University of Bonn

Research Module

Educating success?
Parental involvement and the formation of personality traits in children

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Contents

1 Introduction

The personality of individuals starts developing at an early stage in life. The social environment plays a major role in shaping individuals and parents are one of the most important elements in the early social environment (Caspi and Roberts, 2001 and Caspi et al., 2005)[1]. Because of this, many aspects of individuals are transmitted from one generation to the next. In theoretical frameworks, Bisin and Verdier (2001) and Doepke and Zilibotte (2017) investigate the transmission channel of preferences and personality from parents to their children. In a recent study, Zumbuehl et al. (2018) show that parental involvement in their children's life leads to children with similar risk and trust attitudes compared to their parents. However, the theoretical framework proposed by Doepke and Zilibotti (2017) does not just highlight the major role of parents transmitting their own preferences. Doepke and Zibotti also assume that parents choose their parenting style to shape the child's personality in a way that maximizes her/his lifetime utility, given the parents' preferences and socio-economic environment. Moreover, recent literature shows that some attitudes and personality traits matter for socio-economic outcomes (e.g. Feinstein, 2000 and Heckman et al., 2006). Taking these aspects into account, why should parents only influence their children to become similar to themselves and not impact their children's personality to show more beneficial characteristics?

This paper addresses the question above and investigates on the effect of parental involvement on the formation of children's personality traits. To do so, we follow an approach similar to Zumbuehl et al. (2018). We also account for the transmission of the parents own personality to their children. However, we isolate this effect and try to identify whether parents have the ability, to some extent, to induce favorable character traits independent of their own personality.

Our results indicate that a stronger parental involvement in the children's life has a positive effect on the personality traits that predict better educational and labor market outcomes, given the personality of the parents. In line with Zumbuehl et al. we also find evidence that parents pass their own traits to their children. Our results also suggest that mothers and fathers might play different roles in the formation of the children's personality. We find evidence suggesting that the mother's involvement strongly increases locus of control while paternal involvement increases conscientiousness and reduces neuroticism of adolescent children. Finally, we find some evidence suggesting that the effect of parental involvement is weaker during early childhood and strengthens as children enter the adolescence. Overall, our findings suggest that parents are indeed able to influence personality traits of their children beyond the effect of establishing similarities.

This paper is structured as follows, Section 2 highlights our model approach and methodology. In section 3 the data used for the analysis is described in detail. Section 4 discusses the results and section 5 concludes the paper.

2 Methodology

This work builds on the literature which shows that personality matters for socio-economic outcomes. For instance, Bowles et al. 2001[2] propose a framework describing the direct channel throughout which personality traits affect productivity in the work environment and Heckman et al. (2006) extent this

[1] See Caspi and Roberts (2001) and Caspi et al., (2005) for a broad literature review on personality development.

[2] Bowles et al. (2001) investigate the large income variation between individuals with similar educational levels and cognitive skills. They propose a model that attributes part of the income variance to individual sets of personality characteristics which are rewarded or punished in the labor market.

framework by providing evidence that non-cognitive skills not only affect labor market outcomes directly but also affect schooling decisions, which are well known to determine later earnings. While the theoretical literature exploring the transmission channels might be relatively novel, there is an extensive body of empirical studies trying to identify which individual characteristics are better predictors of success. The current state of the research on this topic will be illustrated in our model justification after presenting our model in the following section.

2.1 Model assumptions and hypothesis

Our project follows the theoretical approach of Doepke and Zilibotti (2017). They assume that parents play a crucial role in the character shaping of their child and can influence the formation of attitudes and preferences via their parenting style. More specifically, they invest in the child in a way which maximizes the child's expected welfare and economic success. So, parents are not just able to influence their children's attitudes and preferences, but also use their impact to shape their children in a beneficial way.

Assumption 1: Parents can influence their children's attitudes and preferences via their parenting and try to maximize children's expected welfare and economic success.

The theoretical model on transmission of character traits is supported by findings in the literature (e.g. Zumbuehl et al. 2018, Feinstein, 2000). We assume that parents are aware of which characteristics have a positive or negative effect on outcomes such as educational and economic success and therefore shape their children in a more promising way by influencing the formation of those personality traits.

Assumption 2: Parents are aware of which personality traits are relevant for expected future success.

However, it is not easy to identify parenting styles and it is also not clear whether parents influence their children solely in a conscious way, which could be measured by educational goals and parenting styles, or whether some channels work subconsciously. The SOEP recently implemented a battery of questions which aim to provide data about parenting styles and educational goals, but as the sample size is still very small we will not focus on that part in this project.
Instead, we follow Zumbuehl et al. (2018) and use parental involvement in the children's lives as an instrument. However, while Zumbuehl et al. show that parental involvement shapes the children to be more similar to their parents in terms of trust and risk preferences, we assume that more involved parents have more time or opportunities to educate and impact their children. Parental involvement therefore also is a measure of the extend to which parents can apply parenting styles, pursue educational goals etc.

Assumption 3: Parental involvement is a measure of the intensity of parenting.

Those three assumptions combined lead to the hypothesis we want to investigate on in our project. If parents know which character traits are important for future success, are able to influence the development of their children's personality and want to maximize their children's expected utility, we would expect that parents influence their children's personality formation in a way which goes further than making them similar to themselves. This means that parents will induce the formation of beneficial traits even though they themselves might not have developed pronounced beneficial characteristics.
As we cannot directly investigate the impact of parenting, we need assumption 3 to analyze whether

parents are able to shape their children's personality. Given parental involvement is a measure for the intensity of parenting, we expect parental involvement to have a significant effect on the character traits of their children, as it reflects the opportunity to influence the character formation of the child. More precisely, we expect parental involvement to have significant positive effects on those traits which literature shows to be beneficial and significant negative effects for those traits literature found unfavorable effects for, respectively.

Hypothesis: Parental involvement has a significant beneficial effect on character traits of their children. This also holds after taking the personality of the parents into account.

Taking the personality of the parents into account is crucial, as it ensures that potential effects for parental involvement are not driven by children who become similar to their parents.

2.2 Model justification

Our model does not contradict the approach by Zumbuehl et al. but rather supplements their idea. For trust and risk preferences, there is no clear direction on whether high or low levels are more beneficial as this depends on the environment one interacts in (Zumbuel et al., 2018). In contrast, there is a growing literature which shows that other character traits have distinct effects on educational and economic success. There is for example conclusive evidence in the literature that locus of control has significant effects on the acquisition of skills and labor market success (e.g. Feinstein, 2000, Heckman et al., 2006 and Anger and Heineck, 2010). Feinstein (2000) and Heckman et al. (2006) also find similar effects for self-esteem. Moreover, patience is found to be a strong predictor for educational success (Falk et al., (2018). Also, evidence from several papers shows that some of the Big Five personality traits influence future performance. Nyhus and Pons (2005) as well as Blanden and Machmillan (2007) find that neuroticism has a negative impact on future outcomes, whilst Judge et al. (1999) and Almlund et al. (2011) find conscientiousness and openness to have positive effects. Some papers indicate, that also extraversion (Blanden and Machmillen, 2007), agreeableness (Feinstein, 2000) and depending on the context also positive reciprocity might have an impact.
It would be of interest to analyze whether parents can influence their children's personality in the expected direction for all the character traits mentioned above. Nevertheless, our analysis will only focus on investigating whether parental involvement significantly influences the shaping of locus of control and the Big Five personality traits, namely openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. Moreover, we will give particular attention to locus of control, conscientiousness and neuroticism, as the literature finds greater evidence for the effects of these traits on educational and economic success. We avoid making particular interpretations for openness, extraversion and agreeableness as the literature does not provide unanimous results for their effects (e.g. Anger and Heineck (2010) or Nyhus and Pons (2005) for evidence of mixed results between genders). Concerning the other traits not part of our analysis, we face at least one of two issues regarding the data provided by SOEP: Either there is no reliable measure to gather information on the trait we are interested in, which applies for example for self-esteem. We found only one item in SOEP which is related to self-esteem. Therefore, we would suffer serious measurement errors when using this measure and the validity of related results would be questionable. Or SOEP provides a validated measure measuring the trait we are interested in, for example the incentivized experiments on time preferences or reciprocity, but the sample size for those individuals does not allow us to use it. This is because there are not enough observations for children and

their parents to run meaningful regressions, if there are any. Finally, the Big five personality traits and the locus of control measure provided in SOEP are well-validated, widely used measures (e.g. Piatek and Pinger (2016) for Locus of control) which were measured for the vast majority of participants. We, therefore, have information on these traits for parents and their children.

2.3 Model specification

To test our hypothesis we run OLS regressions using robust standard errors on all selected personality traits of individuals of age seventeen in a youth sample and of age ten and eleven in the child sample. The idea behind taking these two samples is to identify whether we observe strong effects of parental involvement at an early children's age or whether this strengthens during the adolescence. We use a regression model of the following form:

$$Y_i = \alpha + \beta_1 I_i + \beta_2 P_i + \beta_3 C_i + u_i \tag{1}$$

where Y_i equals the observed measure of the personality trait for child i, I_i is a vector containg the maternal and paternal involvement scores, P_i is a vector containing the measures for the different peronality traits of each parent, C_i is a vector containing a series of socio-economic and family related control measures and u_i captures unobservables which influence the forming of character traits.
We control for socio-economic and background variables as the literature on the development of personality evidences the importance of the social environment for personality formation. However, parents are a major factor of the early social environment and one can expect parental involvement to strengthen similarities between child and parent. The innovation of our approach relies on the fact that we control for the personality characteristics of the parents. This has the advantage that it allows to isolate the effect of parental involvement on children from the possible effect of parents transmitting their own personality through involvement. Thus, the coefficients contained in β_1 should be showing the average effects of parental involvement on the children's personality, given a set of personality traits that parents display.

3 Data

This empirical analysis uses data of the 33rd wave of the German Socio-Economic Panel (SOEP), a representative panel study of households in Germany conducted annually since 1984. The SOEP collects socio-economic information on all members of over 12.000 households. The questionnaires given to the adult members of the sampled households cover a wide range of topics from biography over family life to personality, preferences and happiness. Since the year 2000, every child in the household turning 18 the following year enters the survey filling out the Youth Questionnaire. This questionnaire gathers information regarding childhood, schooling and the relation to the parents.
To analyse the effects of parental involvement on children's personality traits, we use the data available in the Youth Questionnaire which provides information on parental involvement in the child's life and the personality of the children. We have a starting sample of around 3900 individuals who filled the questionnaire at the age of 17 and provided information on their personality and parental involvement.
In the second part, we take into account that the personality development of children is a lengthy process. We therefore investigate whether there already is a significant influence of parental involvement on personality formation before the adolescence period. To do so, we use data provided for children age ten and eleven in the Pre-Teen Questionnaire, a recently introduced study from SOEP which is filled in by

the children themselves. It provides information on the Big Five personality items as measured in the Youth Questionnaire, which allows to compare children age ten and eleven with those at age 17. Due to the recent implementation of the module, our sample for this part is relatively small with about 390 individuals. In the following section we will describe the most important variables used in our analysis and how they were created.

3.1 Personality traits

In the Youth, the Pre-teen and some waves of the adults questionnaire[3], SOEP provided specific items which measured the interviewee's Big Five personality traits (openness to experience, conscientiousness, extraversion, agreeableness, neuroticism) and locus of control. To illustrate what kind of behavior is associated with each character traits we cover, openness in experience refers to individuals' intellectual curiosity and whether someone is eager to learn. A conscious individual is more likely to achieve due to strong work ethic and a focused learning strategy. Agreeableness is an attitude associated with compassion and willingness to cooperate. Neurotic individuals experience anxiety and negative emotionality. Extraversion indicates how social and outgoing an individual is (Komarraju et al. 2011). Locus of control measures the level by which an individual believes she has control over the outcome of events in life which can be divided into internal locus of control which displays the grade to which the individual beliefs herself can impact outcomes and external locus of control indicating to which extend the individual believes external factors influence her success in life.

3.1.1 Locus of control and Big Five personality traits

Locus of control is measured by a 10-item questionnaire including 5 items for external and 5 items for internal locus of control. Similar to above, the respondents are required to determine the extent to which they agree on certain statements related to their character based on a 4-point scale ranging from 1 ("disagree completely") to 4 ("agree completely"). We create the locus of control score of an individual, following the approach from Piatek and Pinger (2016). We conduct a principal component analysis for dimensionality reduction. Note that in order to create the index from proxies measuring internal and external locus we invert the values of some of the 10 proxies. The generated index shall be interpreted as follows. Higher scores are an indication for an individual displaying greater internal locus while low scores indicate someone who displays external locus of control. As in all the measured personality traits in this work, the final scores are standardized by subtracting mean of variables and dividing by its standard deviation. The details of grouping and the loadings of items that generate the index are included in table 13. It is worth mentioning that the validity of reducing the 10 SOEP items into on index is discussed in detail by Piatek and Pinger. The factor loadings obtained for our sample are similar to those obtained by Piatek and Pinger as an indication that our samples have a similar data structure and that this method can be applied without major information loss. The Big Five personality traits are measured by a 15-item questionnaire with each trait covered by three items. The respondents need to determine the extent to which they agreed on certain statements related to their character. The items have to be answered on a 7-point scale ranging from 1 ("Does Not Apply at All") to 7 ("Applies Completely"). For example, the item "Considerate, friendly" is referring to the trait agreeableness and "Often worry" is referring to the trait neuroticism. For some items, we inverted the score due to the inverted statement. As

[3]Measurements for adult's internal and external locus of control are found in the waves 2005,2010 and 2015. Measurements for openness, conscientiousness, extraversion, agreeableness and neuroticism are found in the waves of 2005,2009 and 2013.

a result, we can obtain a score of the specific traits of a respondent by averaging the item scores referring to their corresponding trait. The scores are standardized by subtracting mean of variables and divided by its standard deviation.

3.1.2 Measurement of parental personality

The measures for the parents' personality are assessed in the adult's survey identically to the measures in the youth questionnaire. However, the items on locus of control and Big Five has been asked in three different waves of the survey. This means that there are parents with multiple answers for the same item on personality. One could make use of the multiple observations on each individual trait and compute the average score reported. However, we do not discard the possibility that the individuals' personality might change over time. Additionally, some of these measurements have been taken 10 years apart from each other. For the purpose of this work we are primarily interested in a measurement that reflects the parent's personality during the children's childhood and early youth. Given the time differences the questionnaires were filled by the parents and later by their children we find that earlier measurements for the personality traits of the parents overlap the most with the children's childhood and early youth period. Thus, instead of taking the average score for each trait, we will be using the first reported score found for each adult individual.

3.2 Parental Involvement

For the creation of the parental involvement score, we follow the approach by Zumbuehl et al. (2018). The SOEP includes specific items regarding parental involvement in the Youth Questionnaire. It consists of five items which were measured combined for both parents and relate to school performance and engagement. Additionally, the involvement score takes sixteen proxies of mother's and father's intensity of involvement in the respondents' life, eight relating to the mother and eight relating to the father, into account. The adolescents for example had to state to which extent statements as "Parents take part in parents-evening" or "Mother talks about things that worry you" apply. All the items are measured either as binary variables or on a 4- or 5-point scale. Also, the variables are standardized by the method stated above. We assume parents can choose to participate in their children life if they want such that parental involvement is a kind of general parental investment. By applying the principal component analysis on the parental involvement variables, we constructed two involvement scores, one for the mothers of each adolescent and one for the fathers, respectively. The factor loadings of each proxy are included in table 12. The factor loadings we obtained are similar to those by Zumbuehl et al. (2018).
Unfortunately, the pre-teen questionnaire does not cover information on parental involvement. Instead, we assume that the parent's involvement remains relatively similar over time for all the children in the household. This allows us to match the data from the children age 10-11 with the data provided by older siblings who took part in the Youth Questionnaire at some point.

4 Results

As presented by Bisin and Verdier (2001) and Doepke and Zilibotti (2017) parents play a major role molding preferences, attitudes and personality of their children, so it should be no surprise to observe a relationship between the degree of involvement of parents with their children and the development of certain personality traits. This section analyzes the empirical relation between parental involvement

and the personality of their children in more detail. We begin by identifying the correlation between involvement of each parent and the children's scores for locus of control, openness, conscientiousness, extraversion, agreeableness and neuroticism for the youth sample. Afterwards, we introduce other socio-economic variables which can affect the development of the children's personality. Our work innovates in the sense that we include measurements of the parent's personality. This is meant to capture other possible channels leading to our results, such as more involvement strengthening similarities between children and their parents. Moreover, we split our sample into male and female adolescents in order to investigate potential differences in sexes and special mother-daughter or father-son relations. Finally we extend our analysis to the children sample of age ten and eleven to find out whether the effects of parental involvement are already present at an early stage in childhood.
We provide results on all character traits mentioned above, however, we are mostly interested in knowing whether parental involvement encourages the development of those traits that matter for success, namely locus of control, conscientiousness and neuroticism, as discussed in the previous section.

4.1 Correlation between parental involvement and the children's personality

To get a first impression on the relationship between parental involvement and the children's character traits, we run some simple regressions. Table 1 reports the results of regressing the scores for locus of control and the Big Five traits of children in the youth sample on the generated scores for maternal and paternal involvement. The results indicate a relationship between the involvement of the parents and the personality of the children for all measured traits. As for the traits which are better predictors of success one can observe that the involvement of the parent seems to be shaping these in the correct direction. We observe that both, maternal and paternal involvement have significant positive effects on locus of control and conscientiousness. As for neuroticism, we observe that only paternal involvement has a significant negative effect whilst their is no effect of maternal involvement on neuroticism of the child.
However, the involvement of the parents differs a lot depending on the family and socio-economic background. Table 8 reports the correlation coefficients between maternal and paternal involvement and some control variables which might have significant effects on parental involvement and the development of the children's personality. We find that parents with higher education and those with higher income are significantly more involved in their children's upbringing. Thus, we control for these factors by including the per capita household income[4], and years of education of each parent to the regression[5]. We also check whether both parents still live with the adolescent as table 8 shows that parents, especially the father, who no longer live with the family are significantly less involved. We control for possible effects of the age difference between child and parent, as we also find that it is affecting involvement, especially for the fathers. Moreover, the correlation table shows that the number of siblings is negatively correlated with parental involvement, possibly reflecting that the more children live in the household, the less time parents might be investing in each child. Finally, we add the migration background to our controls as prior literature (e.g. Bisin and Verdier, 2001) indicates that this might play a role in the transmission of culture and Zumbuehl et al. (2018) find this control to have effects on the transmission of risk attitudes[6]. Table 2 presents the regression results after controlling for socio-economic and household related vari-

[4]We generate this variable by taking the logarithms of the net household income divided by the number of persons in the household

[5]Education in years is a variable generated by the SOEP conveying information about the type of education pursuit by the individual and the degree obtained.

[6]The migration variable used in the regression takes the value of one if the child or at least one of the parents has a migration background.

ables. For all traits we find that the involvement of at least one of the parents remains significant. Maternal and paternal involvement are significantly increasing the scores for locus of control, openness and extraversion. However, the coefficients for the mother on these traits have greater statistical significance. A one standard deviation increase in maternal involvement is increasing locus of control by 0.11 standard deviations[7] at a 1 percent significance level. The results also display evidence for asymmetries in the impact of maternal and paternal involvement. Only the paternal involvement seems to have an effect on conscientiousness. A one standard deviation increase in paternal involvement increases conscientiousness by 0.15 standard deviations at a 1 percent significance level, whilest the maternal involvment is not significant. We also observe that only the mother's involvement has an effect on agreeableness. Finally, we observe that a one standard deviation increase in paternal involvement is significantly reducing neuroticism by 0.11 standard deviations at the 1 percent level, maternal involvement has a negative effect by increasing neuroticism by 0.06 standard deviations at a 10 percent significane level.

4.2 Parental involvement and the personality of the parents

The results presented above indicate that parental involvement is affecting children's personality traits in the expected direction. This provides some first evidence for our hypothesis. However, we are interested to see if parental involvement is shaping those traits even after taking the personality of the parents into account. Otherwise, the results could be solely driven by strong parental involvement strengthening similarities between parents and children, as this effect was already shown by Zumbuehl et al. (2018).

Two observations lead us to believe that the personality of the parents does indeed affect how involvement shapes traits of the children. First of all, heterogeneous results between maternal and paternal involvement might indicate that the mother's involvement is shaping those traits that female display the most while the father's involvement is shaping those which the male display the most. Several studies show differences between genders on the Big Five. Schmitt et al. (2008) find that women score higher on average on neuroticism, extraversion, agreeableness, and conscientiousness. Our sample also displays significant gender differences for some of the personality traits of the parents (see table 11 for descriptive statistics), with more significant differences in the distribution for agreeableness and neuroticism consistent with the findings of Schmitt et al. (2008). Furthermore, our regression results find maternal and paternal investment to be the most asymmetric within those traits. This might be an indication that parents might be rather transmitting their own traits to the children.

A second observation makes the effect even more plausible. Table 9 displays the correlation coefficients between the involvement score of each parent and her/his score for the different personality traits. We find significant correlations between involvement and all traits for mothers and fathers. Moreover, we find that parents who score higher on locus of control, conscientiousness and lower on neuroticism are more participative in the upbringing of their children. This indicates that parents who already display the set of personality traits which matter for success spend on average more time with their children.

To account for the possibility that parental involvement rather shapes those traits that parents already display, we control for the parents' personality characteristics. This absorbs the effect the parents' personality might have on the personality of their children which before would have been contained in the involvement variables. Table 3 shows the effects of parental involvement after controlling for all socioeconomic and background variables as well as the parent's personality. The results reveal two major effects. We observe that the parent's personality does have significant effects on the children's person-

[7] To translate the effect into actual points on the non-standardized scores, multiply the coefficient with the related standard deviations found the in descriptive statistics table 10.

ality. Children develop traits that have a stronger presence in their parents. For example, parents with higher scores for locus of control have children scoring significantly higher for locus of control. The same effect is observed for all the other traits, and especially, consciousness, openness and neuroticism. Excluding genetical factors, as this only matter to a certain extent (Caspi et al., 2001), this in line with what Zumbuehl et al. find. Nevertheless, the results also provide evidence for our hypothesis. The coefficients for parental involvement remain significant even after controlling for the personality of the parents. Moreover, the coefficients also show the expected signs. Given a certain set of personalities of the parents, paternal involvement significantly improves conscientiousness and reduces neuroticism. A lower positive impact is observed for locus of control. As for the maternal involvement, it significantly increments the scores for locus of control, openness and agreeableness, while we still observe some undesirable effects on the neuroticism scores. The findings suggest that parents indeed are able to influence their children's personality in a beneficial way which goes beyond making them similar to themselves.

4.3 Parental roles and relations

As discussed in the previous section, mothers and fathers might differ significantly regarding some of the traits we study. Furthermore, the asymmetries between the coefficients for maternal and paternal involvement reveal specific roles for mothers and fathers in the development of the child's personality. By splitting the youth sample by gender we find evidence that suggests the existence of mother and father roles as well as specific mother-daughter and father-son relationships. Figure 1 and figure 2 compares effects of maternal and paternal involvement on personality traits among the entire sample and each subsample. Figure 3 displays the differences between the estimated coefficients for paternal and maternal involvement. (see tables 4 and 5 for the regression results on the female and male subsample). Our results suggest that fathers have a notable role in the development of conscientiousness for daughters and sons, while maternal involvement has almost no effect on this trait. This result is even more impressive considering the fact that in our sample, mother's scores for conscientiousness are on average slightly higher than father's scores. On the other hand, mothers seem to have a notable role in the formation of agreeableness.

Regarding the specific mother-daughter and father-sons relations, we find that for the son's locus of control it is the paternal involvement that shows significant effects while for the daughters only the mother's involvement appears to matter. For neuroticism the involvement of the mother still increases the score for both, but the coefficient loses any statistical significance. The fathers' involvement significantly decreases only the neuroticism scores for the sons and has no significant effect on the daughters' neuroticism.

After decomposing the regression results for the youth sample, in the following section we will compare the effects just described with the results for children age ten and eleven.

4.4 Parental involvement in earlier childhood

Unlike the previous analysis, we could not find the same significant results for the impact of parental involvement on children of age ten and eleven. Our initial regression indicates that maternal involvement has no significant on any of the traits we have measures for. Although paternal involvement appears to have some importance, the statistical significance of the results is reduced considerably comparing to the same regression for the youth sample(see table 6 for initial regression). Moreover, as control variables are introduced (see table 7), except for extraversion any statistical significance of the coefficients

disappears. These results suggest that more parental involvement does not shape those traits in the pre adolescence. A possible explanation for this could be that most of the Big Five traits might start developing in individuals at some later point in life. We find some evidence for this in the psychology literature. For example, Soto et al. (2011) find that openness to experience and neuroticism only start developing at the adolescence. Furthermore, agreeableness and conscientiousness even show negative trends during childhood. However, our results should not be interpreted as an indication that parental involvement does not matter during childhood. There might be many other aspects of personality which start developing earlier in life which we do not cover in our analysis and which could have significant impact on the development of personality later on. Besides that, our parental involvement measure might have some limitations. Firstly, the pre-teen questionnaire does not cover any information on parental involvement. Thus, the parental involvement scores used here were those provided by older siblings under the assumption that parental involvement does not change significantly over time. However, this might create a measurement error because parental involvement between siblings can be different due to, for example, gender differences (Muller et al, 1998). Secondly, one could discuss the validity of the proxies found in the SOEP as a parental involvement measure for children in the pre-teen years. Questions such as "Mother/Father talks about things that worry you" or "Mother/Father asks your opinion on family matter" might suit better describing parental involvement during the adolescence and not relate to children age ten and eleven. Furthermore, there are several limitations for our research on this topic due to the novelty of the pre-teen questionnaires. For the analysis on the kids age ten and eleven we have a very small sample size. In the simple regression without including any control variables, we have only 389 observations. When control variables such as parent's education level and household's income are included, the observations dropped to 265. As a result, we cannot include other important variables such as the personality of the parents to the regression model without losing too many observations. Given the small sample size, the regression results themselves should also be used with caution. Following, we do not have measurements for the locus of control for children of age ten and eleven, which is the measure with the most evidence that it is a strong predictor of socio-economic success. Thus, we cannot make a valid conclusion for this trait.

Ideally, one would need to have personality and parental involvement measures for the same child at many different stages in childhood to understand at which point parental involvement starts shaping the personality of children (regarding the traits covered in this work). This way one would be able to follow the development of a child starting from early years until adolescence. However, the respondents who filled in the pre-teen questionnaire will also be the respondents of the SOEP youth questionnaire in coming years. This means that most of the limitations stated above can be solved in the near future.

5 Conclusion

This paper provides supportive evidence that parents' personalities influence the development of children's personalities as found by Zumbuehl et al. (2018). More strikingly, we find that parental involvement remains significant after controlling for parents' personality. This suggests that parents, to some extent, can influence their children's personality in a way which benefits expected socio-economic success independent of their own personality. Additionally, the results of this paper indicate that different roles for mothers and fathers as well as specific relations between mothers and daughters and fathers and sons regarding the influence on personality development exist. More specifically, our results hint on the fact that there are some traits which are only influenced by the mother, some by the father and some by

mother or father depending on the sex of the child.

Furthermore, our study suggests that the parents' ability to impact their children's personality through parental involvement varies in different childhood stages as we do not find the same evidence for children at age ten and eleven as we find for those at age seventeen. Some evidence in the literature accounts for this finding. Many of the character traits we cover in this work might start developing during the adolescence and some of them even show a negative trend at age ten and eleven (see e.g. Soto et al. 2001). However, we do not disregard possible issues that could also lead to this particular finding for the young children. First, due to the novelty of the Pre-Teen Questionnaire, our study on children at age ten and eleven was conducted with a significantly reduced sample and the parental involvement scores used here were those provided by older siblings under the assumption that parental involvement does not change significantly over time. Second, the proxies found in the SOEP for parental involvement at age seventeen might not be a precise measure for parental involvement at age ten and eleven.

Nevertheless, the children of age ten and eleven will be taking part in the youth questionnaire in the following years. This will not only provide the information needed to track the personality development for each kid over time, but also improve issues such as sample size and a more precise parental involvement measurement. Moreover, a bigger sample size for the Pre-Teen Questionnaire also could motivate further research on the impact of parenting. As mentioned in the model motivation, SOEP provides information on educational goals and parenting styles of the children. With a bigger sample those measures could be used to narrow down and clarify the impact of parenting without relying on parental involvement as an instrument.

Our results have important implications for intergenerational mobility. They not only provide evidence for the ability of parents to shape their children, but more importantly, suggest that parental involvement could be an important mechanism to develop personality traits that might lead to better socio-economic outcomes, even when parents do not display those traits themselves. Yet, little is known about how the parental involvement channel works shaping these traits. Questions such as whether parents consciously or subconsciously impact their children still need to be addressed. Future research might be able to investigate this and many other issues thanks to the growing data being collected on parenting styles and educational goals. This might allow identifying the key aspects that make parental involvement work positively on children and might help policymakers create effective programs to reduce intergenerational persistence.

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7 Tables

Table 1: Parental involvement on the children's locus of control and Big Five, simple

	LoC	O	C	E	A	N
Constant	0.00	-0.00	0.01	0.01	-0.01	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
$\text{Involvement}_{\text{m}}$	0.10***	0.10***	0.10***	0.09***	0.14***	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
$\text{Involvement}_{\text{f}}$	0.14***	0.05***	0.06***	0.06***	0.08***	-0.08***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
R-squared	0.04	0.02	0.02	0.02	0.03	0.01
No. Obs.	3798	3798	3798	3798	3798	3798

Note: The dependent variables are the standardized scores for locus of control, openness, conscientiousness, extraversion, agreableness and neuroticism of individuals of age seventeen. Details about the measurement and construction of the scores are provided in section 3. The main explanatory variables "$\text{Involvement}_{\text{m}}$" and "$\text{Involvement}_{\text{f}}$" are indices constructed using factor analysis on 13 involvement proxies. More information in section 3. Robust standard errors in parenthesees. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 2: Parental involvement on the children's locus of control and Big Five, controls

	LoC	O	C	E	A	N
Constant	-1.42***	-1.01***	1.06***	0.16	0.66*	0.42
	(0.37)	(0.39)	(0.36)	(0.36)	(0.38)	(0.38)
$\text{Involvement}_{\text{m}}$	0.10***	0.08**	0.05	0.07**	0.15***	0.06*
	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)
$\text{Involvement}_{\text{f}}$	0.08*	0.07*	0.16***	0.08*	0.05	-0.11**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
$\text{Years of Education}_{\text{m}}$	0.01	0.02*	-0.02	-0.01	-0.02	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\text{Years of Education}_{\text{f}}$	0.01	0.02**	-0.02*	-0.01	0.02	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Number of Siblings	0.03	-0.04*	0.02	0.02	0.01	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
P\C Net Income	0.17***	0.03	-0.14***	-0.00	-0.09	0.02
	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)
Migration Background	-0.14*	0.30***	0.00	0.03	-0.04	0.13*
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Mother in HH	-0.15	0.04	0.17	0.02	-0.02	-0.15
	(0.12)	(0.13)	(0.13)	(0.14)	(0.14)	(0.15)
Father in HH	0.07	-0.09	0.12	0.07	-0.01	-0.07
	(0.08)	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)
$\Delta\ \text{Age}_{\text{m}}$	-0.00	0.00	0.00	0.00	-0.01	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\Delta\ \text{Age}_{\text{f}}$	0.00	0.01	-0.00	-0.00	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
R-squared	0.05	0.05	0.04	0.02	0.03	0.01
No. Obs.	1775	1775	1775	1775	1775	1775

Note: The dependent variables are the standardized scores for locus of control, openness, conscientiousness, extraversion, agreableness and neuroticism of individuals of age seventeen. Details about the measurement and construction of the scores are provided in section 3. The main explanatory variables "$\text{Involvement}_{\text{m}}$" and "$\text{Involvement}_{\text{f}}$" are indices constructed using factor analysis on 13 involvement proxies. More information in section 3. Robust standard errors in parenthesees. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 3: Parental involvement on the children's locus of control and Big Five, extended

	LoC	O	C	E	A	N
Constant	-0.92**	-0.76***	1.15***	0.35	0.67	0.36
	(0.54)	(0.56)	(0.51)	(0.53)	(0.58)	(0.55)
$\text{Involvement}_{\text{m}}$	0.09**	0.09**	0.04	0.06	0.13***	0.06
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
$\text{Involvement}_{\text{f}}$	0.08*	0.05	0.16***	0.07	0.05	-0.09**
	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)
LoC_{m}	0.11***	-0.00	-0.03	-0.02	0.01	0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
LoC_{f}	0.07**	0.03	0.03	0.06**	0.03	0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$\text{Openness}_{\text{m}}$	0.04	0.09***	0.03	0.02	-0.02	-0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$\text{Openness}_{\text{f}}$	-0.03	0.10***	-0.01	0.02	-0.02	0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$\text{Conscientiousness}_{\text{m}}$	-0.09***	0.01	0.10***	0.04	0.04	-0.02
	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
$\text{Conscientiousness}_{\text{f}}$	-0.03	-0.07*	0.10***	0.06	-0.02	-0.12***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
$\text{Extraversion}_{\text{m}}$	0.04	-0.02	-0.03	0.05	-0.00	0.03
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
$\text{Extraversion}_{\text{f}}$	0.02	0.01	-0.01	0.06*	-0.00	0.06*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
$\text{Agreeableness}_{\text{m}}$	0.01	0.03	-0.02	-0.05*	0.11***	0.05*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$\text{Agreeableness}_{\text{f}}$	0.03	0.01	0.00	-0.02	0.05*	0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$\text{Neuroticism}_{\text{m}}$	0.03	0.03	-0.03	-0.00	-0.01	0.06**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$\text{Neuroticism}_{\text{f}}$	-0.00	0.01	0.01	0.02	-0.00	0.06**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
R-squared	0.08	0.07	0.07	0.04	0.05	0.03
No. Obs	1641	1641	1641	1641	1641	1641

Note: The dependent variables are the standardized scores for locus of control, openness, conscientiousness, extraversion, agreableness and neuroticism of individuals of age seventeen. Details about the measurement and construction of the scores are provided in section 3. The main explanatory variables "$\text{Involvement}_{\text{m}}$" and "$\text{Involvement}_{\text{f}}$" are indices constructed using factor analysis on 13 involvement proxies. More information in section 3. In addition to the listed variables all socio-economic and family controls have been included. Robust standard errors in parenthesees. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 4: Parental involvement on the children's locus of control and Big Five, female sample, extended

	LoC	O	C	E	A	N
Constant	-0.31	-0.65	1.46***	0.59	1.14*	0.21
	(0.58)	(0.62)	(0.53)	(0.60)	(0.60)	(0.65)
$\text{Involvement}_\text{m}$	0.11**	0.06	0.04	0.03	0.11**	0.06
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$\text{Involvement}_\text{f}$	0.02	0.09	0.15**	0.04	0.06	-0.13**
	(0.05)	(0.06)	(0.06)	(0.07)	(0.06)	(0.06)
R-squared	0.07	0.11	0.06	0.05	0.05	0.05
No. Obs.	792	792	792	792	792	792

Note: The dependent variables are the standardized scores for openness, conscientiousness, extraversion, agreableness and neuroticism of individuals of age seventeen. The main explanatory variables "$\text{Involvement}_\text{m}$" and "$\text{Involvement}_\text{f}$" are indices constructed using factor analysis on 13 involvement proxies. Details about the measurement and construction of the scores are provided in section 3. In addition to the listed variables, scores for the parent's personality as well as all socio-economic and family controls have been included. Robust standard errors in parenthesees. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 5: Parental involvement on the children's locus of control and Big Five, male sample, extended

	LoC	O	C	E	A	N
Constant	-1.41**	-0.88	1.17**	0.21	0.25	0.54
	(0.56)	(0.59)	(0.53)	(0.52)	(0.58)	(0.54)
$\text{Involvement}_\text{m}$	0.07	0.06	0.00	0.05	0.11**	0.01
	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$\text{Involvement}_\text{f}$	0.14*	0.06	0.23***	0.14**	0.10	0.00
	(0.07)	(0.06)	(0.06)	(0.07)	(0.06)	(0.07)
R-squared	0.12	0.07	0.10	0.06	0.06	0.03
No. Obs.	849	849	849	849	849	849

Note: The dependent variables are the standardized scores for openness, conscientiousness, extraversion, agreableness and neuroticism of individuals of age seventeen. The main explanatory variables "$\text{Involvement}_\text{m}$" and "$\text{Involvement}_\text{f}$" are indices constructed using factor analysis on 13 involvement proxies. Details about the measurement and construction of the scores are provided in section 3. In addition to the listed variables, scores for the parent's personality as well as all socio-economic and family controls have been included. Robust standard errors in parenthesees. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 6: Parental involvement on the children's locus of control and Big Five, Pre-Teen sample, simple

	O	C	E	A	N
Constant	-0.03	-0.08*	-0.12**	-0.03	0.11**
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$\text{Involvement}_\text{m}$	0.02	-0.05	0.01	-0.05	0.09
	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)
$\text{Involvement}_\text{f}$	0.08	0.13**	0.14**	0.10*	-0.10*
	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)
R-squared	0.01	0.02	0.02	0.01	0.01
No. Obs.	388	388	388	388	388

Note: The dependent variables are the standardized scores for locus of control, openness, conscientiousness, extraversion, agreableness and neuroticism of individuals of age ten and eleven. Details about the measurement and construction of the scores are provided in section 3. The main explanatory variables " $\text{Involvement}_\text{m}$" and "$\text{Involvement}_\text{f}$" are indices constructed using factor analysis on 13 involvement proxies. These proxies are not self-reports from the Pre-Teen sample, but are taken from older siblings who filled the youth questionnaire. More information in section 3. Robust standard errors in parenthesees. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 7: Parental involvement on the children's locus of control and Big Five, Pre-Teen sample, controls

	O	C	E	A	N
Constant	-1.47	0.05	0.31	0.06	0.31
	(1.07)	(1.02)	(1.22)	(1.59)	(1.24)
$\text{Involvement}_{\text{m}}$	-0.06	-0.08	0.02	-0.07	-0.01
	(0.08)	(0.07)	(0.08)	(0.08)	(0.08)
$\text{Involvement}_{\text{f}}$	0.02	0.06	0.15	0.08	0.02
	(0.09)	(0.08)	(0.09)	(0.08)	(0.08)
$\text{Year of Education}_{\text{m}}$	0.03	-0.01	-0.02	0.05*	0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
$\text{Year of Education}_{\text{f}}$	-0.00	0.08***	0.00	-0.01	-0.03
	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)
Migration Background	-0.30	0.39**	0.03	0.00	0.11
	(0.20)	(0.16)	(0.17)	(0.23)	(0.18)
Mother in HH	0.72**	-0.83	-0.50	-0.03	-0.77
	(0.30)	(0.81)	(0.93)	(1.31)	(0.99)
Father in HH	-0.22	-0.08	0.35*	-0.27	-0.39**
	(0.19)	(0.17)	(0.19)	(0.19)	(0.19)
P\C Net Income	0.11	-0.01	0.00	-0.06	0.10
	(0.15)	(0.09)	(0.11)	(0.13)	(0.11)
R-squared	0.03	0.06	0.05	0.02	0.04
No. Obs.	248	248	248	248	248

Note: The dependent variables are the standardized scores for locus of control, openness, conscientiousness, extraversion, agreableness and neuroticism of individuals of age ten and eleven. Details about the measurement and construction of the scores are provided in section 3. The main explanatory variables "$\text{Involvement}_{\text{m}}$" and "$\text{Involvement}_{\text{f}}$" are indices constructed using factor analysis on 13 involvement proxies. These proxies are not self-reports from the Pre-Teen sample, but from older siblings who filled the youth questionnaire. More information in section 3. Robust standard errors in parenthesees. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 8: Correlation coefficients between parental involvement and controls

	Mother		Father	
	Involvement	p-value	Involvement	p-value
Education in Years	0.2099	0.0000	0.2178	0.0000
Age Difference with Child	0.0647	0.0026	0.1200	0.0000
Migration Background	0.0396	0.0648	0.0227	0.3254
P\C Net Income	0.1617	0.0000	0.2011	0.0000
Parents in the HH	0.1501	0.0000	0.3240	0.0000
Number of Siblings	-0.0445	0.0379	-0.0373	0.1064
No. Obs.	2173		1876	

Note: Only parents with children in the age seventeen sample included.

Table 9: Correlation coefficients between parental involvement and parents' locus of control and Big Five

	Mother		Father	
	Involvement	p-value	Involvement	p-value
Locus of Control	0.1055	0.0000	0.1069	0.0000
Openness	0.1158	0.0000	0.0881	0.0000
Conscientiousness	0.0862	0.0000	0.0512	0.0024
Extraversion	0.0889	0.0000	0.0335	0.0471
Agreableness	0.1058	0.0000	0.1137	0.0000
Neuroticism	-0.0554	0.0005	-0.0629	0.0002
No. Obs.	3938		3509	

Note: Only parents with children in the age seventeen sample included.

Table 10: Descriptive statistics of non standardized locus of control and Big Five as well as parental involvement at age 17

Measure	Descriptive Statistics				
	Mean	Std	Min	Max	No. Obs.
Personality Traits					
Openness to experiences	4.694	1.111	1.000	7.000	3794
Extraversion	4.900	0.915	1.000	7.000	3794
Conscientiousness	4.846	1.121	1.000	7.000	3794
Agreeableness	5.339	0.924	1.000	7.000	3794
Neuroticism	3.963	1.156	1.000	7.000	3794
Locus of control	0.013	1.542	1.103	3.809	3798
Parental Involvement					
$\text{Involvement}_{\text{f}}$	0.047	2.242	-5.313	4.287	3798
$\text{Involvement}_{\text{m}}$	0.090	1.869	-8.100	3.946	3798

Note: Scores for personality traits are constructed averaging the proxy values for each trait. Indices for parental involvement are constructed using factor analysis on 13 involvement proxies.

Table 11: Descriptive statistics of the non standardized scores for parents' locus of control and Big Five

Measure	Descriptive Statistics				
	Mean	Std	Min	Max	No. Obs.
$\text{Openness to experiences}_{\text{m}}$	4.587	1.203	1.000	7.000	4025
$\text{Openness to experiences}_{\text{f}}$	4.371	1.165	1.000	7.000	3573
$\text{Extraversion}_{\text{m}}$	5.397	0.791	1.000	7.000	4025
$\text{Extraversion}_{\text{f}}$	5.354	0.772	1.000	7.000	3573
$\text{Conscientiousness}_{\text{m}}$	6.050	0.846	1.000	7.000	4025
$\text{Conscientiousness}_{\text{f}}$	5.979	0.879	1.000	7.000	3573
$\text{Agreeableness}_{\text{m}}$	5.627	0.922	1.000	7.000	4025
$\text{Agreeableness}_{\text{f}}$	5.252	1.010	1.000	7.000	3573
$\text{Neuroticism}_{\text{m}}$	4.121	1.209	1.000	7.000	4025
$\text{Neuroticism}_{\text{f}}$	3.745	1.168	1.000	7.000	3573
$\text{Locus of control}_{\text{m}}$	-0.083	1.596	-5.297	3.758	4959
$\text{Locus of control}_{\text{f}}$	0.124	1.570	-6.048	3.934	4210

Note: Only parents with children in the age seventeen sample included. Scores for personality traits are constructed averaging the proxy values for each trait.

Table 12: Factor-loadings for PCA parental involvement measures

Item in the Questionnaire	Involvement Mother	Involvement Father
Parents show interest in performance	0.211	0.100
Parents take part in parents-evening	0.147	0.091
Parents come to teacher office hours	0.113	0.047
Parents visit teacher outside office hours	0.084	0.009
Parents involved in at least one school activity	0.162	0.093
Mother talks about things you do	0.339	
Mother asks you prior to making decision	0.358	
Mother expresses opinion on something you do	0.378	
Mother is able to solve problems with you	0.364	
Mother asks your opinion on family matters	0.389	
Mother gives reason for making decision	0.392	
Mother talks about things that worry you	0.183	
Mother helps with studying	0.162	
Father talks about things you do		0.378
Father asks you prior to making decision		0.368
Father expresses opinion on something you do		0.367
Father is able to solve problems with you		0.387
Father asks your opinion on family matters		0.373
Father gives reason for making decision		0.380
Father talks about things that worry you		0.276
Father helps with study		0.231

Note: Factor loadings for parental involvement proxies. The parental involvement index was constructed unsing principal component analysis on the available proxies of the youth sample.

Table 13: Factor-loadings for PCA locus of control measures

Items in Questionnaires	Factor Loadings			
	Youth	Parents, 2005	Parents, 2010	Parents, 2015
Internal Locus of Control				
Success Through Working Hard	-0.034	0.065	0.031	-0.013
Control Over My Own Destiny	0.146	0.289	0.289	0.257
Soc., Pol. Activity Can Makes A Difference	-0.075	-0.016	0.025	0.013
Doubt Myself When Faced Difficulties	0.379	0.374	0.381	0.392
Have Little Control Over My Life	0.422	0.464	0.459	0.460
External Locus of Control				
In Comparison Do Not Have What I Deserve	0.393	0.379	0.384	0.385
What You Achieve Is A Question Of Luck	0.386	0.360	0.351	0.354
Others Have Often Controlled My Life	0.438	0.425	0.426	0.428
Opportunities Depend On Soc. Circumstance	0.351	0.314	0.312	0.318
Talents You Have At Birth Are V. Import.	0.175	0.061	0.099	0.102

Note: Factor loadings for locus of control proxies. The locus of control index was constructed unsing principal component analysis on the available proxies of the youth sample and the adults waves of 2005, 2010 and 2015 separately.

8 Figures

Figure 1: Mother's involvement parameter compared among samples

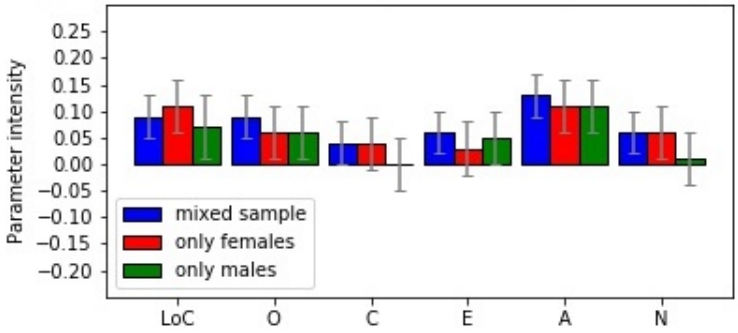

Figure 2: Father's involvement parameter compared among samples

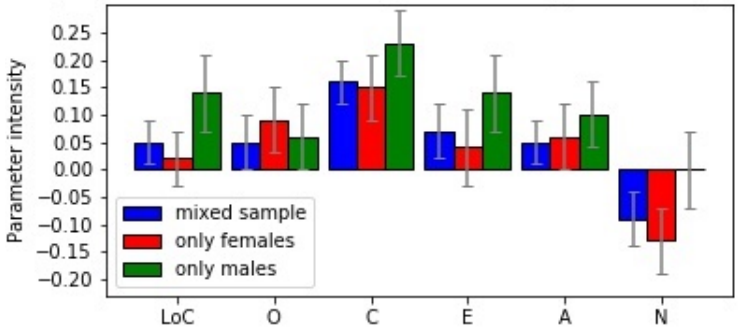

Figure 3: Difference in involvement parameters (father - mother)