hours/day)	1.521 [0.064]	-1.186 [0.882]	-1.156 [0.876]	-0.731 [0.768]	-0.194 [0.577]
Formal care (hours/day)	1.925 [0.027]	-0.324 [0.627]	0.297 [0.383]	-0.064 [0.526]	-0.515 [0.697]
Informal care (hours/day)	5.905 [0.000]	1.033 [0.151]	1.554 [0.060]	-1.078 [0.859]	2.774 [0.003]
No. of carers	4.969 [0.000]	0.561 [0.288]	-0.202 [0.580]	-0.436 [0.669]	1.948 [0.026]
Family inc. (in Thsd. €)	2.148 [0.016]	-0.330 [0.629]	-0.646 [0.741]	0.190 [0.425]	0.256 [0.399]
Inc. share mother (in %)	2.891 [0.002]	-1.551 [0.940]	0.787 [0.216]	-0.412 [0.660]	-0.886 [0.812]

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows tests for the appropriate level of clustering following the procedures proposed in MacKinnon et al. (2023). I present the τ_σ-statistic and asymptotic p-values in brackets (see equation 20 in MacKinnon et al., 2023). τ_σ tests for the equality of the error variance matrix under the benchmark level of clustering (family-level) against the alternative indicated in the table header. Cluster tests are performed after regressing the outcomes indicated in the first column on the PWG (see equation 3). All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects, and the sum of maternal and paternal potential wages.

TABLE S.32 – Robustness: 10% decrease in the PWG and socio-emotional skills by family size

	≤ 10 (1)	≤ 9 (2)	≤ 8 (3)	≤ 7 (4)	≤ 6 (5)	≤ 5 (6)
Panel (a): Big Five						
Openness	-0.051 (0.065) [5,519]	-0.050 (0.065) [5,511]	-0.050 (0.065) [5,504]	-0.045 (0.065) [5,481]	-0.043 (0.065) [5,452]	-0.045 (0.067) [5,337]
Conscientiousness	-0.025 (0.067) [5,519]	-0.025 (0.067) [5,511]	-0.026 (0.067) [5,504]	-0.027 (0.067) [5,481]	-0.029 (0.067) [5,452]	-0.032 (0.069) [5,337]
Extraversion	0.084 (0.060) [5,519]	0.086 (0.060) [5,511]	0.088 (0.060) [5,504]	0.086 (0.060) [5,481]	0.085 (0.060) [5,452]	0.069 (0.062) [5,337]
Agreeableness	-0.030 (0.064) [5,519]	-0.027 (0.064) [5,511]	-0.026 (0.064) [5,504]	-0.031 (0.064) [5,481]	-0.029 (0.064) [5,452]	-0.040 (0.066) [5,337]
Neuroticism	0.028 (0.111) [3,602]	0.028 (0.111) [3,596]	0.033 (0.111) [3,593]	0.028 (0.112) [3,580]	0.029 (0.111) [3,556]	0.049 (0.123) [3,477]
Panel (b): SDQ						
Externalizing behavior	0.189 (0.146) [2,302]	0.189 (0.146) [2,296]	0.191 (0.146) [2,294]	0.189 (0.145) [2,286]	0.192 (0.146) [2,266]	0.194 (0.146) [2,201]
Internalizing behavior	0.000 (0.091) [2,302]	-0.001 (0.091) [2,296]	-0.000 (0.091) [2,294]	-0.001 (0.092) [2,286]	0.000 (0.091) [2,266]	-0.005 (0.090) [2,201]
Panel (c): Children's living environment						
Parental care (hours/day)	-0.284 (0.285) [5,567]	-0.270 (0.284) [5,559]	-0.257 (0.284) [5,552]	-0.315 (0.283) [5,529]	-0.316 (0.284) [5,500]	-0.219 (0.289) [5,385]
Formal care (hours/day)	0.157 (0.133) [5,567]	0.162 (0.134) [5,559]	0.162 (0.134) [5,552]	0.159 (0.134) [5,529]	0.154 (0.133) [5,500]	0.155 (0.138) [5,385]
Informal care (hours/day)	0.121** (0.058) [5,567]	0.122** (0.058) [5,559]	0.122** (0.058) [5,552]	0.119** (0.058) [5,529]	0.119** (0.058) [5,500]	0.119** (0.061) [5,385]
No. of carers	0.161** (0.081) [5,567]	0.164** (0.081) [5,559]	0.162** (0.081) [5,552]	0.161** (0.081) [5,529]	0.163** (0.081) [5,500]	0.131* (0.076) [5,385]
Family inc. (in Thsd. €)	2.033** (0.835) [5,567]	2.114** (0.836) [5,559]	2.123** (0.838) [5,552]	2.089** (0.839) [5,529]	2.111** (0.841) [5,500]	2.216*** (0.854) [5,385]
Inc. share mother (in %)	6.898*** (2.166) [5,567]	6.887*** (2.168) [5,559]	6.884*** (2.170) [5,552]	6.870*** (2.175) [5,529]	6.873*** (2.178) [5,500]	7.064*** (2.211) [5,385]

Data: GSOEP, SIAB, MZ.
Note: Own calculations. This table shows robustness checks for changes in children's socio-emotional skills in response to a 10% decrease in the PWG (see equation 3). Each column represents a subsample of core analysis sample excluding families larger than the size specified in the column header. All coefficients are estimated on the core sample described in Table 1. All regressions control for family times child age fixed effects and year fixed effects, and the sum of maternal and paternal potential wages.

C MEASUREMENT ERROR CORRECTION

Basic set-up. Assume that outcome y^* is measured with error and that measurement error is classical:

$$y_{it} = y^*_{it} + \eta_{it},$$

where $y \sim \mathcal{N}(0,1)$, $\eta \sim \mathcal{N}(0,\sigma^2_\eta)$, $Cov(X,\eta) = 0$, and $Cov(y^*,\eta) = 0$.

In this case, equation 3 can be re-written as follows:

$$y_{it} = \alpha + \beta^\Delta \underbrace{(\ln \hat{w}^m_{it-1} - \ln \hat{w}^p_{it-1})}_{=\hat{w}^\Delta_{it-1}} + \beta^\Sigma \underbrace{(\ln \hat{w}^m_{it-1} + \ln \hat{w}^p_{it-1})}_{=\hat{w}^\Sigma_{it-1}} + \gamma_{f(i)a(it)} + \tau_t + X'_{it}\delta + \epsilon^*_{it} + \eta_{it},$$

where ϵ^* is the true error term.

Estimation of measurement error. Suppose we have two noisy measures of y^* such that $y^1, y^2 \sim \mathcal{N}(0,1)$. Then, we can estimate $\sigma^2_{y^*}$ by regressing y^1 on y^2 (e.g., Gillen et al., 2019):

$$\hat{\delta} = \frac{Cov(y^*_{it} + \eta^1_{it}, y^*_{it} + \eta^2_{it})}{Var(y^2_{it} + \eta^2_{it})} = \frac{Cov(y^*_{it}, y^*_{it})}{Var(y^2_{it} + \eta^2_{it})} = \frac{Var(y^*_{it})}{Var(y^2_{it} + \eta^2_{it})} = \sigma^2_{y^*}.$$

Under our maintained assumptions it must be the case that $\sigma^2_y = \sigma^2_{y^*} + \sigma^2_\eta$, and we get:

$$\sigma^2_\eta = \sigma^2_y - \sigma^2_{y^*} = 1 - \hat{\delta}.$$

I can implement this estimation strategy in my data for a subsample of children at age 10. In waves 2010–2013, GSOEP collected data on children's Big 5 personality traits from both parents of children in this age group. Thus, for these children we have two noisy measures of the same outcome allowing us to estimate σ^2_η in this subsample.

Table S.33 shows the results of this estimation. The estimated value of δ ($= 1 - \sigma^2_\eta$) is above 0.5 for all Big 5 personality traits except for Neuroticism. Furthermore, we can use these estimates to correct standard errors for measurement error in the dependent variable.

TABLE S.33 – Estimation of measurement error

	Big Five at age 10				
	Openness (1)	Conscientiousness (2)	Extraversion (3)	Agreeableness (4)	Neuroticism (5)
δ	0.621*** (0.026)	0.639*** (0.023)	0.580*** (0.027)	0.519*** (0.028)	0.493*** (0.027)
Controls	×	×	×	×	×
N	1,083	1,083	1,083	1,083	1,083
R^2	0.385	0.408	0.336	0.269	0.243
Outcome Mean	0.000	0.000	0.000	0.000	0.000
Outcome SD	1.000	1.000	1.000	1.000	1.000

Data: GSOEP.
Note: Own calculations. This table shows correlations of maternal and paternal reports on children's socio-emotional skills. All skill measures are standardized on the estimation sample. This sample differs from the core analysis sample: I do not restrict the sample to the availability of data on siblings and children's living environments. Furthermore, the sample is restricted to children with maternal and paternal reports of socio-emotional skills. Standard errors (in parentheses) are heteroskedasticity-robust. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Measurement error correction. I cluster standard errors at level g, i.e., the family-level in our baseline estimates. Therefore, the formula for the variance-covariance matrix reads as follows:

$$\hat{V}(\hat{\beta}) = \left(X'X\right)^{-1}\left(\sum_{g=1}^{G} X'_g \hat{\epsilon}_g \hat{\epsilon}'_g X_g\right)\left(X'X\right)^{-1},$$

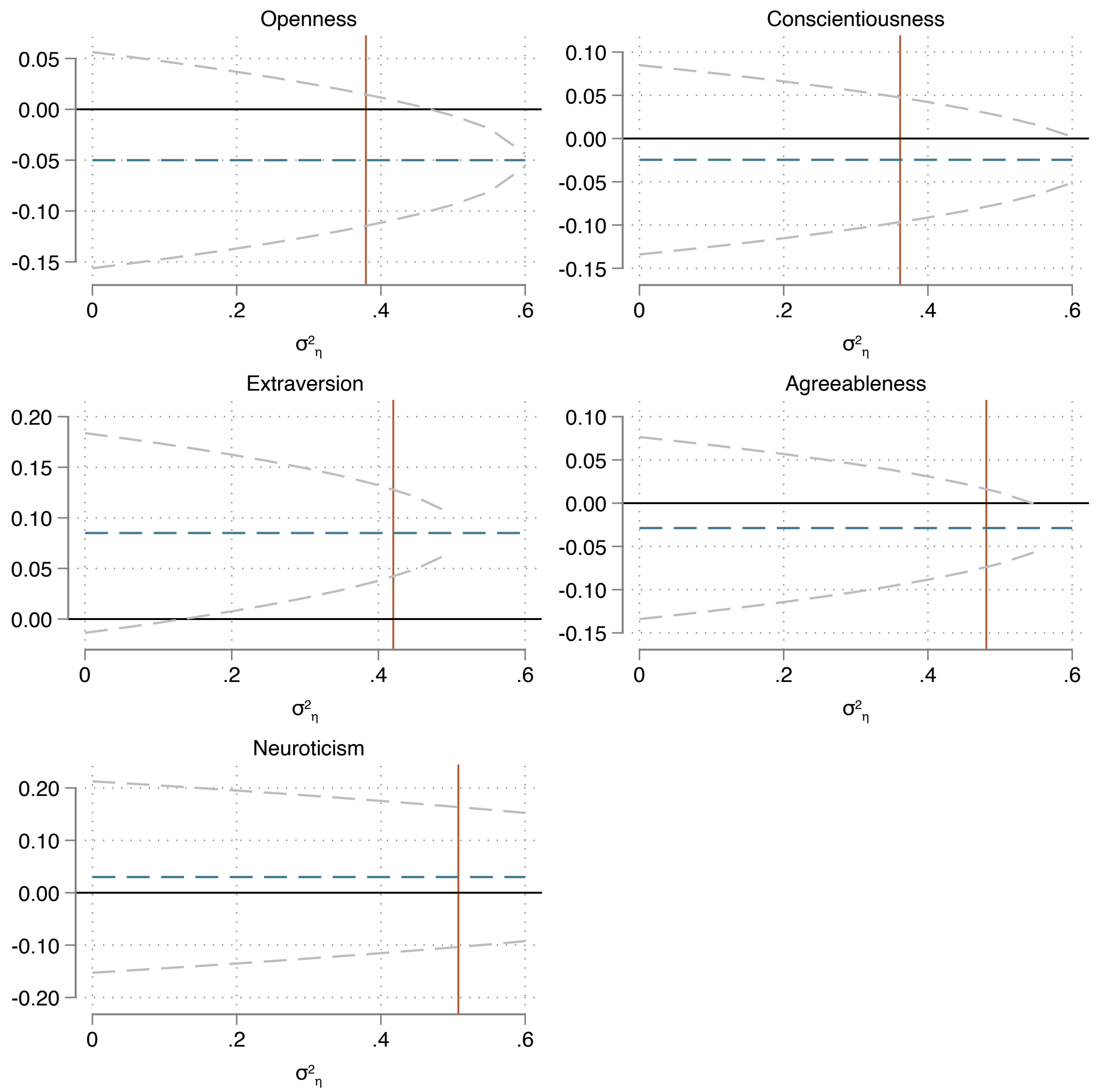
where, with a slight divergence from equation 3, we use X to represent the matrix of all independent variables.

Assuming that $\eta_g \eta'_g$ is invariant across clusters g, we can adjust $\hat{V}(\hat{\beta})$ for measurement error as follows:

$$\begin{aligned}\hat{V}^*(\hat{\beta}) &= \left(X'X\right)^{-1}\left(\sum_{g=1}^{G} X'_g\left(\hat{\epsilon}_g \hat{\epsilon}'_g - \sigma^2_\eta I_g\right) X_g\right)\left(X'X\right)^{-1}, \\ &= \hat{V}(\hat{\beta}) - \sigma^2_\eta \left(X'X\right)^{-1}\left(\sum_{g=1}^{G} X'_g X_g\right)\left(X'X\right)^{-1}.\end{aligned} \tag{5}$$

Figure S.11 shows the impact of this standard error correction for estimates of β^Δ in equation 3 under different assumptions about σ^2_η. A value of $\sigma^2_\eta = 0$ corresponds to the baseline estimates shown in Table 4. The vertical lines show estimates based on δ (see Table S.33). As expected, the

FIGURE S.11 – Robustness of standard errors to measurement error correction



Data: GSOEP, SIAB, MZ.
Note: Own calculations. This figure shows treatment effects (dashed horizontal lines) and 95% confidence bands (dashed gray lines) for a 10% decrease in the PWG under different assumptions about measurement error in the outcome variables. Standard errors are corrected using the formula shown in equation 5, where σ^2_η is taken over the interval $[0.00(0.05)0.60]$. $\sigma^2_\eta = 0$ replicates the baseline result shown in Table 4. Vertical lines show estimates of σ^2_η using concurrent reports of mothers and fathers on children's socio-emotional skills at age 10 (see Table S.33).

higher σ^2_η, the smaller standard errors and corresponding confidence intervals. However, there is no case in which the measurement error correction overturns our conclusions from Table 4, suggesting that the null result is not driven by inflated standard errors due to measurement error in the dependent variable.

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