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Parental support and diversity in sibling personality

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ABSTRACT

Personality is associated with important life outcomes such as occupational status, and there is continued interest in understanding how family processes shape people's character. Previous research has shown that despite being exposed to a common family environment, sibling personalities differ substantially. We test one explanation of this phenomenon: differential parental support within families. Fitting family fixed-effects models to data from the German Socio-economic Panel (SOEP), we find that, even within families, differences in parental support contribute to explain the personality of adolescent children. However, this association declines when children reach early adulthood. We interpret these results as demonstrating the importance of within-family factors for shaping personality, and how the influence of parent-child relationships varies over the life course.

1. Introduction

It might be intuitive to assume that most siblings are as alike as peas in a pod. However, past research shows substantial variation in sibling personality traits (Anger and Schnitzlein, 2017; Björklund and Jäntti, 2012; Grönqvist, Öckert, and Vlachos, 2017; Mazumder, 2008). Given the consistent association between personality traits for life outcomes such as mortality (Roberts et al. 2007), career success (Judge et al. 1999), education (Borghans, Meijers, and Ter Weel, 2008; Mammadov, 2022), and friendship (Laakasuo et al. 2017), we ask: why do personality traits vary between siblings?

Parents are generally viewed as crucial actors with significant influence on childhood personality formation (Conger, Martin, and Masarik, 2021; Smith and Skrbis 2017). We focus on the role of parental support, one of the most important parenting characteristics for child personality development (Aguiar, Álvarez, and Miller, 2021; Conger et al. 2021; Perez-Gramaje et al. 2019). Do variations in parental support between siblings account for variations in personality outcome?

We address this question using longitudinal data from the German Socio-economic Panel (SOEP) to examine one potential source of sibling variation in personality: differential parental treatment. The SOEP is a high-quality representative household panel survey which gives us an abundant source of sibling data, coming from the 1989 through 2001 birth cohorts, allowing us to apply a life course perspective by looking at

personality in two life phases: adolescence (mean age = 17.0, standard deviation = 0.04), and early adulthood (mean age = 19.4, standard deviation = 1.3).

Empirically, we contribute to the literature on sibling personality similarity by using variance decomposition techniques to show that there are very sizeable within-family differences in personality outcomes. Since sibling similarities can arise from several distinct theoretical processes (Lundberg, 2020), we then move to the main empirical focus of the paper: the association between support and sibling outcomes. To address unobserved confounding we compare standard OLS-estimated models to models with family fixed-effects (Härkönen, 2014). We find that the within-family effect of parental support on child personality (i.e. the fixed-effects estimate) is almost as large as the average effect in the general population (i.e. simple OLS estimate). Variation in parental support can hence drive substantial variation in sibling personality.

Taking a life-course perspective, the findings strongly suggest that the impact of parental support on personality wanes as children reach adulthood, as siblings also become more alike. Given the association of personality traits with later life outcomes, the findings have important implications for understanding within-family drivers of inequality.

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2. Personality: Big Five and locus of control

Personality is consistently associated with valued life outcomes such as educational achievement (Mammadov, 2022), mortality (Roberts et al. 2007), and social connectedness (Laakasuo et al. 2017). Many personality models exist, of which the Big Five personality model is “one of the most well researched, well regarded, and widely accepted theoretical frameworks” (Azucar, Marengo, and Settanni, 2018:151). The five personality traits in the Big Five model are: (1) “openness to experience”, meaning the willingness to have varied and novel experiences, and to be potentially changed by them (McCrae, 1993); (2) “conscientiousness”, meaning the tendency to be disciplined, responsible, and considerate (Roberts et al. 2007); (3) extraversion, meaning a propensity to seek social contact with others (Watson & Clark Lee, 1997); (4) agreeableness, the tendency to be likeable and harmonious in interpersonal relations (Graziano and Tobin 2009); and (5) emotional stability, meaning the tendency to be moderate and to remain calm in the face of difficulty (Hills and Argyle, 2001).

Because of the central role of the Big Five schema in personality research, we opt to make its constituent constructs the outcome variables in our study, alongside locus of control. Those with an “internal” locus of control tend to believe that they can exert control over the circumstances of their life, whereas those with an “external” locus of control tend to believe that the circumstances of their life are out of their control (Lefcourt, 1991).

As with locus of control, each of the Big Five personality constructs is a scale with opposing poles – e.g. the opposite of extraversion is introversion, the opposite of emotional stability is neuroticism. Moreover, each of these scales can be considered to have a generally more positive pole and a more negative pole – e.g. it is generally better to be conscientious (disciplined and considerate), than it is to be unconscientious (undisciplined and inconsiderate). Besides conscientiousness, it is conventionally considered better to be more open than not, more extroverted than not, more agreeable than not, more emotionally stable than not, and to have a more internal locus of control. At least, it is certainly the case that having more “positive” values on these traits is typically correlated with favourable life outcomes such as income, job prestige, educational attainment, and mental and physical health (Becker and Birkelbach, 2018; Humphries and Kosse, 2017; Judge et al. 1999; Soldz and Vaillant, 1999). Indeed, a large literature originating in economics treats these traits (inter alia) as “non-cognitive skills” – i.e. desirable personal attributes with positive associations with economic outcomes (Hoeschler, Balestra, and Backes-Gellner, 2018; West et al. 2016).

Of course, given the complexity of human psychology and its interaction with the social environment, blanket description of certain traits as positive or negative must be subject to substantial exceptions and qualifications. The precise benefits of certain personality traits depend on situation and social roles (Kröger, Palacios-Abad, and Radl, 2024). For example, while it is probably better to be agreeable than disagreeable in most cases, people who are too agreeable may be easy targets for exploitation in certain contexts. Nonetheless, the general and widely observed correlation between “positive” personality traits and important life outcomes should underline the importance of understanding how personality is shaped.

3. Parental investments, parental styles, and children’s personality

Parenting behaviour is widely understood to yield an important influence on children’s personality (Conger et al. 2021; Smith and Skrbis 2017). Despite exposure to a common environment, research has shown substantial within-family variation in personality (Anger and Schnitzlein, 2017; Björklund and Jäntti, 2012; Grönqvist et al. 2017). Empirically, this literature is rooted in variance decompositions to estimate the Intraclass Correlation Coefficient (ICC). Our first empirical

contribution is to run our own ICC analysis, incorporating a life course perspective by examining how sibling similarity varies between adolescence and early adulthood.

Our second empirical contribution is to investigate an important correlate of within-family variation in sibling personality outcomes. Specifically, we examine whether this variation is partly driven by differential parenting behaviour. Indeed, investigating the role of within-family variation is a powerful lens to study parenting behaviour’s effect on personality, because other consequential aspects of the shared environment (and common genetic inheritance) are held constant. We likewise bring a life course perspective by examining how this influence varies over the adolescent-to-adulthood transition.

The parenting literature typically identifies two fundamental dimensions underlying parenting behaviour – support and discipline (Baumrind, 1991; Foley and Radl, 2024; Liu and Lachman, 2019; Locke and Prinz, 2002). In this study we focus on parental support, because research has demonstrated that support has consistent (positive) effects on child behaviour and personality (Conger et al. 2021; Liu and Lachman, 2019; Perez-Gramaje et al. 2019), whereas the impact of discipline is often null, or negative, even when interacted with support (Lamborn et al. 1991; Liu and Lachman, 2019; Weiss and Schwarz, 1996).

Parental support can be conceptualized as having both a quantitative and a qualitative dimension; the first is related to the *amount* of investment into children, and the second is related to the *style* of parenting behaviour. Both perspectives have relevant implications for children’s personality.

First, from the quantitative perspective, parental support can be seen as a limited resource which parents must allocate between their children and their other daily activities, from work to leisure (Cobb-Clark, Salamanca, and Zhu, 2018). While parents can reassign time from other activities to child-rearing, there are natural limits to such reallocation. Hence, first-born children tend to benefit from greater parental investment (Booth and Kee, 2009; Conley and Glauber, 2006), since they have no siblings to share the spoils with. And, unsurprisingly, the number of siblings a child has tends to be negatively associated with the received parental investment (Downey, 2001; Öberg, 2017), such as the amount of “quality time” (Price and Kalil, 2019).

Quite simply, the more time parents spend with their children, the more supportive they can be. Parental time spent with children is associated with the cognitive and non-cognitive development of the child. For example, paternal time involvement was associated with an increased childhood cognitive ability (Cano, Perales, and Baxter, 2019); and maternal investment has been found to positively influence educational attainment (Cordero-Coma and Esping-Andersen 2018). Parental time investment is also associated with positive mental health outcomes in children: higher overall well-being (Milkie, Nomaguchi, and Denny, 2015), fewer depressive symptoms (Crouter et al. 2004), and less externalizing behaviour (Fomby and Musick, 2018). Hence, it can be expected to nurture more “positive” personality constellations (children who are more conscientious, more open, more emotionally stable, and so on).

Second, from the qualitative perspective, parental support can be conceived as a style of behaviour, encompassing different attributes of the parent-child relationship such as affection, responsiveness, and nurturance (Baumrind, 1991; Liu and Lachman, 2019; Locke and Prinz, 2002; Maccoby and Martin 1983). The social scientific literature on the relationship between parenting and personality traits mainly builds on the seminal work of Baumrind (1966) who distinguished parenting styles according to two underlying dimensions: parents’ responsiveness or support to their children and the demands or discipline they impose on their children. The well-known key finding is that the authoritative parenting style (which combines high support and high discipline) yields the best child development in terms of favourable personality traits and behaviour (Conger et al. 2021; López Turley, Desmond, and Bruch, 2010; Shucksmith, Hendry, and Glendinning, 1995; Weiss and Schwarz, 1996). Nonetheless, the permissive parenting style (high

support and low discipline) has also been shown to have positive effects on youth outcomes (García and Gracia, 2009; Perez-Gramaje et al. 2019). The consistent element across both authoritative and permissive styles is *high support*.

Hence, both in quantitative and qualitative terms, greater parental support is associated with more “positive” personality traits. This is intuitive. Parents presumably wish to “optimise” their child’s personality to improve their adjustment and future achievement (Lamborn et al. 1991; Weiss and Schwarz, 1996; Crouter et al. 2004), and the more resources they invest in supportive behaviour, the better they are able to accomplish these goals (Figueredo and Rushton, 2009). In brief, inculcating positive behaviour traits in children requires investment, and the more investment, the more likely the traits are to be inculcated. A parent who spends little time with their children, does not reward them for desired behaviour or boost their self-esteem is less likely to raise a child who is, e.g., a motivated worker (i.e. conscientious), resistant to setbacks and difficulties (i.e. emotionally stable), and confident that the circumstances of their life are under their own control (i.e. possessing an internal locus of control).

Yet supportive behaviour is costly, in terms of time, but also in terms of emotional or motivational resources. Parents may exhibit variation in supportive behaviour because of, for example, varying optimisation strategies: e.g. investing more in the high-potential child to maximise household resource attainment (Browne et al. 2018; Frijters et al. 2013), or investing more in the disadvantaged child to equalise children’s outcomes (Black, Devereux, and Salvanes, 2010; Del Bono, Ermisch, and Francesconi, 2012). Interestingly, even when parents try to invest strictly equal quantities support across children, this can lead to de facto inequalities in cumulative investment because first-borns will receive 100 % of their parents investment up till the birth of the second child, who will only receive half (Hertwig, Davis, and Sulloway, 2002; Price, 2008).

Whatever the reason, investigating variations in parental support is a natural way to study its importance for personality outcomes, net of other confounding factors shared within-families. Family fixed-effects models account for unobserved heterogeneity between families and allow for the estimation of the effect of within-family variation in support. Given the documented association between support and personality, we expect that *parental support is positively associated with children’s positive personality traits, even when comparing siblings within the same families (H1)*.

There is also the possibility of reverse causality – e.g. that parents invest more support in helping children with less positive personality traits, or that positive traits elicit a more caring response. We address this issue in more detail at the end of Section 5.2.

4. The impact of parental support across the life course

Personality traits have been shown to vary over the life course (Borghuis et al. 2017). The greatest stability in traits occurs in adulthood, with more variance observed in childhood, adolescence, and old age (Lucas and Donnellan, 2011; Specht, Egloff, and Schmukle, 2011). Different personality traits are also reported to follow different trajectories: openness and extraversion are positively correlated with age, agreeableness and conscientiousness are negatively correlated, whereas neuroticism remains flat (Lucas and Donnellan, 2011; Specht et al. 2011).

We focus on the crucial transition period from adolescence to early adulthood. It is at this stage of the life course that a person begins to become independent from their family origin and starts to form their personal identity (Arnett, 2000). Generally this period is characterized by maturation rather than radical change in personality, with personality settling into a more stable trajectory (Donnellan, Conger, and Burzette, 2007; Roberts et al. 2007). In early adulthood, the child’s relationship to their parent tends to weaken while they form new and significant relationships with friends, life partners, and mentors

(Hollstein, 2023). Hence, *the impact of parental behaviour on child personality is hypothesized to weaken in early adulthood compared to adolescence (H2)*.

5. Methods

5.1. Data and measures

We use data from version 36 of the German Socio-Economic Panel Study (SOEP). The SOEP is a household panel survey that started in 1984 and is representative of the German private household population. We use data from the years between 2006 and 2019. Our sample consists of individuals who have filled out the SOEP youth questionnaire at age 16–17 and of individuals who have filled out the regular personal questionnaire in early adulthood at age 18–29. By the virtue of the SOEP sampling procedure that tracks former members of SOEP households, young adults are observed even after leaving the parental home.

In the family fixed-effects models, we only include individuals with valid information on our independent variables and at least one of our dependent variables. Because of the nature of the family fixed-effects models we employ, in our analytic sample(s) we only include individuals with valid information on at least one sibling who has also filled out the youth or the personal questionnaire.

These restrictions give us analytic sample sizes varying between circa 2500 to 2900 siblings in circa 1200 households.¹ As a consequence of the data structure and sample restrictions, the individuals in the analytic sample belong to the 1989 through 2001 birth cohorts.

5.2. Dependent variables

5.2.1. Big Five personality dimensions

Each of the Big Five personality traits – conscientiousness, openness, agreeableness, emotional stability (opposite of neuroticism), and extraversion – is a dependent variable. The scales for conscientiousness, agreeableness, extraversion, and emotional stability are based on three items each, while the scale for openness is based on four items. We take the mean score across scales for each personality trait and then standardise. (See Appendix A for the subitems used in constructing the scales). The youth questionnaire included the Big Five item scale from the year 2006 onwards. In the individual questionnaire in adulthood, the Big Five were introduced in 2005 and collected again in 2009, 2012, 2013, 2017, and 2019. For our measures of Big Five in early adulthood, we take the first available observation of a person after completing the youth questionnaire, meaning that the early adults are young on average – they have a mean age of 19.5 years (SD = 1.3). In the adolescent sample, circa 99.8 % of the adolescents in our sample were aged 17 at the time of sampling.

5.2.2. Locus of control

The sixth personality trait that we study is locus of control, which is assessed in the SOEP through ten items. We created a single scale based on seven of the ten original items, as only these seven items could be reliably put into a one-dimensional scale, which we then standardized (see Appendix A for more details). Higher values on the scale relate to a stronger internal locus of control, while lower values represent a stronger external locus of control. The locus of control was introduced to the youth questionnaire of the SOEP in 2006. It was included in the adult questionnaire in 2005, 2010, 2015, and 2016. For our measure of locus of control in early adulthood, we likewise take the first available observation after the year the individual has completed their youth questionnaire.

¹ The adult locus of control sample is an outlier with N = 717

5.3. Independent variables

5.3.1. Parental support

Each child is asked in the youth questionnaire about how much parental support they receive (“How often do the following situations occur with your mother and father?”). This is done separately for mothers’ and fathers’ support. The scale consists of nine items with possible answers ranging from 1 (Very often) to 5 (Never). We exclude one item (“Do your parents bring up things that bother or worry you”), as in a principal component analysis, this item did not load on the same factor as the others (see Appendix B for more details). For the remaining eight items, we create a mean score of support for each parent. The wording of these items is given in Appendix B.

Age is not a control in the (age-homogenous) adolescent sample. Values of birth order run from 1 to 4 + , with 4 + indicating the participant was born fourth or later.

We then finalise the construction of the parental support variable by taking the highest of the maternal and paternal support (i.e. dominance criterion).² If the mother was rated as more supportive, parental support was set to the same value as maternal support; but if the father was rated as more supportive, parental support was set to the same value as paternal support. In case of missingness on one parent, the nonmissing parent’s support was used.

Since parental support is only measured in the youth questionnaire, this measure is used both for adolescents and for early adults. From one perspective this may fairly be considered a drawback of the data, leading to potential measurement error for the impact of support on early adulthood personality. This worry is mitigated to the extent that the mean age difference between samples is two-and-a-half years, hence there should be a high correlation in parental support across this span. Nonetheless, the issue may also be addressed by a more exact framing of the investigation: we examine the persistent impact of parental support during adolescence on personality from late adolescence to early adulthood. This question is theoretically relevant given that parental behaviour likely exerts a greater effect before children reach adulthood.

An additional issue is that our measure of parental support is derived from the child’s own reports. Previous research has shown only weak correlations between children’s and parents’ report of parental support (Grätz, Lang, and Diewald, 2022). Hence, if we were to have data on parent-reported support (which we don’t) the results of our study may vary. Nevertheless, we judge children’s reports to be of at least equal if not superior quality to parental reports. Firstly, parental reports are subject to social demand bias (Morsbach and Prinz, 2006). Children’s reports may be as well, but likely to a lesser extent – people are more willing to reveal flaws in others than in themselves. Secondly, our outcome variable concerns the children’s psyche, and hence we consider it superior to have a support measure that is more coloured by children’s perceptions than by adults’.

5.3.2. Further variables

Across all models, we control for the number of siblings an individual has, as well as his or her position in the birth order. We also include a dummy variable for the individual’s gender. In addition, we control for possible period effects by including the year of the survey. To investigate the role of possible moderators, in a supplementary analysis we include interaction effects of parental support and birth order and gender (see Appendix F).

² The rationale for the dominance criterion was to have consistency across single and dual parent households. Single parents are usually mothers, and mothers are generally rated as more supportive in our data. Taking the mean across households with a mother and father would then lead to the child with both parents being scored as having less support. As shown in appendix E, results are nearly identical when constructing parental support as the mean of maternal and paternal support, rather than using the dominance criterion.

Descriptive statistics for the dependent variables, independent variables, and most of the control variables are given in Table 1, for the youth and adult analytic samples. There is a substantive if minor level of attrition, of around 10 %, going from the adolescent to the early adult samples.

5.4. Analytical approach

5.4.1. Estimating within-family variation in personality

We begin our analysis by demonstrating how much variation moderator there is between siblings within the same family. This motivates the exploration – in the family fixed-effects model – of parental support as a main driver of within-family differences. The first step of our analysis is the estimation of a basic multilevel model with siblings as the first level and households as the second level (see Eq. 1).

$$y_{hs} = \alpha + X_{hs}\beta + u_h + \varepsilon_{hs} \quad (1)$$

In Eq. 1, the index h stands for household and s for a sibling. y_{hs} is the outcome (personality item). The constant α is the overall average (grand mean) of the personality measure. X_{hs} is a vector of controls: dummy variables for survey year and SOEP sample. u_h is a random intercept at the household level describing the average deviation of the household from the grand mean, α . ε_{hs} is a random error term representing the deviation of individual siblings from their household average. The total variance of the dependent variable (net of the correlation with the control vector X) can be decomposed into two parts corresponding to the two random components of the model:

$$\sigma_y^2 = \sigma_u^2 + \sigma_\varepsilon^2 \quad (2)$$

From Eq. 2 it follows that the total variance in personality is the sum of the variance between households (i.e. the variance of u_h) and the variation between siblings within households (i.e. the variation of ε_{hs}). From this multi-level model, we then calculate ρ , the intraclass correlation (ICC) for each of the six personality traits. The intraclass correlation tells us how strong the correlation in personality is between level-one units (i.e. siblings) within the level-two clusters (i.e. households). More precisely, the ICC represents the ratio of household variance in the outcome (σ_u^2) to the sum of household variance and sibling variance ($\sigma_u^2 + \sigma_\varepsilon^2$).

Table 1
Descriptive statistics for adolescent and early adult analytic samples.

Variable	Adolescent			Early adult		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Conscientiousness	2852	−0.02	0.98	2552	−0.15	0.99
Openness	2852	−0.02	0.97	2552	−0.1	0.91
Agreeableness	2852	−0.02	0.99	2552	−0.02	1
Emotional stability	2852	−0.02	0.97	2552	−0.01	0.99
Extraversion	2852	−0.03	0.99	2552	−0.06	1.02
Locus of control	2852	0.06	0.87	2552	−0.15	0.99
Parental support	2852	0.36	0.78	1582	−0.02	1.02
Male	2852	0.5	0.5	2552	0.5	0.5
Number of siblings	2852	3.21	1.35	2552	3.14	1.34
Birth order	2852	1.93	0.89	2552	1.95	0.91
Survey year	2852	2012.85	3.26	2552	2012.68	5.02
Age	2852	17	0.04	2552	19.39	1.33

Notes: For the adolescent sample, the statistics are given for all observations which have zero missingness across all variables in the table. For the early adult sample, the statistics are given for all observations which have zero missingness across all variables *except locus of control*. This is because locus of control was generally asked in a different year to the Big Five. The statistics for locus of control are given for all observations that are nonmissing on locus of control and on the other variables except for the Big Five.

$$\rho = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_e^2} \quad (3)$$

The ICC is bounded by 0 and 1. An ICC of 1 in personality would mean that all the variation is due to differences between households. An ICC of 0 on the other hand would mean that all the variation is due to differences between siblings within households. Hence, the lower the ICC, the greater the within-family difference in personality. In Appendix I we perform the same exercise for parental support, decomposing variance into between- and within-family components.

5.4.2. Estimating within-family effect of parental support on personality

In next step of our analysis, we test the two hypotheses stated above by estimating family fixed-effects models. Methodologically, this has the advantage of adjusting for any unobserved common factors determining sibling personality, reducing the distorting effect of confounders. Substantively, family fixed-effects models examine the *within-family* effect of parental support. This allows us to test whether parental support is a substantial driver of within-family variation in personality.

The family fixed-effects model is specified in Eq. 4. Family-level fixed-effects do not control for factors that vary within families and which could also lie on the causal path between support and personality outcomes. Hence we control for the vector of factors X_{hs} already specified in Section 5.1 (such as birth order position, number of siblings, the individual's gender and the year of the survey).

$$y_{hs} = \alpha + X_{hs}\beta + u_h + \varepsilon_{hs} \quad (4)$$

For purposes of comparison, we also estimate Eq. 4 without the fixed-effects (we refer to this as the “simple” model). The simple model is estimated on the same analytic sample as the fixed-effects model – i.e. the circa 2800 siblings in 1200 households. Comparison with the simple model gives us an approximate benchmark for the confounding introduced by correlation between parental support and siblings' shared environment. As a rough heuristic, if the attenuation is small we can interpret this as potential evidence that confounding due to shared environment is low, and that parental support is generally a relatively important contributor to the household influence on personal outcomes. Furthermore, the simple models can be used as a benchmark comparison with cross-sectional studies examining the effect of parenting on personality outcomes.

We estimate our simple and family fixed-effects regression models for respondents in two life-course stages: adolescence and early adulthood. To test whether the effect of support on personality traits is statistically significantly different between adolescence and adulthood, we implement the procedure presented in Clogg, Petkova and Haritou (1995) for comparing coefficients from different models.

5.4.3. Endogeneity

Before proceeding we should flag the important question of endogeneity. The fixed effects models can account for confounding with factors shared between siblings, but that is, of course, insufficient to allow causal identification. The main barrier to identification is reverse causality – i.e. that child personality may affect their parents' parenting behaviour (deHaan et al. 2021; Haan, Dekovic, and Prinzie, 2012). This issue is particularly pertinent for family fixed effects designs where the independent variable is a family-level factor (Engzell and Hällsten, 2024).

How such endogeneity might affect the quantity of interest in our analysis – the coefficient for a regression of child personality on parental support – depends on what sign we might assume this endogenous relationship to take. Reinforcement theories would predict that parents decide to invest in the better-endowed child (Frijters et al. 2013), i.e. the one which already has more positive traits. This would entail a positive causal influence of child personality on support, which would inflate our quantity of interest. Compensation theories, on the other hand, would predict that parents equalise differences between their children (Fan and

Porter, 2020), hence investing more in the child which is struggling to develop positive personality traits. This would entail a negative causal influence of child personality on support, which would deflate our quantity of interest.

To anticipate our results, we find there to be a positive, substantive, and statistically significant association between parental support and personality traits across all six outcomes for adolescents. (The estimates remain positive, though mainly statistically insignificant, for early adults). Could this finding be explained by reverse causality? Given the positive sign, endogeneity would have to derive from a reinforcement mechanism. Of recent studies which claim to identify exogenous impact of child endowment on parental support, there appears to be roughly equivalent support for both compensation (Fan and Porter, 2020; Halla and Zweimüller 2014; Leight, 2017; Wu, Lin, and Han, 2023) and reinforcement behaviour (Adhvaryu & Nyshadham, 2016; Dizon-Ross, 2019; Frijters, Islam, & Pakrashi, 2019; García-Sierra, 2024; Wu, Yang, Kim, Hyung, & Yue, 2023), with other papers finding mixed (Ayalew, 2005) or null evidence (Beshir and Maystadt, 2020; Fink, Venkataramani, and Zanolini, 2021). Of particular note is the study by Fan and Porter (2020) which uses a family fixed-effects design (as well as plausibly exogenous variation in child endowment) and finds that compensation dominates reinforcement. Therefore, on the balance of current evidence, there is not a strong rationale to assume that reinforcement dominates compensation in our data – it is just as likely that our estimated effects might be downwardly biased.

Whatever the sign of the bias (if there is one), it is hard to fathom – given common sense and the wealth of literature discussed above – that the true effect of parental support should be zero or negligible. Moreover, the supposition that our results are mainly explained by reverse causality due to reinforcing behaviour is theoretically implausible, since it supposes that parents engage in reinforcing behaviour and yet those parenting investments are entirely wasted (due to the presumably negligible true effect of parental support). Overall, while we cannot rule it out, we do not believe our estimates to be strongly affected by endogeneity.

6. Results

6.1. Within-household variation in sibling personality traits

In the first step of our analysis, we estimate sibling similarity in personality for both adolescence and early adulthood. We do this by estimating the intraclass correlation (ICC) between siblings within households; a higher ICC ($\in [0, 1]$) means greater similarity.

We begin with the analysis of sibling similarity in personality. Fig. 1 graphically presents the ICC for the six personality traits we examine (Big Five plus locus of control), with 95 % confidence intervals. The solid blue squares represent the ICC for siblings during adolescence and the empty green circles represent early adulthood. The adolescent ICC ranges between a low of 0.08 (for agreeableness, extraversion, and emotional stability), and a high of 0.15 for openness. Thus, only a small portion (between 8 and 15 percent) of sibling adolescence personality is attributable to shared family origin. Even if we consider that random measurement error might bias these estimates downwards, the siblings in our sample are a lot less similar than might be assumed, given their common family and broader social environment. However, sibling similarity in all six traits rises in early adulthood. Conscientiousness exhibits the join highest similarity, with an ICC equal to 0.21. In contrast, extraversion and agreeableness exhibit the lowest similarity in early adulthood (ICC = 0.11). For robustness we estimate these ICCs using bootstrapped standard errors, with very similar results (see Appendix I). We also provide, in Appendix I, the ICCs for our independent variable, parental support.

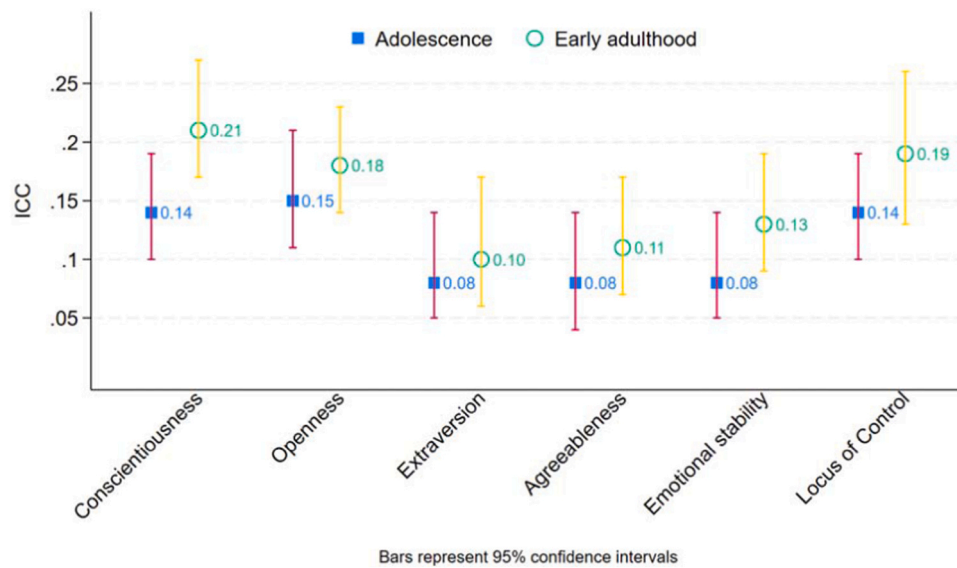
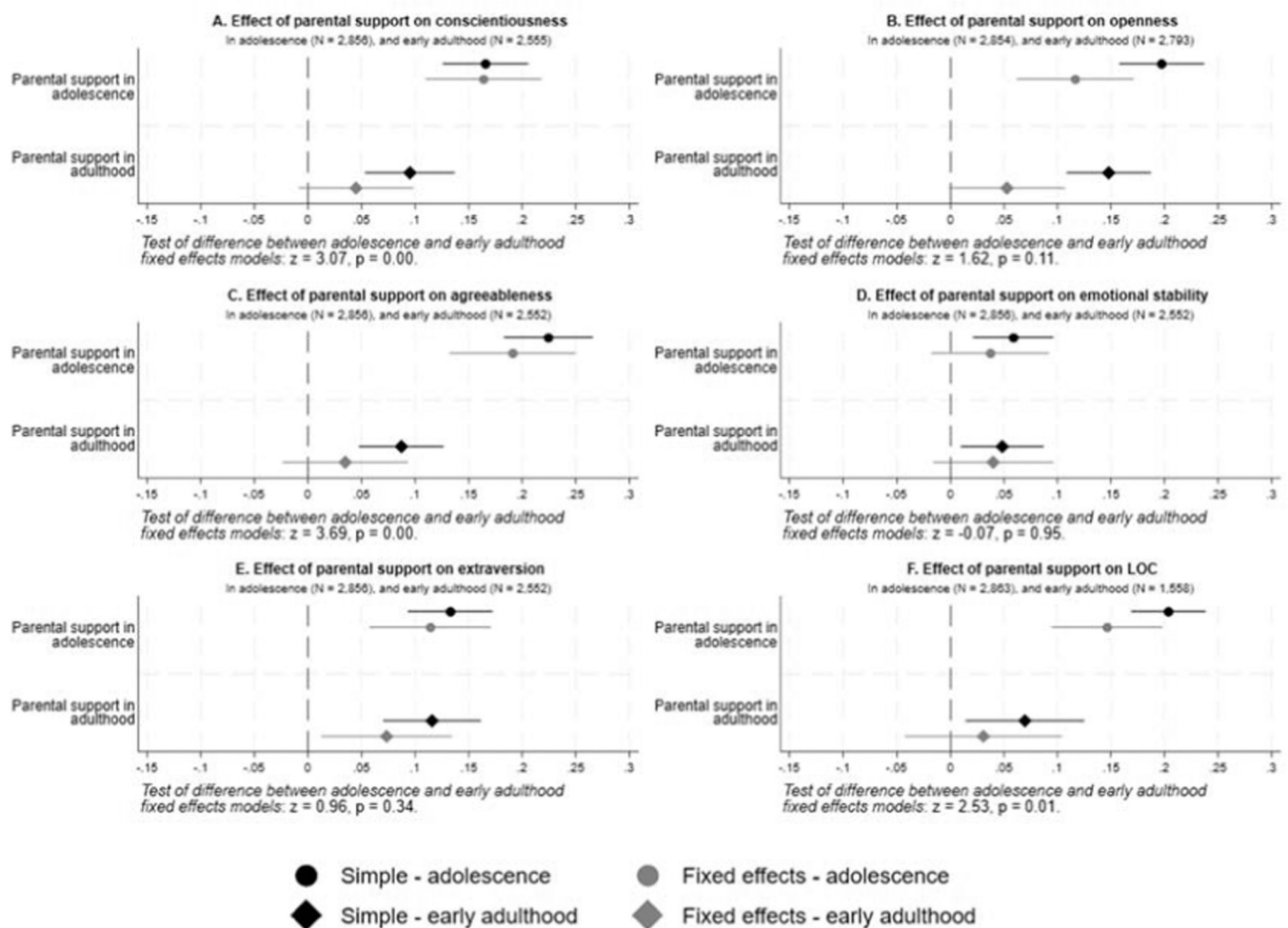


Fig. 1. Sibling similarity in personality traits in adolescence and early adulthood, intraclass correlation coefficients.



Controls = gender, number of siblings, sibling position, survey year, and age. (Age control in adult sample only).
Horizontal bars represent 95% confidence intervals.

Fig. 2. Estimated effects of parental support on personality traits in adolescence and early adulthood (simple and family fixed-effects models).

6.2. Parental support and personality

Next we estimate family fixed-effects models to study the within-family relationship between parental support and personality. We also estimate “simple” models without family fixed-effects for comparison. Models are estimated with least squares. Separate models are run for the adolescent and early adulthood life course periods. Coefficients for parental support are presented in Fig. 2, with the bars representing 95 % confidence intervals. The full regression tables (including the control variables) are presented in Appendix C.

As Fig. 2 shows, parental support is positively associated with personality, net of other observables. For the simple models (no fixed-effects) the association is statistically significant for all personality traits, and across adolescence and early adulthood. Once family fixed-effects are introduced, the coefficients naturally attenuate somewhat, becoming statistically insignificant at the 0.05 level in early adulthood for all traits except extraversion, with the coefficients on conscientiousness and openness significant at the 0.1 level.

Notwithstanding the greater uncertainty of the estimates, the overall effect of parental support on personality remains positive throughout. While the coefficients generally attenuate in the fixed-effects models compared to the simple models, they generally don't shrink by a large magnitude. Confidence intervals overlap between the simple and fixed-effects models and, in one case (conscientiousness in adolescence), there is no attenuation at all. Hence, the data largely offer support for Hypothesis 1, which stated that the within-family association between support and personality should be positive.

Nonetheless, looking at within-family effects of parental support through the fixed-effects models, there is a substantive difference between adolescence and early adulthood: the median point estimate (across the six traits) for age 16–17 is about 0.155, whereas for age 18–29 it is about 0.045. The shrinking of the point estimates for early adulthood provides suggestive support for Hypothesis 2: the effect of parental support visibly attenuates in early adulthood. In order to ascertain whether the difference in point estimates between age periods really is statistically significant, we implement a simple differences in means test (Clogg et al. 1995:1276; Gelman and Stern, 2006:328):

$$z = \frac{\beta_{\text{adolescent}} - \beta_{\text{adult}}}{\sqrt{(SE_{\text{adolescent}}^2 + SE_{\text{adult}}^2)}}$$

This is equivalent to pooling both models and including an interaction between age period and parental support – but by running separate models we can have a larger sample for the adolescent model. The z-statistic and p-values from this test are given in the notes beneath each plot in Fig. 2, for the fixed effect models. For three of the six traits (conscientiousness, agreeableness, and locus of control), the difference is statistically significantly at the conventional 95 % confidence level. For the remaining three (openness, extraversion, and emotional stability), it is not. Hence, we find qualified support for Hypothesis 2 postulating a weakening impact of parental support over a youth's life course.

6.3. Further analyses

In further analyses, we distinguish between maternal and paternal support. As shown in Appendix D, the patterns of maternal and paternal support look remarkably similar both to each other, and to the main results. Appendix E replicates the main analysis with a parental support variable constructed as the mean of paternal and maternal support (rather than the dominance criterion), with essentially identical results.

We also look at possible moderating effects of parent and child characteristics on the support-personality relationship. Namely, we investigate birth order, and gender. The results of this moderation analysis are presented in Appendix F. We do not find any evidence that birth order moderates parental support. While surprising given the large literature on birth order, this result is consistent with work using registry

data providing “definitive evidence that birth order has little or no substantive relation to personality trait development” (Damian and Roberts, 2015:14120). However, we do find a negative moderating effect of male gender for emotional stability and extraversion in adults, and a positive moderating effect of male gender for locus of control in adults. These results would appear to demonstrate a delayed interaction of parental support with child gender for some personality traits.

Roughly 40 % of adult participants in our analytic sample had multiple observations of their personality – i.e. they answered surveys about their personality in more than one year. Because more than half of observed adults had only one observation, we judged it best in the main analysis to use only one observation per participant – i.e. the earliest one. However, in Appendix G we report variations on the “main analysis” (i.e. the one presented here in Section 6.2) incorporating multiple observations per adult where available. Specifically, we report three analyses: (i) the main analysis for early adults, incorporating multiple observations (i.e. greater N than main analysis); (ii) the main analysis for early adults, incorporating multiple observations, with support interacted with age (to measure a potential “decay” effect); and (iii) the main analysis for early adults, with a single observation per participant comprising the average value across all observations (i.e. same N as main analysis). Substantively speaking, the pattern of effect sizes is very similar. Given the greater N in analysis (i), we do observe smaller confidence intervals and hence more statistically significant results; the opposite occurs in analysis (iii). The age-support interactions in analysis (ii) are negligible. In sum, the results remain very similar when we incorporate multiple observations into the analysis.

Finally, we analyse only siblings in the main analysis, excluding only children. However, in Appendix H we replicate the main analysis on a sample of all youths, not just those who have siblings (in the data). The results are very similar to those of the main analysis.

7. Discussion

7.1. Summary

In this paper we ask, do variations in parental support between siblings account for variations in personality outcome? To address this question, we make use of the German Socio-Economic Panel Study (SOEP), a high-quality representative household panel survey. The presence of multiple siblings per family permits us to implement family fixed-effects models, which reduce the distortive effect of confounders (Härkönen, 2014), and bring our estimates closer than most of the available (primarily psychological) research to the actual effects of parenting on personality.

We begin by estimating intraclass correlation coefficients (ICCs) for sibling personality, which reveal how much of the variation is a result of shared family factors. High ICCs for personality would imply that exposure to shared family environments makes siblings highly similar in personality. But as it turns out, our estimated ICCs for sibling personality are surprisingly low: a cross-trait median value of 0.110 for adolescents, rising to 0.135 for early adults. More than 85 % of variation in parental support is within-families (albeit, it should be acknowledged that ICCs generally represent a lower bound for this quantity (Anger and Schnitzlein, 2017)).

The substantial variation in sibling personality motivates our deeper-going analyses. We run two types of models on our sample of siblings: “simple” models estimated with OLS to gauge average population-level differences, and fixed-effects models which include family dummies to account for exposure of siblings to shared family environments. Both our dependent variables and our independent variable, parental support, are z-standardised. We find that there is a generally positive association between parental support and personality traits. (Traits are coded so that the higher values are the ones typically associated with more positive life outcomes). The median effect size for adolescents is 0.185 for the simple model, and 0.135 for the fixed-effects models (a decline of

33 % in magnitude). The median effect size for early adults is 0.095 for the simple model, and 0.040 for the fixed-effects models (a decline of 58 % in magnitude).

Hence, the positive association in adolescence mostly holds even for the fixed-effects models, suggesting that within-family variation in support indeed moulds personality traits, as theoretically suggested. However, while remaining positive, in the case of early adulthood, the estimated effect for the fixed-effects models is only statistically significant at the 0.05 level for one of the six personality traits, and the coefficients are small, between 0.04 and 0.07.

The decline in influence of parental support could reflect measurement error, since our measure of support is taken for adolescence only. But if substantive, it would suggest that despite the obvious importance of parents, their influence on personality is not so far-reaching. Young people may change a lot when they leave the nest. Hence, while personality is important for life outcomes such as mortality (Roberts et al. 2007) and career success (Judge et al. 1999), the indirect role of parenthood through personality on these outcomes may be limited. On the other hand, parenting strategy would seem to affect personality-related outcomes realised in adolescence such as education (Borghans et al. 2008; Mammadov, 2022).

7.2. Implications for theory and future research

Although it may not constitute common knowledge, the results indicating overwhelming sibling dissimilarity are in line with the general qualitative conclusion of previous research – that most variation in personality takes place within families. However, in quantitative terms our estimates are on the lower end – we find that shared environmental factors explain about 12 percent of variation in sibling personality. An earlier study by Anger and Schnitzlein (2017), also using the SOEP, found that shared family background accounted for between 22 and 46 percent of variation in personality traits (Big Five and locus of control, plus positive and negative reciprocity). The divergence in results may be due to the smaller sample of siblings and shorter follow-up used by Anger and Schnitzlein, who also do not observe adolescents. Likewise, using registry data from tests taken, at about 18 years old, for compulsory Swedish military service, Björklund and Jäntti (2012) and Grönqvist, Öckert, and Vlachos (2017) find that shared background accounts for about 32–36 percent of variation in personality traits – roughly in the middle of Anger and Schnitzlein's estimates of sibling similarity. Again, a relevant aspect is that these latter two papers, use a sample of brothers only – which leads to greater similarity than samples of mixed-gender siblings. More in line with our research are the findings of Mazumder (2008), who found an ICC of 0.09 for locus of control. Hence, we can conclude that our results are at the lower end of findings in the field – while contributing to an emerging expert consensus around substantial within-family variations in personality.

The results for our main analysis seem to be generally in line with past research on the association between parental support and personality traits. In a recent meta-analysis, Tehrani et al. (2024) find that the aggregate correlation between parental support and Big Five traits ranged between 0.01 and 0.23, depending on whether support is combined with high or low discipline. These statistics are Pearson correlations (corrected for meta-analysis), whereas our analyses present coefficients from regression models. However, since our independent and dependent variables were standardized, both are largely commensurate, with the crucial difference that our estimates are adjusted with control variables, and that the fixed-effects models account for sample selection. Our median estimates are well within the range identified in the meta-analysis.

One aspect to note is that the differentiating effect of varying parental support seems to dwindle as teenagers reach adulthood. It is possible that this result is a statistical artefact – since parental support was only measured in teenage years. Nonetheless, it is also substantively plausible that the effect of parents on their children's personality

diminishes as the latter reach adulthood, and the tight parent-child bond slackens somewhat. Of note is that individuals develop at different rates, depending on other life course factors. For example, some individuals will directly enter the labour force after school, while others will continue to higher education. These different paths may manifest in different maturation rates – e.g. those who begin work may become conscientious faster. Since siblings tend to share social trajectories, the effect of common destination on personality may come to dominate.

On a broader level, how does this study help us understand why humans who develop in similar settings end up being quite different to each other? Why would the same parent treat their children differently? In Appendix F we considered the role of factors such as birth order and gender. We did not find evidence for birth order, as a moderator of parental support. However, given the importance of birth order in the literature, it is possible that our null finding results from a lack of statistical power. Gender does, in some cases, appear to have a delayed moderating effect which inconsistently manifests in early adulthood.

The study presented here opens up several avenues for future research, by following up implications as well as addressing limitations. First, while the fixed-effects approach used here likely shunts the estimates closer to the true “causal” effect, it does not push our design past the threshold to true causality. One significant issue is endogeneity. As discussed in greater detail in Section 5.2, there is not a strong rationale to believe that our findings are mainly or entirely due to reverse causality – i.e. parents lavishing more support on children with more positive personality traits. Nonetheless, it is obviously desirable to implement more causally secure designs which could seek to combine family fixed-effects with exogenous variation in parental support.

Second, in our study parental support is a child-reported variable and hence subject to biases. For instance, children's own personality may affect how they perceive parental behaviour. A more agreeable child may rate their parents as more supportive than a less agreeable one, *ceteris paribus*. Indeed, Gozu and Newman (2020) find that sibling personality differences affect their perception of parenting fairness. Parents' self-reported support would be subject to its own sources of bias, but future work could seek to incorporate some behavioural or other-reported measure of parental support.

Third, family fixed-effects models do not account for environmental factors which, due to period or stochastic or other such factors, may vary between siblings. Hence, sibling correlation measures represent a lower bound for shared environmental effects (Björklund and Jäntti, 2012). Future studies which incorporated measures of significant environmental factors would increase the precision of the findings presented here.

Fourth, we measure personality using the Big Five and Locus of Control. While the Big Five is one of (if not the most) widely respected personality paradigm (Azucar et al. 2018), it is ultimately only one way to view the complex system that is the human personality. Several criticisms of the Big Five paradigm have been raised, including that it provides a too-static model of personality, that its construct validity is limited to educated populations, and that the question of human personality structure is more properly a metaphysical than a statistical one (Block, 2001; Boyle, 2008). We would argue that the consistent association across factors is evidence that the relationship between parental support and personality is general, and does not just coincide with the six traits examined here. Nonetheless, future research can address this question by examining other outcomes such as grit or self-esteem to more fully understand how parental behavior shapes children's personality.

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CRediT authorship contribution statement

William Foley: Writing – review & editing, Visualization, Methodology, Investigation, Data curation. **Lea Katharina Kröger:** Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **Jonas Radl:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization.

Declaration of Conflict of Interest

The authors have nothing to declare.

Appendix

A Construction of personality scales

The personality scales are constructed by taking the mean across subitems and standardising. For each subitem, respondents answered whether some statement (e.g. “I’m someone who works thoroughly”) applied to them, on a seven point scale from 1 “Absolutely does not apply” to 7 “Fully applies”. Below we detail the subitems used. The statement is given in English and, following the slash, in German. The variable name is given in square brackets, with the variable name for adolescents given first and the variable name for adults given after (e.g. [jl0365, plh0212], where the jl prefix indicates adolescent and the plh prefix indicates adult). It is also indicated whether the variable was reversed for scale construction (e.g. [jl0371, plh0218, reversed]). Note that the wording may vary slightly between surveys and between adolescents and adults.

A1 Big 5

Conscientiousness

The scale for conscientiousness was constructed using the following items:

1. I’m someone who works thoroughly. / Ich bin jemand, der gründlich arbeitet. [jl0365, plh0212]
2. I’m someone who’s a bit lazy. / Ich bin jemand, der eher faul ist. [jl0371, plh0218, reversed]
3. I’m someone who completes tasks effectively and efficiently. / Ich bin jemand, der Aufgaben wirksam und effizient erledigt. [jl0375, plh0222]

Openness

The scale for openness was constructed using the following items:

1. I’m someone who’s original, who brings new ideas to the table. / Ich bin jemand, der originell ist, neue Ideen einbringt. [jl0368, plh0215]
2. I’m someone who appreciates artistic, aesthetic experiences – this means I like to draw or paint, play music or go to museums or the theatre. / Ich bin jemand, der künstlerische, ästhetische Erfahrungen schätzt; das heißt, ich male gerne oder mache Musik, gehe gerne ins Theater oder ins Museum. [jl0373, plh0220]
3. I’m someone who has a lively imagination and ideas – this means that I like to dream and can imagine things well. / Ich bin jemand, der eine lebhaft Phantasie, Vorstellungen hat; das heißt, ich kann mir gut Dinge vorstellen und träume gern. [jl0378, plh0225]
4. I’m someone who has a thirst for knowledge. / Ich bin jemand, der wissbegierig ist. [jl0380, plh0255]

Agreeableness

The scale for agreeableness was constructed using the following items:

1. I’m someone who’s sometimes a bit rough towards others. / Ich bin jemand, der manchmal etwas grob zu anderen ist. [jl0367, plh0214, reversed]
2. I’m someone who’s able to forgive – meaning that I accept apologies quickly. / Ich bin jemand, der verzeihen kann; das heißt, ich nehme Entschuldigungen schnell an. [jl0370, plh0217]
3. I’m someone who treats others considerately and in a friendly manner. / Ich bin jemand, der rücksichtsvoll und freundlich mit anderen umgeht. [jl0377, plh0224]

Emotional stability

The scale for emotional stability was constructed using the following items:

1. I’m someone who often worries. / Ich bin jemand, der sich oft Sorgen macht. [jl0369, plh0216, reversed]
2. I’m someone who gets nervous easily. / Ich bin jemand, der leicht nervös wird. [jl0374, plh0221, reversed]
3. I’m someone who is relaxed and can cope well with stress. / Ich bin jemand, der entspannt ist, mit Stress gut umgehen kann. [jl0379, plh0226]

Extraversion

The scale for extraversion was constructed using the following items:

1. I’m someone who’s communicative and chatty. / Ich bin jemand, der kommunikativ und gesprächig ist. [jl0366, plh0213]

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2. I'm someone who is capable of being outgoing, I'm sociable. / Ich bin jemand, der aus sich herausgehen kann, gesellig ist. [jl0372, plh0219]
 3. I'm someone who's reserved. / Ich bin jemand, der zurückhaltend ist. [jl0376, plh0223, reversed]

A2 Locus of control

The SOEP questionnaire includes ten Locus of Control items, which may be combined into a single scale. However, we opted to exclude three of these items on the grounds that they could not be placed on a reliable scale alongside the other seven.

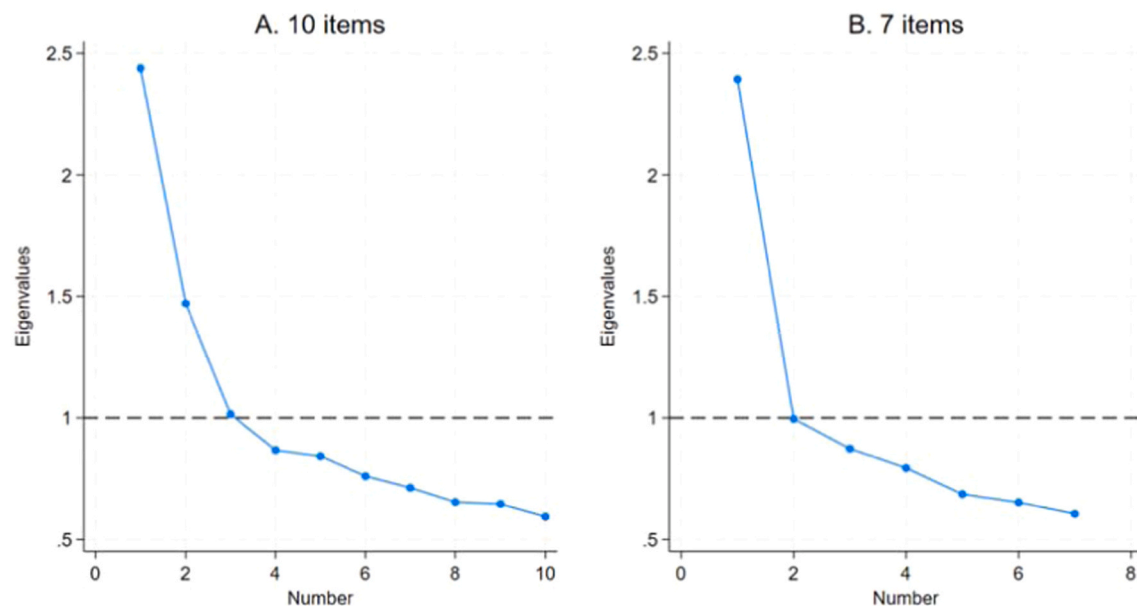
The ten items given in the SOEP are given as follows, with raw variable names in square brackets.

1. How my life goes depends on me. / Wie mein Leben verläuft, hängt von mir selbst ab. [jl0350_v1, plh0379_v2]
2. Compared to other people, I have not achieved what I deserve / Im Vergleich mit anderen habe ich nicht das erreicht, was ich verdient habe. [jl0351_v2, plh0378, reversed]
3. What a person achieves in life is above all a question of fate or luck / Was man im Leben erreicht, ist in erster Linie eine Frage von Schicksal oder Glück. [jl0352_v2, plh0380_v2, reversed]
4. If a person is socially or politically active, he/she can have an effect on social conditions / Wenn man sich sozial oder politisch engagiert, kann man die sozialen Verhältnisse beeinflussen. [jl0359_v2]
5. I frequently have the experience that other people have a controlling influence over my life / Ich mache häufig die Erfahrung, dass andere über mein Leben bestimmen. [jl0353_v2, plh0386_v2, reversed]
6. One has to work hard in order to succeed / Erfolg muss man sich hart erarbeiten. [jl0354_v2, plh0382_v2]
7. If I run up against difficulties in life, I often doubt my own abilities / Wenn ich im Leben auf Schwierigkeiten stoße, zweifle ich oft an meinen Fähigkeiten. [jl0355_v1, plh0383_v2, reversed]
8. The opportunities that I have in life are determined by the social conditions / Welche Möglichkeiten ich im Leben habe, wird von den sozialen Umständen bestimmt. [jl0356_v2, plh0384_v2, reversed]
9. Innate abilities are more important than any efforts one can make / Wichtiger als alle Anstrengungen sind die Fähigkeiten, die man mitbringt. [jl0357_v2, plh0385_v2]
10. I have little control over the things that happen in my life (Ich habe wenig Kontrolle über die Dinge, die in meinem Leben passieren). [jl0358_v2, plh0381_v2, reversed]

Each item was asked on a seven-point scale, running from 1 (Not at all / Stimme überhaupt nicht zu) to 7 (Absolutely / Stimme voll zu).

Items 4, 6, and 9 were excluded in the construction of our scale. All items used in the scale, except item 1, were reverse-coded. Items 4, 6, and 9 were excluded from the scale because, on a qualitative level, they do not closely adhere to the core aspect of locus of control: whether an individual believes they have control over their life, or whether their life is controlled by external circumstances.

Moreover, a principal component analysis reveals that the three excluded items load onto a different factor. Figure A2.1 plots the eigenvalues for a factor analysis for the full 10 items (panel A) and the restricted 7 items (panel B). When the principal component analysis is run in the 10 item case, three factors are identified (i.e. three items above the threshold of unity). When the analysis is run in the 7 item case, only one eigenvalue passes the threshold (though a second lies just below). Table A2.1 reports the rotated factor loadings for the 10 item and 7 item cases. As can be seen, for the 10 item case the loadings on factor 1 for the three excluded items are very close to zero for item 4 and 6, and negative in sign for item 9.



Plot of eigenvalues from a principal factor analysis, for (A) all 10 LOC items given in the SOEP, and (B) the 7 items used to construct the LOC scale in our analysis

Figure A2.1. Scree plot of eigenvalues for the full 10 and restricted 7 LOC items

Table A2

1 Rotated factor loadings for the full 10 locus of control items, and the restricted 7 items included in the final scale used in the analysis

Item	10 items			7 items
	Factor 1	Factor 2	Factor 3	Factor 1
1	0.25	0.69	−0.02	0.30
2	0.64	−0.06	0.17	0.62
3	0.60	−0.08	0.07	0.58
4*	0.01	0.01	0.93	
5	0.69	0.07	−0.04	0.70
6*	−0.04	0.76	0.01	
7	0.59	−0.04	−0.09	0.60
8	0.51	−0.12	−0.34	0.53
9*	−0.25	0.57	0.10	
10	0.66	0.22	−0.06	0.67

Items marked with asterisk were excluded from the final scale used in the analysis.

B Construction of parental support

The parental support variable was constructed from a number of questionnaire items asked in the youth questionnaire of the SOEP. The items pertaining to parental support, and were asked separately for mothers and fathers. The items are listed below, with raw variable names in square brackets (mother first, then father).

How often do the following situations occur with your mother and father? How often... (Wie häufig treten in Ihrer Beziehung zu Ihren Eltern die folgenden Situationen auf? Wie häufig kommt es vor...):

1. Do your parents talk to you about things you do or experience (dass Ihre Eltern mit Ihnen über Dinge sprechen, die Sie tun oder erlebt haben)? [jl0040/ jl0041]
2. Do your parents bring up things that bother or worry you (dass Ihre Eltern Dinge ansprechen, die Sie ärgern oder belasten)? [jl0043/ jl1043]
3. Do your parents ask you for your opinion before they decide something that affects you (dass Ihre Eltern nach Ihrer Meinung fragen, bevor sie etwas entscheiden, das Sie betrifft)? [jl0044/ jl0045]
4. Do your parents express their opinion when you do something that they like or approve of (dass, wenn Sie etwas tun, was Ihre Eltern gut finden, Ihre Eltern Ihnen auch zeigen, dass sie sich darüber freuen)? [jl0046/ jl0047]
5. Are you and your parents able to find a solution together to problems you have with each other (dass, wenn Sie und Ihre Eltern ein Problem miteinander haben, Sie dann gemeinsam eine Lösung finden können)? [jl0048/ jl0049]
6. Do your parents give you the impression that they really trust you (dass ihre Eltern Ihnen das Gefühl geben, dass sie Ihnen wirklich vertrauen)? [jl0050/ jl0051]
7. Do your parents ask for your opinion before they make decisions on family matters or issues (dass Ihre Eltern nach Ihrer Meinung fragen, bevor sie über Familienangelegenheiten entscheiden)? [jl0052/ jl0053]
8. Do your parents give you an explanation for their decisions (dass Ihre Eltern Ihnen gegenüber Entscheidungen begründen)? [jl0054/ jl0055]
9. Do your parents show you that they really love you (dass Ihre Eltern Ihnen zeigen, dass sie Sie wirklich lieben)? [jl0056/ jl0057]

Each item was answered on a five-point scale, running from 1 (Very often / Sehr häufig) to 5 (Never / Nie).

In the construction of the scale, item number 2 was omitted, meaning that eight of the nine items were used to create the paternal and maternal support variables. The reasons for the omission of item number 2 are both qualitative and quantitative. Qualitatively, frequent parental discussion of things that worry children does not necessarily connote supportive parenting – it could also connote an abusive parent who induces anxiety in their own children for the purposes of control or other motives. Quantitatively, a principal component analysis demonstrated that item 2 did not load on the same factor as the other items. Figures B1 and B2 report the eigenvalues from principal component analyses carried out *with* (panel A in each figure) and *without* (panel B in each figure) item 2 respectively. As can be seen, there is strong evidence for a single factor, with the second highest eigenvalue generally landing just below 1, though it peeps above this conventional threshold when item 2 is included for maternal support (panel A of Figure B2). Table B1 provides the rotated factor loadings for the paternal items, and Table B2 provides the rotated factor loadings for the maternal cases. The number of factors presented corresponds to the number of eigenvalues greater than 1 that were found in each case. As can be seen, item 2 in all cases has a much lower loading than the others on factor 1.

Given the above considerations, we constructed the parenting support scale by first getting the average value across all nonmissing items (except item 2) for the mother and father separately. Then we use the dominance principle, selecting the highest value on support for mother or father, or simply the nonmissing value if one parent is missing. An alternative approach would be to take the mean value across parents. Appendix E shows that this operationalisation yields the same results as in the analysis where support is operationalised with the dominance criterion.

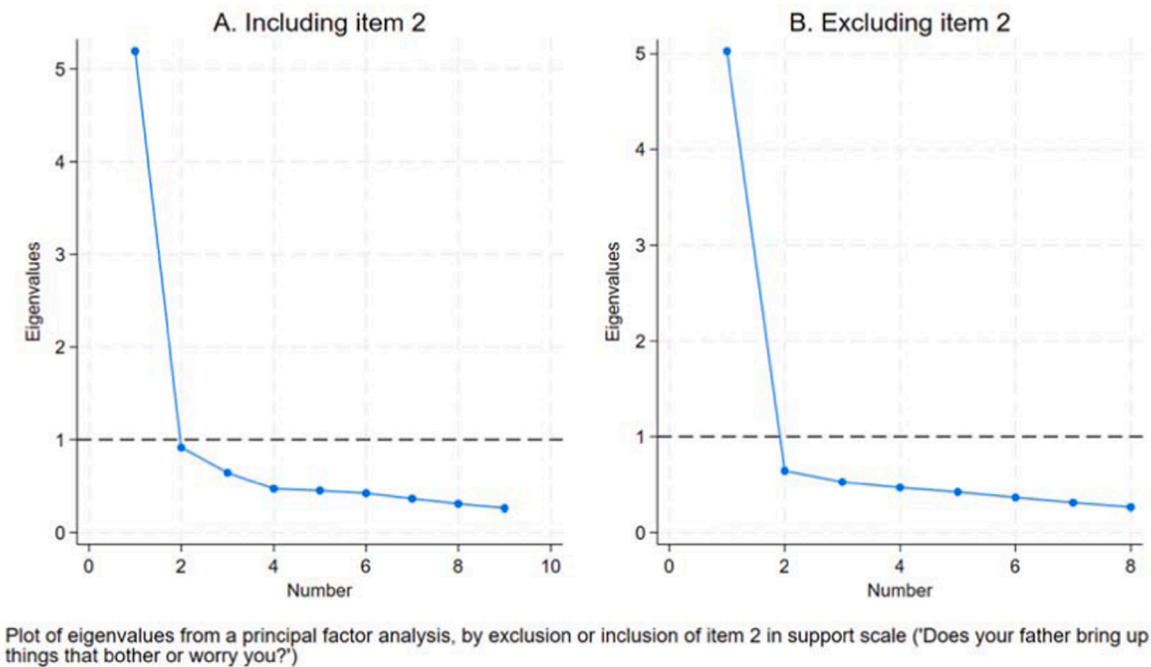


Figure B1. Scree plot of eigenvalues for paternal support items, including and excluding item 2

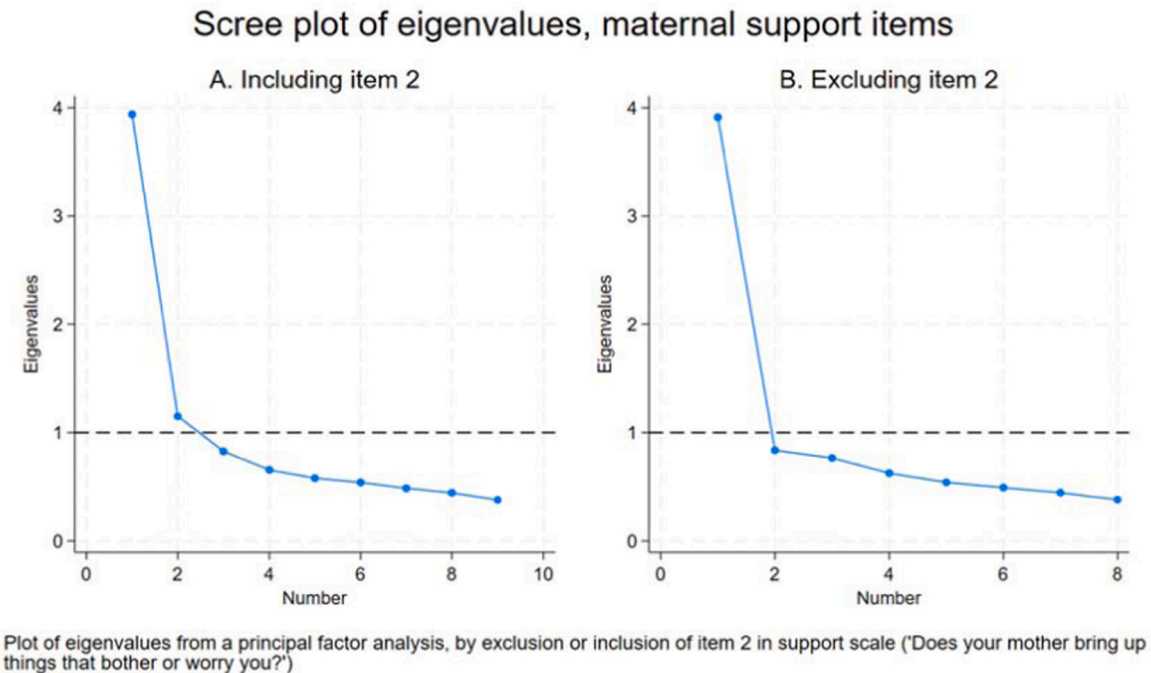


Figure B2. Scree plot of eigenvalues for maternal support items, including and excluding item 2

Table B1
Factor loadings for paternal support, including and excluding item 2

Item	Including item 2	Excluding item 2
	Factor 1	Factor 1
1	0.74	0.73
2*	0.45	
3	0.75	0.75
4	0.83	0.84
5	0.79	0.80
6	0.83	0.84

(continued on next page)

Table B1 (continued)

Item	Including item 2	Excluding item 2
7	0.78	0.78
8	0.79	0.79
9	0.81	0.81

Items marked with asterisk were excluded from the final scale used in the analysis.

Table B2

Factor loadings for maternal support, including and excluding item 2

Item	Including item 2		Excluding item 2
	Factor 1	Factor 2	Factor 1
1	0.42	0.63	0.57
2*	−0.05	0.90	
3	0.58	0.27	0.63
4	0.73	0.18	0.75
5	0.73	0.05	0.72
6	0.79	−0.05	0.75
7	0.70	0.14	0.71
8	0.68	0.18	0.71
9	0.75	0.03	0.73

Items marked with asterisk were excluded from the final scale used in the analysis.

C Regression output for main analysis

Tables C1 through C6 below reproduce the regression output for each of the six personality outcomes (conscientiousness, openness, agreeableness, emotional stability, extraversion, locus of control), and the four models (simple – adolescent, simple – early adult, fixed-effects – adolescent, fixed-effects – early adult).

Table C1

Regression of conscientiousness on parental support, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.166 ^{***} (0.020)	0.164 ^{***} (0.028)	0.095 ^{***} (0.021)	0.045 ⁺ (0.027)
Male	−0.263 ^{***} (0.036)	−0.243 ^{***} (0.046)	−0.373 ^{***} (0.039)	−0.408 ^{***} (0.046)
Number of siblings in family	0.013 (0.019)	0.087 (0.110)	0.035 ⁺ (0.021)	0.151 (0.210)
Order within siblings (reference category = first)				
2nd sibling	−0.008 (0.042)	−0.051 (0.060)	0.025 (0.042)	−0.001 (0.058)
3rd sibling	0.023 (0.060)	−0.091 (0.109)	0.047 (0.063)	−0.022 (0.104)
4th or higher sibling	0.059 (0.083)	−0.222 (0.161)	0.062 (0.093)	−0.013 (0.161)
Age			0.056 ^{***} (0.015)	0.054 [*] (0.022)
Constant	0.207 ⁺	−0.007	−1.035 ^{***}	−1.342 ⁺
Observations	2856	2856	2555	2555
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table C2

Regression of openness on parental support, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.197 ^{***} (0.020)	0.116 ^{***} (0.028)	0.148 ^{***} (0.020)	0.053 ⁺ (0.028)
Male	−0.235 ^{***} (0.035)	−0.260 ^{***} (0.045)	−0.177 ^{***} (0.037)	−0.219 ^{***} (0.046)
Number of siblings in family	−0.007 (0.016)	0.116 (0.243)	0.022 (0.020)	0.173 (0.154)
Order within siblings (reference category = first)				
2nd sibling	−0.114 ^{**} (0.039)	−0.111 ⁺ (0.057)	−0.099 [*] (0.040)	−0.183 ^{***} (0.054)

(continued on next page)

Table C2 (continued)

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
3rd sibling	–0.059 (0.059)	–0.000 (0.111)	–0.120* (0.061)	–0.279** (0.104)
4th or higher sibling	–0.132 (0.087)	–0.010 (0.167)	–0.171 ⁺ (0.090)	–0.405* (0.160)
Age			0.018 (0.014)	–0.022 (0.021)
Constant	0.181 ⁺ (0.100)	–0.228 (0.786)	–0.423 (0.291)	–0.299 (0.620)
Observations	2854	2854	2793	2793
N of clusters (i.e. families)	1279	1279	1251	1251

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table C3

Regression of agreeableness on parental support, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.224*** (0.021)	0.191*** (0.030)	0.087*** (0.020)	0.035 (0.030)
Male	–0.175*** (0.037)	–0.193*** (0.051)	–0.219*** (0.040)	–0.262*** (0.052)
Number of siblings in family	–0.029 (0.019)	0.021 (0.202)	0.047* (0.023)	0.182 (0.176)
Order within siblings (reference category = first)				
2nd sibling	–0.023 (0.041)	–0.003 (0.066)	–0.001 (0.045)	0.033 (0.069)
3rd sibling	–0.046 (0.062)	0.000 (0.124)	–0.095 (0.066)	–0.066 (0.123)
4th or higher sibling	–0.107 (0.091)	0.024 (0.197)	–0.190* (0.091)	–0.068 (0.184)
Age			–0.017 (0.016)	0.010 (0.027)
Constant	0.269* (0.105)	0.095 (0.642)	0.341 (0.326)	–0.517 (0.724)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table C4

Regression of emotional stability on parental support, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.059** (0.019)	0.037 (0.028)	0.048* (0.020)	0.040 (0.029)
Male	0.463*** (0.036)	0.465*** (0.048)	0.521*** (0.040)	0.547*** (0.049)
Number of siblings in family	0.018 (0.015)	–0.605*** (0.146)	0.013 (0.019)	–0.120 (0.197)
Order within siblings (reference category = first)				
2nd sibling	–0.004 (0.040)	–0.008 (0.057)	0.070 ⁺ (0.042)	0.038 (0.061)
3rd sibling	–0.063 (0.058)	–0.089 (0.104)	0.090 (0.060)	0.039 (0.113)
4th or higher sibling	–0.030 (0.086)	–0.119 (0.169)	0.092 (0.094)	–0.177 (0.173)
Age			–0.015 (0.015)	–0.017 (0.024)
Constant	–0.326** (0.105)	1.734*** (0.490)	0.056 (0.306)	0.461 (0.739)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,
 *** $p < 0.001$

Table C5

Regression of extraversion on parental support, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.133*** (0.020)	0.114*** (0.029)	0.116*** (0.023)	0.073* (0.031)
Male	–0.161*** (0.037)	–0.203*** (0.049)	–0.130** (0.042)	–0.139* (0.055)
Number of siblings in family	–0.000 (0.017)	–0.122 (0.226)	0.024 (0.018)	0.055 (0.266)
Order within siblings (reference category = first)				
2nd sibling	–0.019 (0.042)	–0.015 (0.064)	–0.005 (0.047)	–0.042 (0.069)
3rd sibling	0.038 (0.060)	0.021 (0.116)	0.092 (0.063)	0.044 (0.120)
4th or higher sibling	0.062 (0.087)	–0.029 (0.168)	–0.018 (0.100)	–0.100 (0.198)
Age			0.008 (0.016)	–0.003 (0.027)
Constant	0.200+ (0.103)	0.574 (0.742)	–0.194 (0.320)	–0.104 (0.942)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,
 * $p < 0.05$,
 ** $p < 0.01$,
 *** $p < 0.001$

Table C6

Regression of locus of control on parental support, for adolescence and early adulthood

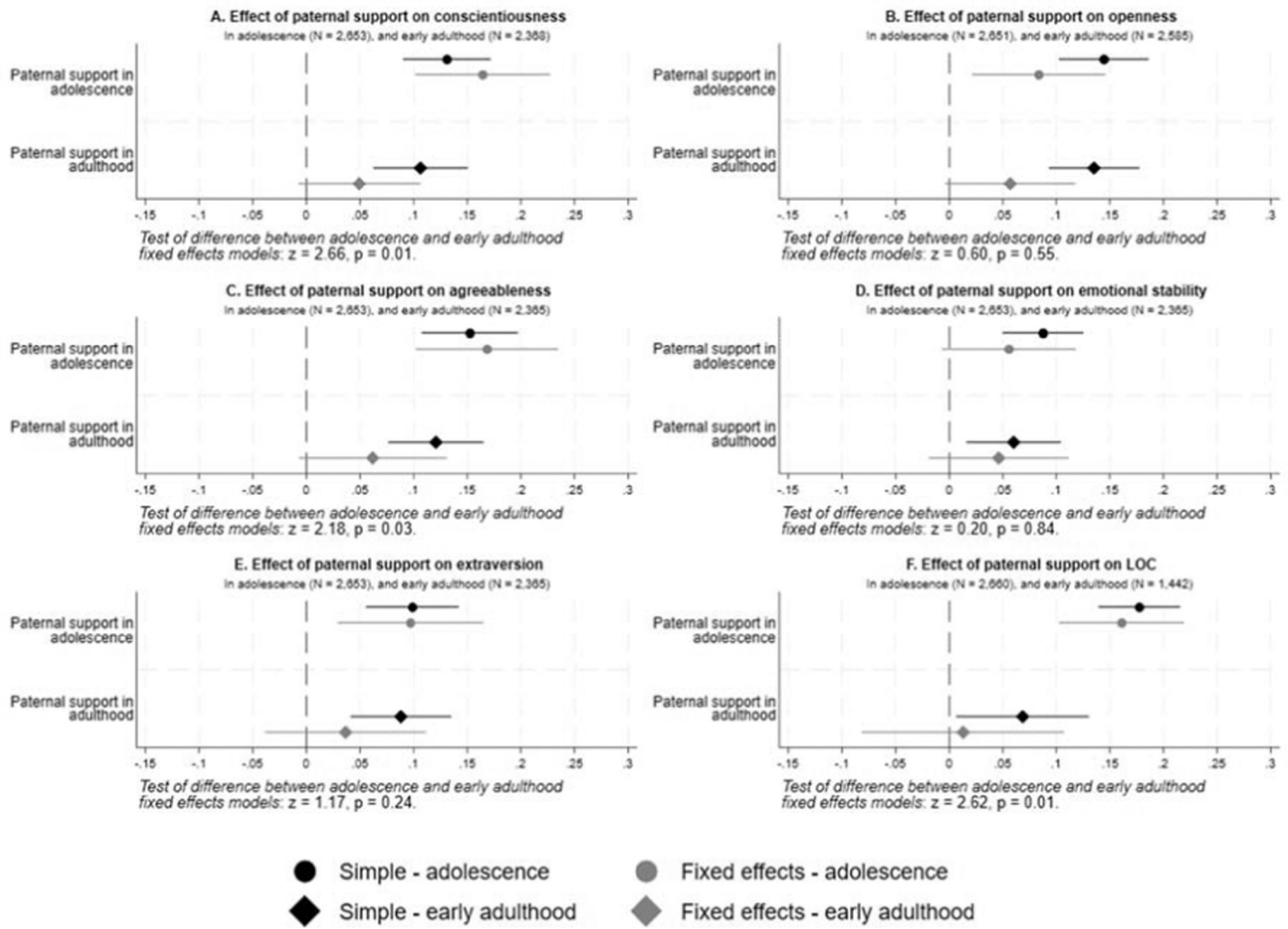
	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.203*** (0.018)	0.146*** (0.026)	0.070* (0.028)	0.031 (0.037)
Male	0.105** (0.033)	0.077+ (0.043)	0.079 (0.054)	0.141* (0.067)
Number of siblings in family	–0.008 (0.015)	0.139 (0.201)	0.007 (0.026)	–0.445* (0.209)
Order within siblings (reference category = first)				
2nd sibling	–0.036 (0.035)	–0.114* (0.053)	0.067 (0.057)	0.132 (0.084)
3rd sibling	–0.044 (0.053)	–0.209* (0.100)	0.101 (0.084)	0.201 (0.160)
4th or higher sibling	–0.071 (0.085)	–0.433* (0.179)	0.065 (0.132)	0.368 (0.259)
Age			0.010 (0.018)	0.026 (0.032)
Constant	–0.067 (0.089)	–0.627 (0.660)	–0.394 (0.378)	0.745 (0.919)
Observations	2863	2863	1558	1558
N of clusters (i.e. families)	1283	1283	717	717

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,
 * $p < 0.05$,
 ** $p < 0.01$,
 *** $p < 0.001$

D Analyses for paternal and maternal support separately

Here the main analysis is reproduced, but replacing parental support with paternal support and maternal support sequentially. Figures D1 and D2 reproduce the coefficient plots presented in the main analysis for paternal and maternal support respectively. Generally speaking, the same pattern of results is reproduced: a positive and statistically significant (at the 95 % level) effect of paternal/maternal support on personality traits, with the exception of the fixed-effects models for personality in early adulthood which are not statistically significant. And as with the main results, the effect of support is generally greater in adolescence, albeit the difference is only statistically significant for half the personality traits (conscientiousness, agreeableness, and locus of control).



Controls = gender, number of siblings, sibling position, survey year, and age. (Age control in adult sample only).
Horizontal bars represent 95% confidence intervals.

Figure D1. Estimated effects of paternal support on personality traits in adolescence and early adulthood (simple and sibling fixed-effects models)

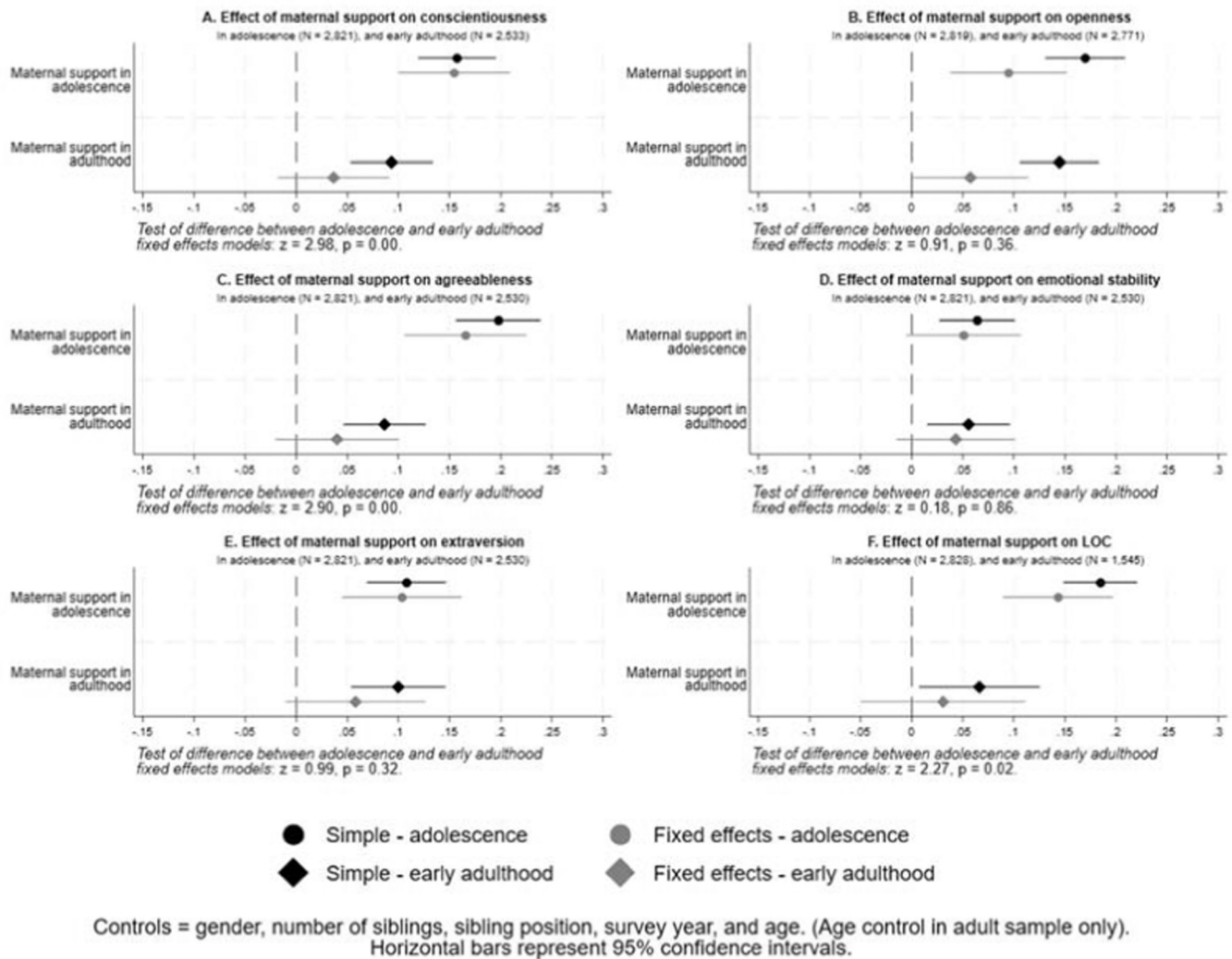


Figure D2. Estimated effects of maternal support on personality traits in adolescence and early adulthood (simple and sibling fixed-effects models)

E Analyses for mean parental support

In the main analyses, the dominance criterion is used to construct the parental support variable. This means that the highest value of support from the separate maternal and paternal support variables is chosen (see section B of this appendix for more details). Here we replicate the main analysis, but with a parental support variable constructed from the mean of maternal and paternal support. Figure E1 reproduces the coefficient plots presented in the main analysis for the mean parental support variable. The results are qualitatively the same.

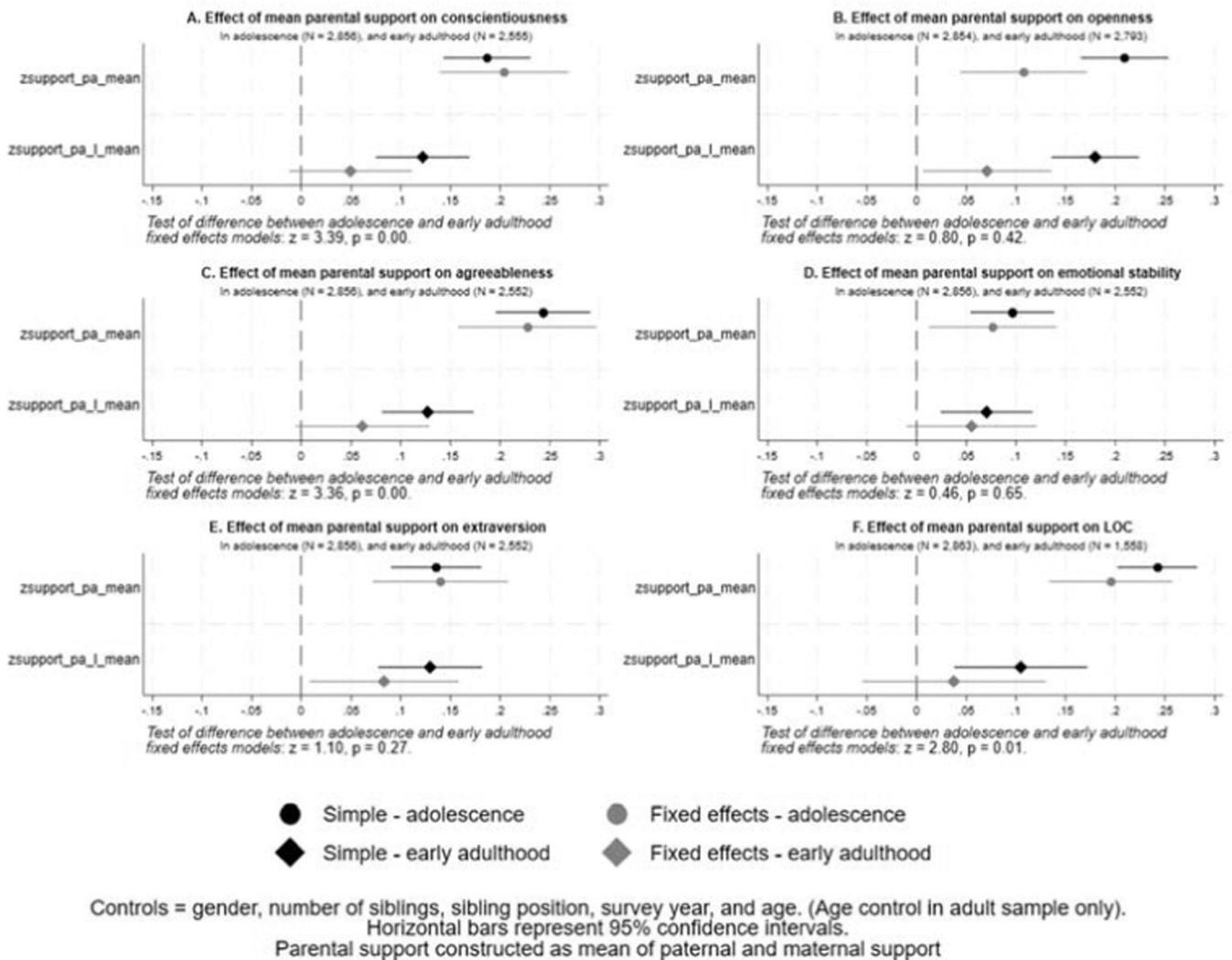


Figure E1. Estimated effects of mean paternal support on personality traits in adolescence and early adulthood (simple and sibling fixed-effects models)

F Moderation analyses

This section presents the regression output for the moderation analyses. The moderating effect of two variables on the parental support effect is examined: birth order (section F1) and gender (section F2). Moderation is operationalized through interactor the moderator with parental support.

F1 Birth order

Table F1. 1

Regression of conscientiousness on parental support interacted with birth order, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple - early adult	Fixed-effects - early adult
Parental support (std)	0.173*** (0.000)	0.210*** (0.000)	0.0764* (0.050)	0.0337 (0.427)
Order within siblings (reference category = first)				
2nd sibling	-0.00711 (0.864)	-0.0473 (0.432)	0.0250 (0.555)	-0.000813 (0.989)
3rd sibling	0.0264 (0.662)	-0.0846 (0.436)	0.0461 (0.463)	-0.0224 (0.830)
4th or higher sibling	0.0544 (0.513)	-0.219 (0.175)	0.0613 (0.509)	-0.00772 (0.962)
2nd sib*parental support	-0.0101 (0.824)	-0.0583 (0.265)	-0.0101 (0.824)	-0.0583 (0.265)
3rd sib*parental support	-0.0462	-0.108	-0.0462	-0.108

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Table F1. 1 (continued)

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
4th+ sib*parental support	(0.433) 0.0499 (0.522)	(0.102) –0.0522 (0.551)	(0.433) 0.0499 (0.522)	(0.102) –0.0522 (0.551)
Age			0.0564*** (0.000)	0.0533* (0.014)
Male	–0.263*** (0.000)	–0.241*** (0.000)	–0.373*** (0.000)	–0.406*** (0.000)
Number of siblings in family	0.0134 (0.484)	0.0812 (0.456)	0.0356+ (0.087)	0.150 (0.470)
Constant	0.205+ (0.074)	0.00918 (0.981)	–1.036*** (0.001)	–1.335+ (0.078)
Observations	2856	2856	2555	2555
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F1.2

Regression of openness on parental support interacted with birth order, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.197*** (0.000)	0.124** (0.002)	0.208*** (0.000)	0.124** (0.002)
Order within siblings (reference category = first)				
2nd sibling	–0.113** (0.004)	–0.111* (0.048)	–0.0977* (0.015)	–0.179*** (0.001)
3rd sibling	–0.0571 (0.329)	0.00231 (0.983)	–0.121* (0.046)	–0.274** (0.008)
4th or higher sibling	–0.142 (0.106)	–0.0292 (0.857)	–0.170+ (0.059)	–0.392* (0.015)
2nd sib*parental support	–0.0136 (0.746)	–0.0288 (0.537)	–0.0940* (0.032)	–0.109* (0.032)
3rd sib*parental support	–0.0313 (0.554)	–0.0822 (0.212)	–0.125* (0.024)	–0.130+ (0.054)
4th+ sib*parental support	0.123 (0.156)	0.183+ (0.051)	–0.00135 (0.987)	–0.0481 (0.585)
Age			0.0170 (0.241)	–0.0214 (0.311)
Male	–0.235*** (0.000)	–0.258*** (0.000)	–0.178*** (0.000)	–0.222*** (0.000)
Number of siblings in family	–0.00610 (0.712)	0.120 (0.612)	0.0222 (0.274)	0.171 (0.275)
Constant	0.179+ (0.075)	–0.251 (0.744)	–0.408 (0.162)	–0.292 (0.640)
Observations	2854	2854	2793	2793
N of clusters (i.e. families)	1279	1279	1251	1251

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F1.3

Regression of agreeableness on parental support interacted with birth order, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.229*** (0.000)	0.182*** (0.000)	0.124*** (0.001)	0.0487 (0.300)
Order within siblings (reference category = first)				
2nd sibling	–0.0226 (0.586)	–0.00366 (0.955)	–0.000547 (0.990)	0.0329 (0.633)
3rd sibling	–0.0464 (0.458)	–0.00291 (0.981)	–0.0947 (0.152)	–0.0665 (0.590)
4th or higher sibling	–0.104 (0.256)	0.0158 (0.936)	–0.189* (0.039)	–0.0700 (0.706)
2nd sib*parental support	–0.0111 (0.802)	–0.00536 (0.920)	–0.0492 (0.316)	–0.0145 (0.795)
3rd sib*parental support	0.0105 (0.870)	0.0232 (0.760)	–0.0563 (0.396)	–0.0213 (0.801)

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Table F1.3 (continued)

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
4th+ sib*parental support	–0.0230 (0.788)	0.0790 (0.412)	–0.0889 (0.210)	–0.0478 (0.598)
Age			–0.0171 (0.285)	0.00956 (0.721)
Male	–0.175*** (0.000)	–0.194*** (0.000)	–0.219*** (0.000)	–0.262*** (0.000)
Number of siblings in family	–0.0292 (0.130)	0.0231 (0.909)	0.0461* (0.050)	0.180 (0.307)
Constant	0.270* (0.010)	0.0872 (0.892)	0.343 (0.292)	–0.509 (0.482)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F1.4

Regression of emotional stability on parental support interacted with birth order, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.0131 (0.703)	–0.0190 (0.683)	0.0443 (0.199)	0.0610 (0.190)
Order within siblings (reference category = first)				
2nd sibling	–0.00870 (0.827)	–0.0137 (0.811)	0.0694 (0.102)	0.0396 (0.516)
3rd sibling	–0.0687 (0.235)	–0.0990 (0.337)	0.0863 (0.152)	0.0394 (0.726)
4th or higher sibling	–0.0331 (0.705)	–0.131 (0.438)	0.0904 (0.334)	–0.171 (0.321)
2nd sib*parental support	0.0695 (0.126)	0.0515 (0.350)	0.0551 (0.205)	0.00866 (0.868)
3rd sib*parental support	0.0859 (0.131)	0.132+ (0.064)	–0.0947 (0.109)	–0.0956 (0.178)
4th+ sib*parental support	0.0486 (0.558)	0.139 (0.140)	–0.0305 (0.685)	–0.0727 (0.417)
Age			–0.0160 (0.288)	–0.0176 (0.462)
Male	0.463*** (0.000)	0.462*** (0.000)	0.522*** (0.000)	0.549*** (0.000)
Number of siblings in family	0.0182 (0.214)	–0.598*** (0.000)	0.0126 (0.508)	–0.123 (0.533)
Constant	–0.325*** (0.002)	1.708*** (0.000)	0.0762 (0.803)	0.476 (0.519)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F1.5

Regression of extraversion on parental support interacted with birth order, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.131*** (0.000)	0.121** (0.008)	0.118** (0.002)	0.0460 (0.332)
Order within siblings (reference category = first)				
2nd sibling	–0.0171 (0.688)	–0.0149 (0.814)	–0.00430 (0.928)	–0.0409 (0.554)
3rd sibling	0.0381 (0.522)	0.0259 (0.825)	0.0905 (0.151)	0.0489 (0.685)
4th or higher sibling	0.0533 (0.539)	–0.0398 (0.810)	–0.0180 (0.857)	–0.0862 (0.659)
2nd sib*parental support	–0.0219 (0.641)	–0.00551 (0.922)	–0.00634 (0.900)	0.0241 (0.679)
3rd sib*parental support	0.00571 (0.921)	–0.0925 (0.177)	–0.0399 (0.497)	0.0154 (0.822)
4th+ sib*parental support	0.122	0.121	0.0907	0.164+

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Table F1.5 (continued)

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
	(0.125)	(0.190)	(0.289)	(0.074)
Age			0.00797	–0.00228
			(0.619)	(0.933)
Male	–0.161***	–0.202***	–0.130**	–0.140*
	(0.000)	(0.000)	(0.002)	(0.011)
Number of siblings in family	–0.000260	–0.118	0.0246	0.0574
	(0.987)	(0.596)	(0.178)	(0.830)
Constant	0.201 ⁺	0.553	–0.193	–0.135
	(0.052)	(0.448)	(0.547)	(0.887)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

⁺ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F1.6

Regression of locus of control on parental support interacted with birth order, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.241***	0.200***	0.0576	0.00555
	(0.000)	(0.000)	(0.230)	(0.930)
Order within siblings (reference category = first)				
2nd sibling	–0.0335	–0.109*	0.0667	0.131
	(0.347)	(0.041)	(0.239)	(0.120)
3rd sibling	–0.0395	–0.203*	0.107	0.192
	(0.456)	(0.043)	(0.203)	(0.232)
4th or higher sibling	–0.0611	–0.424*	0.0833	0.358
	(0.477)	(0.018)	(0.537)	(0.175)
2nd sib*parental support	–0.0385	–0.0674	–0.00560	0.0654
	(0.315)	(0.147)	(0.929)	(0.399)
3rd sib*parental support	–0.0692	–0.0933	0.0612	–0.00783
	(0.182)	(0.116)	(0.449)	(0.938)
4th+ sib*parental support	–0.138 ⁺	–0.114	0.0709	–0.0213
	(0.067)	(0.238)	(0.493)	(0.873)
Age			0.0105	0.0256
			(0.568)	(0.425)
Male	0.106**	0.0789 ⁺	0.0781	0.144*
	(0.001)	(0.065)	(0.146)	(0.032)
Number of siblings in family	–0.00795	0.131	0.00710	–0.564*
	(0.589)	(0.526)	(0.785)	(0.025)
Constant	–0.0678	–0.599	–0.396	1.098
	(0.439)	(0.377)	(0.296)	(0.280)
Observations	2863	2863	1558	1558
N of clusters (i.e. families)	1283	1283	717	717

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

⁺ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

F2 Gender

Table F2.1

Regression of conscientiousness on parental support interacted with child gender, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.167***	0.171***	0.109***	0.0761*
	(0.000)	(0.000)	(0.000)	(0.030)
Male	–0.263***	–0.242***	–0.373***	–0.409***
	(0.000)	(0.000)	(0.000)	(0.000)
Male* Parental support (std)	–0.00292	–0.0145	–0.0275	–0.0630
	(0.941)	(0.770)	(0.514)	(0.182)
Age			0.0561***	0.0531*
			(0.000)	(0.014)
Number of siblings in family	0.0129	0.0884	0.0350 ⁺	0.157
	(0.505)	(0.423)	(0.095)	(0.450)
Order within siblings (reference category = first)				

(continued on next page)

Table F2.1 (continued)

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
2nd sibling	–0.00800 (0.847)	–0.0517 (0.392)	0.0239 (0.571)	–0.00363 (0.951)
3rd sibling	0.0234 (0.697)	–0.0914 (0.401)	0.0459 (0.465)	–0.0233 (0.824)
4th or higher sibling	0.0591 (0.474)	–0.224 (0.168)	0.0608 (0.512)	–0.0198 (0.902)
Constant	0.207 ⁺ (0.072)	–0.0155 (0.968)	–1.031 ^{***} (0.001)	–1.357 ⁺ (0.073)
Observations	2856	2856	2555	2555
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$, * $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F2.2

Regression of openness on parental support interacted with child gender, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.199 ^{***} (0.000)	0.138 ^{***} (0.000)	0.155 ^{***} (0.000)	0.0689 ⁺ (0.053)
Male	–0.235 ^{***} (0.000)	–0.256 ^{***} (0.000)	–0.175 ^{***} (0.000)	–0.219 ^{***} (0.000)
Male* Parental support (std)	–0.00323 (0.932)	–0.0426 (0.344)	–0.0149 (0.696)	–0.0326 (0.484)
Age			0.0193 (0.179)	–0.0226 (0.286)
Number of siblings in family	–0.00658 (0.690)	0.121 (0.620)	0.0221 (0.280)	0.176 (0.256)
Order within siblings (reference category = first)				
2nd sibling	–0.114 ^{**} (0.003)	–0.112 ⁺ (0.051)	–0.0960* (0.017)	–0.182 ^{***} (0.001)
3rd sibling	–0.0594 (0.312)	–0.00118 (0.992)	–0.120 ⁺ (0.050)	–0.277 ^{**} (0.008)
4th or higher sibling	–0.132 (0.131)	–0.0163 (0.922)	–0.170 ⁺ (0.060)	–0.405* (0.011)
Constant	0.181 ⁺ (0.073)	–0.253 (0.749)	–0.456 (0.115)	–0.290 (0.641)
Observations	2854	2854	2793	2793
N of clusters (i.e. families)	1279	1279	1251	1251

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F2.3

Regression of agreeableness on parental support interacted with child gender, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.208 ^{***} (0.000)	0.192 ^{***} (0.000)	0.0887 ^{**} (0.002)	0.0393 (0.332)
Male	–0.177 ^{***} (0.000)	–0.193 ^{***} (0.000)	–0.219 ^{***} (0.000)	–0.262 ^{***} (0.000)
Male* Parental support (std)	0.0325 (0.408)	–0.00190 (0.970)	–0.00309 (0.941)	–0.00932 (0.857)
Age	0.0325	–0.00190	–0.0170 (0.289)	0.00968 (0.719)
Number of siblings in family	–0.0291 (0.131)	0.0215 (0.916)	0.0468* (0.047)	0.182 (0.299)
Order within siblings (reference category = first)				
2nd sibling	–0.0234 (0.570)	–0.00266 (0.968)	–0.00118 (0.979)	0.0323 (0.640)
3rd sibling	–0.0461 (0.458)	0.000133 (0.999)	–0.0950 (0.152)	–0.0660 (0.593)
4th or higher sibling	–0.106 (0.244)	0.0242 (0.902)	–0.190* (0.038)	–0.0691 (0.708)
Constant	0.273 ^{***} (0.010)	0.0944 (0.883)	0.342 (0.296)	–0.519 (0.473)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F2.4

Regression of emotional stability on parental support interacted with child gender, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.0641* (0.019)	0.0389 (0.315)	0.114*** (0.000)	0.0948* (0.014)
Male	0.464*** (0.000)	0.465*** (0.000)	0.522*** (0.000)	0.545*** (0.000)
Male* Parental support (std)	–0.0109 (0.775)	–0.00306 (0.951)	–0.130*** (0.001)	–0.111* (0.023)
Age			–0.0164 (0.278)	–0.0182 (0.446)
Number of siblings in family	0.0182 (0.212)	–0.605*** (0.000)	0.0141 (0.458)	–0.108 (0.577)
Order within siblings (reference category = first)				
2nd sibling	–0.00389 (0.922)	–0.00849 (0.882)	0.0659 (0.120)	0.0333 (0.586)
3rd sibling	–0.0625 (0.281)	–0.0892 (0.391)	0.0860 (0.153)	0.0373 (0.740)
4th or higher sibling	–0.0298 (0.730)	–0.119 (0.484)	0.0860 (0.355)	–0.189 (0.274)
Constant	–0.327** (0.002)	1.732*** (0.000)	0.0785 (0.798)	0.435 (0.552)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F2.5

Regression of extraversion on parental support interacted with child gender, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple – early adult	Fixed-effects – early adult
Parental support (std)	0.122*** (0.000)	0.106** (0.008)	0.166*** (0.000)	0.126** (0.002)
Male	–0.163*** (0.000)	–0.205*** (0.000)	–0.129** (0.002)	–0.141* (0.011)
Male* Parental support (std)	0.0222 (0.589)	0.0165 (0.758)	–0.0984* (0.028)	–0.106+ (0.051)
Age			0.00691 (0.666)	–0.00423 (0.874)
Number of siblings in family	–0.000374 (0.982)	–0.124 (0.582)	0.0248 (0.174)	0.0655 (0.802)
Order within siblings (reference category = first)				
2nd sibling	–0.0190 (0.656)	–0.0143 (0.822)	–0.00839 (0.860)	–0.0461 (0.505)
3rd sibling	0.0379 (0.526)	0.0214 (0.854)	0.0884 (0.160)	0.0419 (0.728)
4th or higher sibling	0.0623 (0.473)	–0.0261 (0.876)	–0.0218 (0.826)	–0.112 (0.572)
Constant	0.203+ (0.050)	0.584 (0.432)	–0.178 (0.579)	–0.129 (0.890)
Observations	2856	2856	2552	2552
N of clusters (i.e. families)	1280	1280	1151	1151

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table F2.6

Regression of locus of control on parental support interacted with child gender, for adolescence and early adulthood

	Simple - adolescence	Fixed-effects - adolescence	Simple - early adult	Fixed-effects - early adult
Parental support (std)	0.189*** (0.000)	0.112** (0.001)	0.0105 (0.771)	-0.0279 (0.583)
Male	0.103** (0.002)	0.0715+ (0.095)	0.0861 (0.110)	0.150* (0.025)
Male* Parental support (std)	0.0293 (0.395)	0.0682 (0.122)	0.119* (0.024)	0.121+ (0.078)
Age			0.0103 (0.573)	0.0263 (0.412)
Number of siblings in family	-0.00797 (0.593)	0.131 (0.519)	0.00698 (0.788)	-0.282 (0.214)
Order within siblings (reference category = first)				
2nd sibling	-0.0361 (0.308)	-0.113* (0.034)	0.0699 (0.216)	0.137 (0.103)
3rd sibling	-0.0444 (0.400)	-0.207* (0.039)	0.103 (0.221)	0.199 (0.211)
4th or higher sibling	-0.0704 (0.410)	-0.423* (0.018)	0.0607 (0.646)	0.377 (0.142)
Constant	-0.0625 (0.481)	-0.588 (0.378)	-0.393 (0.298)	0.233 (0.806)
Observations	2863	2863	1558	1558
N of clusters (i.e. families)	1283	1283	717	717

Standard errors, clustered within families, are given in parentheses. Estimates for survey year control variable excluded.

+ $p < .1$,* $p < 0.05$,** $p < 0.01$,*** $p < 0.001$ *G Multiple observations per participant*

Some adults in the data recorded their personality at multiple time points (e.g. age 19, age 21, age 25 etc). The following analyses are: (i) the main analysis for early adults, incorporating multiple observations per participant; (ii) the main analysis for early adults, incorporating multiple observations, with support interacted with age; and (iii) the main analysis for early adults, with a single observation per participant comprising the average value across all observations. Standard errors are clustered at the level of the participant for (i) and (ii), and at the family for (iii). The results are presented graphically, with p-values for the interaction beneath the graphs.

For analysis (i), incorporating multiple observations per participant, four of the six fixed effects models now show statistically significant results, as opposed to only two in the main analysis. Nonetheless, effect sizes are very similar, with a slight decrease for openness, and a slight increase for LOC.

For analysis (ii), incorporating multiple observations per participant with an interaction between participant age at time of observation and parental support, eleven of twelve interactions age*support interactions for the fixed effects models are statistically insignificant. In terms of effect size, the age*support interaction is generally negligible, showing that there is not much of a decay effect *within-adulthood*.

For analysis (iii), incorporating a single observation per participant comprising the average personality value across all observations, five of the six fixed effects models now show statistically insignificant results. However, the effect sizes remain largely the same as the main analysis, with only a slight increase in LOC.

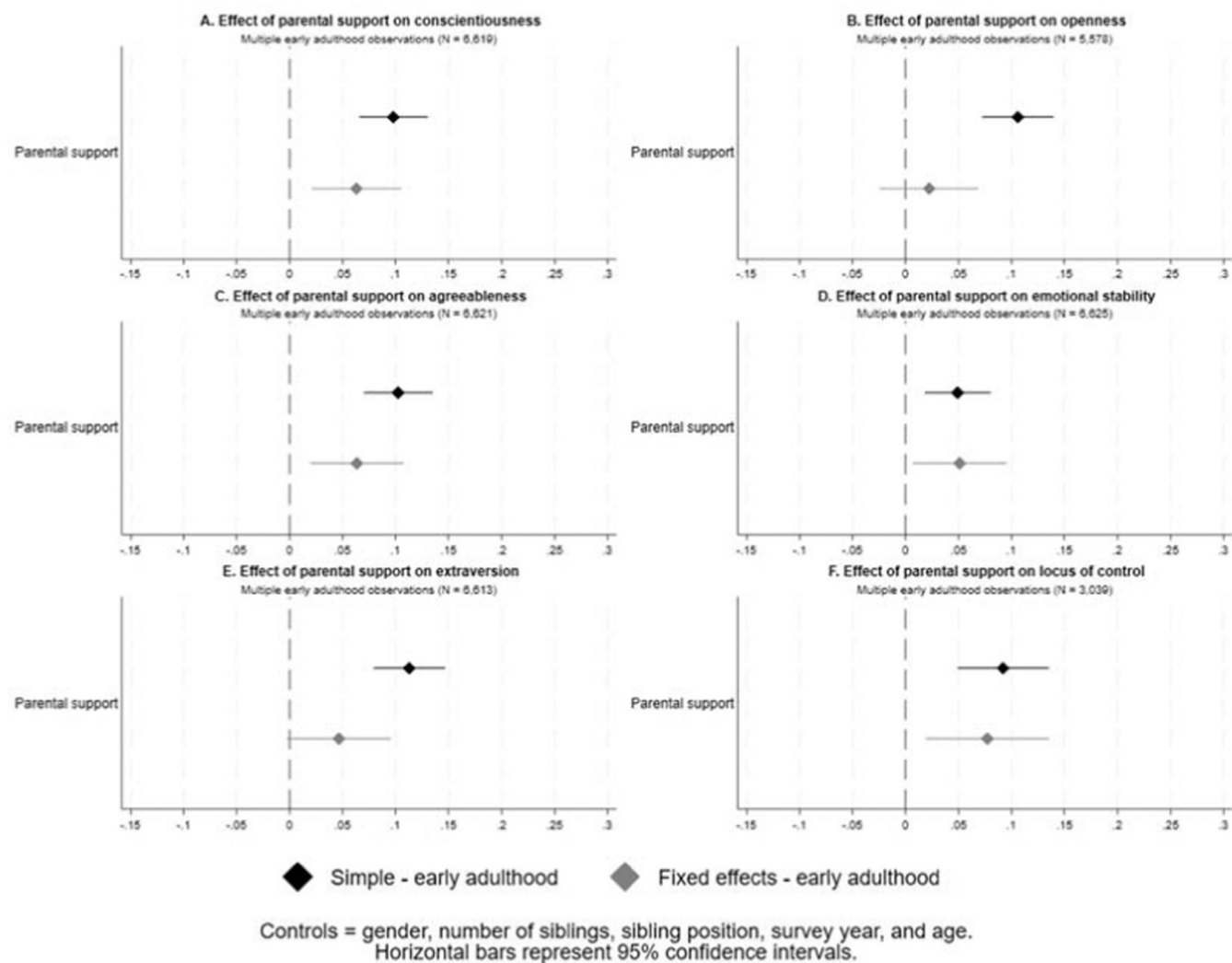


Figure G1. Estimated effects of parental support on personality traits in early adulthood, including multiple observations per participant

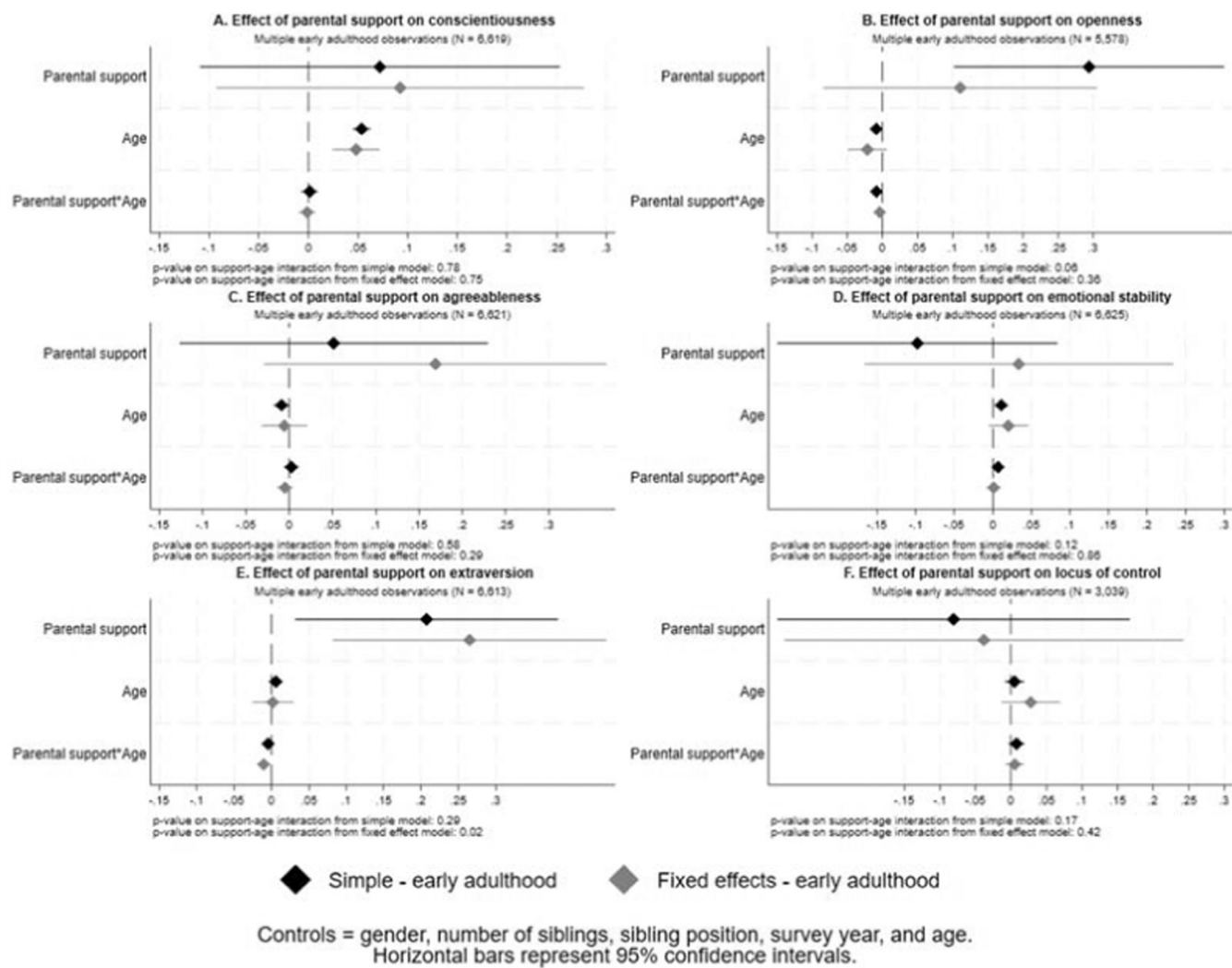


Figure G2. Estimated effects of parental support interacted with age on personality traits in early adulthood, including multiple observations per participant

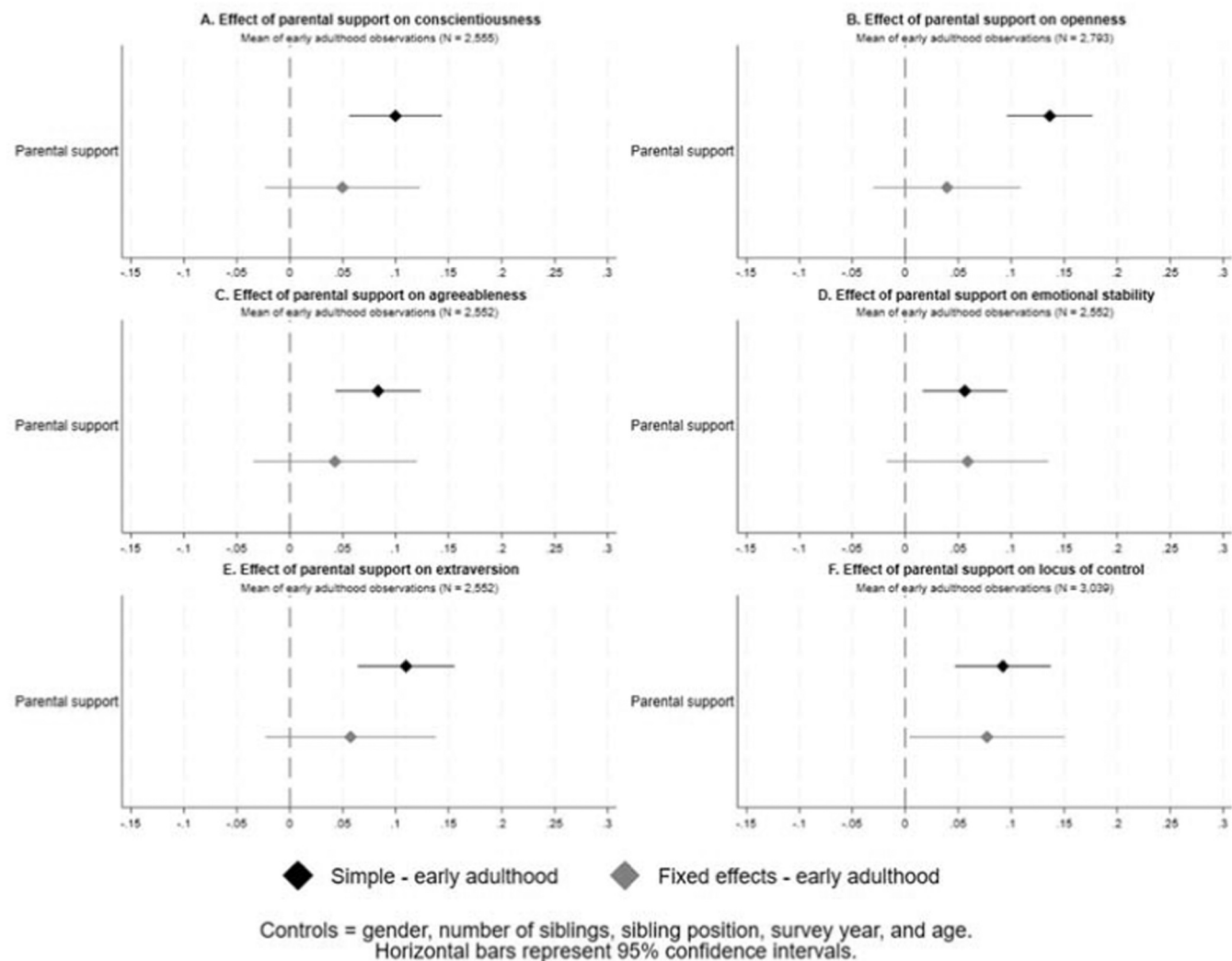


Figure G3. Estimated effects of parental support on personality traits in early adulthood, averaging across multiple observations per participant

H Analysis on all children

In the main analysis we run on a sample of siblings only. Here we present the same analysis but run on a sample of all youths, not just those who have siblings (in the data). For the simple models, this is arguably a more relevant comparator to the observational literature on parental behaviour and personality. Including non-siblings makes less sense for the fixed effects models. The results are presented in Figure H1. The results are very similar to those of the main analysis.

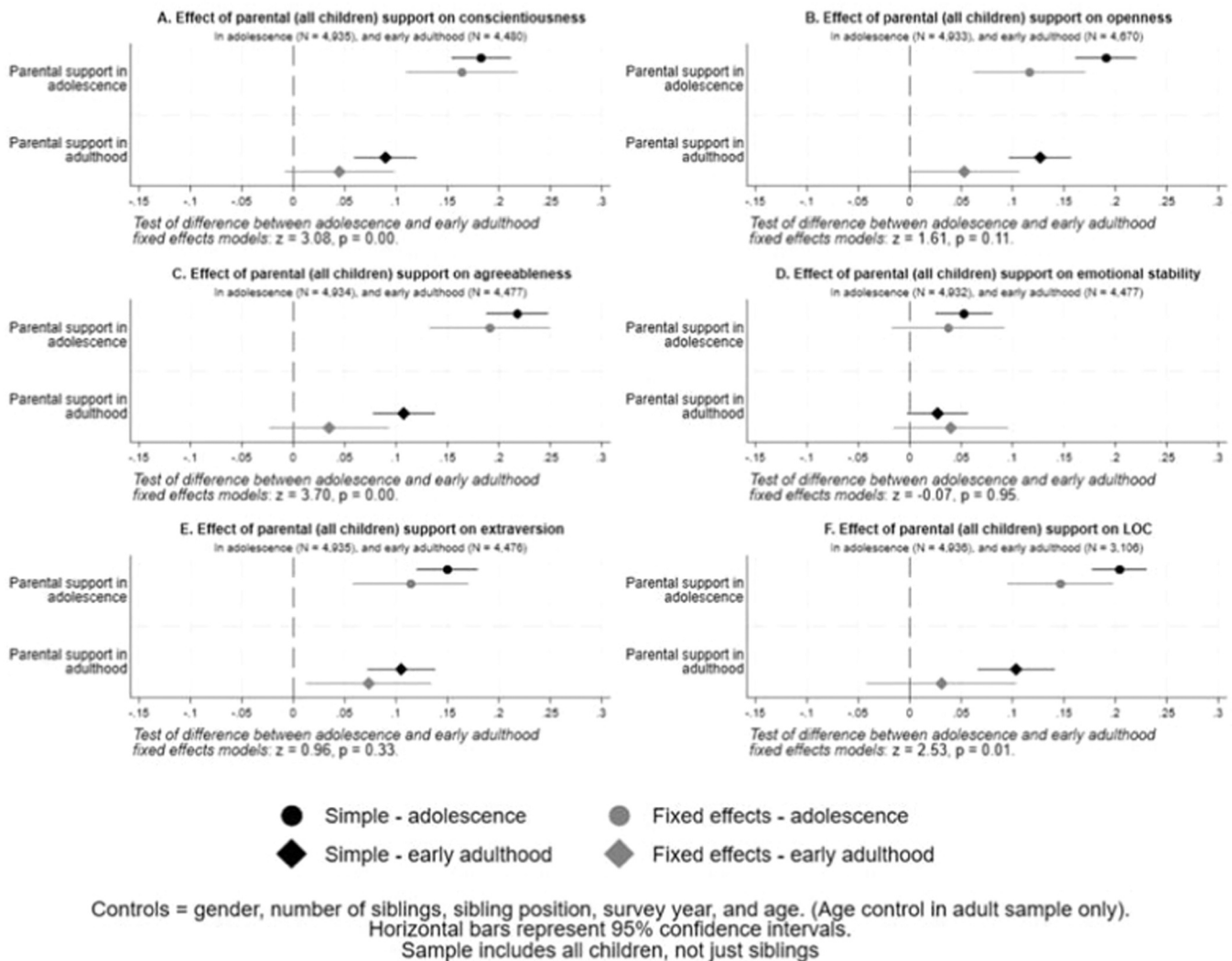


Figure H1. Estimated effects of parental support on personality traits in early adulthood, including children who do not have siblings (in the data)

I ICCs

I1 ICC for parental support

Symmetrically to the ICC analysis of sibling personality in the main text, we consider here sibling similarity in reported parental support. We estimate the ICC in child-rated support reported for both parents, as well as just the mother and father. The estimates are presented in Figure I1. Parental support was only measured once – in adolescence, so Fig. 2 represents adolescent data only (i.e. from the youth questionnaire). The ICC is highest for paternal support – at 0.42 – followed by maternal support at 0.30, and then overall parental support at 0.27. It would seem that fathers are more consistent in their parental behaviour than mothers are, at least in the eyes of their adolescent children.

The ICC for parental support, while greater than that for personality, is still rather small, revealing that a shared household explains only 27–42 % of between-subject variation in parental support. This is consistent with our contention that a substantial amount of personality differences is driven by within-household differences in parenting practice.

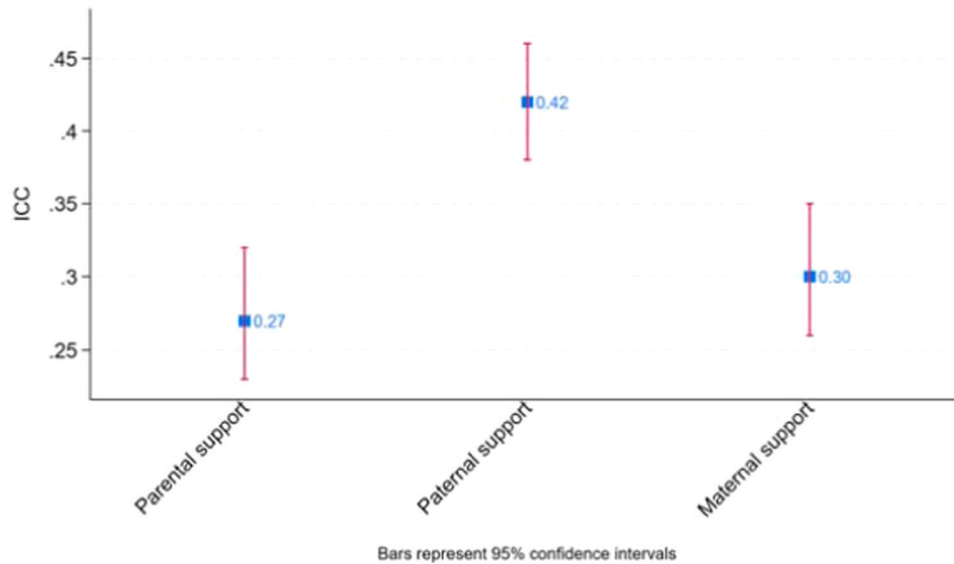


Figure 11. Sibling similarity in parental support in adolescence, intraclass correlation coefficients

12 Bootstrapped ICCs for personality traits

The ICC analysis for personality traits is repeated here with bootstrapped standard errors. Results, very similar to those in the main paper, are presented in figure G2.

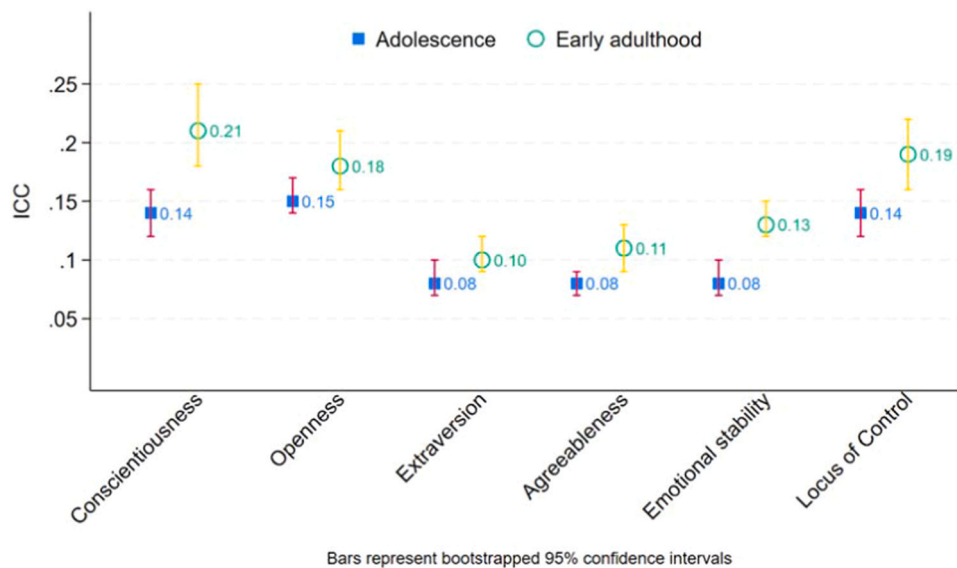


Fig. 12. ICC analysis for sibling personality with bootstrapped confidence intervals

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