

Personality Psychology

Longitudinal Associations Between Parenting and Child Big Five Personality Traits

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The goal of this research was to explore the relationships between four parenting dimensions (academic involvement, structure, cultural stimulation, and goals) and child personality development. Many theories, such as social learning, attachment theory, and the psychological resources principle assume that parenting practices influence child personality development. Most of past research on the associations between parenting and child Big Five traits specifically has used cross-sectional data. The few longitudinal studies that examined these associations found small relations between parenting and child personality. We extended this research by examining the long-term relations between four underexplored parenting dimensions and child Big Five personality traits using bivariate latent growth models in a large longitudinal dataset ($N = 3,880$). Results from growth models revealed a preponderance of null relations between these parenting measures and child personality, especially between changes in parenting and changes in child personality. In general, the observed associations between parenting and child Big Five personality were comparable in magnitude to the association between factors such as SES and birth order, and child personality—that is, small. The small associations between environmental factors and personality suggest that personality development in childhood and adolescence may be driven by multiple factors, each of which makes a small contribution.

Personality traits are stable, but also amenable to change (Roberts et al., 2006, 2017). Starting from early childhood, several factors are thought to influence personality development, such as life events and long-term person-environment transactions (Fralely & Roberts, 2005). Influences on personality encompass factors ranging from family to peer, school, neighborhood and cultural contexts. Due to the amount of time and energy invested in raising a child, it is logical to consider parents-child relationships as central to the development of child personality. Starting from infancy, parents organize the child's home and environment, help the child regulate their affect and moral actions, teach, and provide opportunities for children to learn (Bornstein, 2001). Parents are the most consistent people with whom children spend their time. In short, all signs point to the idea that parents play a crucial role in child personality development, but is that really the case?

Past studies have examined the associations between parenting and an array of child outcomes such as depression (e.g., McLeod et al., 2007), behavioral problems (e.g., Pachter et al., 2006), temperament (e.g., Kiang et al., 2004), and academic achievement (e.g., Cheung & Pomerantz,

2012). Fewer studies have investigated the associations between parenting and child Big Five personality traits, which are relatively enduring, automatic patterns of thoughts, feelings, and behaviors manifested in specific contexts (Roberts, 2009). Most of these studies have examined the links between parenting and child Big Five traits using cross-sectional methods, while very few studies have employed longitudinal methods.

We extend past research using data from a longitudinal study of children transitioning to adolescence to examine the co-development of four parenting dimensions and child Big Five personality traits. The parenting dimensions in our study, which are parental academic involvement, parental structure, parental cultural stimulation, and parental goals are not widely explored in the literature. We focus on the Big Five personality traits for multiple reasons. The Big Five model is among the most widely used and well-established model of personality trait structure; therefore, it is a useful framework for conducting systematic research. Moreover, the Big Five are used to explore child, adolescent, and adult personality, which facilitates comparisons across developmental periods. Furthermore, we know very little about the

factors associated with differential development of the Big Five traits during childhood and adolescence, a gap in the literature that we aimed to fill. In the present study, we use a longitudinal design to study the association between parenting and child personality to better understand directional associations. Specifically, assessing parenting and child personality across years allows us to understand their developmental trajectories, as well as how their trajectories are related to each other. Longitudinal designs are also capable of delineating the bidirectional associations, which are characteristic of parent-child relationships. Above and beyond these strengths, our study uses a sample size with adequate statistical power, and uses data from multiple informants to eliminate shared method variance. Below, we review the literature on dimensions of parenting, theoretical models of parent-child relationships, and existing literature on parenting and child personality associations.

Major Dimensions of Parenting

Parenting refers to the process of nurturing and supporting the emotional, social, intellectual, and physical development of a child (Brooks, 2013). Generally, researchers are interested in parenting patterns, rather than specific behaviors (Atherton & Schofield, 2021). Therefore, it is popular in parenting research to use parenting dimensions that aim to capture broad variations in parenting, for which the most commonly identified domains are parental warmth, psychological control, and behavioral control (Pomerantz & Thompson, 2008; Power, 2013). Parental warmth refers to parental activities such as showing physical affection, praising, encouraging, and attending to a child. Psychological control refers to the extent to which parents promote or suppress their children's autonomy. Parental behavioral control refers to the extent to which parents provide consistency, organization, and predictability in the child's environment.

In parenting research, there are often multiple names for the same types (or subcomponents) of parenting dimensions. For example, parental involvement in children's education can be considered an expression of parental behavioral control. Furthermore, parental structure refers to the parents' organization of the child's environment and providing them with consistent rules. Parental structure can be considered a proxy for parental behavioral control as well (Atherton & Schofield, 2021; Power, 2013).

In addition to the wide use of the parental warmth, parental behavioral control, parental psychological control, or their proxies in the literature, some researchers have proposed expanding the domains of parenting that are studied. For example, Power (2013) argues that parental cognitive stimulation, which includes behaviors such as nonverbal stimulation and cultural socialization, is likely a fourth major dimension of parenting. The extent to which parents expose their children to cultural elements such as music and arts, is one aspect of parental cognitive stimulation that is referred to as "parental cultural stimulation" and is not typically captured by the existing domains of parenting such as warmth, psychological, and behavioral control. Moreover, prior research has argued that parenting should be disaggregated into parental goals and parental

practices (Darling & Steinberg, 1993). This means that parental goals should be examined as a separate component to wholly understand parental socialization (Darling & Steinberg, 1993).

Theoretical Models of Parent-Child Relationships

Parental socialization models propose a wide variety of different mechanisms for how parents influence child personality development. For example, Social Learning Theory (Bandura & Walters, 1963) proposes that children learn behaviors through observation and imitation. Bandura suggested that children tend to observe behaviors, and subsequently encode and imitate them. Moreover, Attachment Theory (Bowlby, 1969) proposes that the child's early experiences with parents (or caregivers in general) shape their mental representations of the self and others. Attachment theory further proposes that early bonding experiences will have an impact on the individual's behavior, adjustment, and interpersonal relationships later in life (Ainsworth et al., 1978; Bowlby, 1980). The Psychological Resources Principle (Pomerantz & Thompson, 2008) posits that parents influence their children's development through promoting or hindering the growth of their psychological (affective, behavioral, cognitive) resources.

These theories generally propose that parents influence their child's characteristics and development, but it is also the case that children influence the parenting they receive. Prior to the 1960s, most parenting research was devoted to examining the unidirectional influences of parents on children. However, interest in the effects of children on their parents' behavior was spurred by Bell's (1968) paper, in which he reinterpreted the correlations between parenting and child's behavior as indications of the effects of child's characteristics on parenting. Since then, child effects on parenting gained increasing attention in the field (e.g., Atherton et al., 2020; Belsky, 1984; Pettit & Arsiwalla, 2008).

Rather than thinking of parent-child relationships as driven by either the parents or children, there are theoretical models that emphasize the mutual influence of parents and children. For example, Sameroff's (1983, 2009) transactional model views child development as resulting from continuous bidirectional interactions between parents and children, where each individual's behavior is modified by the other. Similarly, the coercion model (Patterson, 2002) assumes that a series of parent-child transactions leads to child's antisocial behavior. For example, a coercive cycle typically starts with the parent scolding a misbehaving child. The scolding exacerbates the child's misbehavior, and as a result of the child acting out, the parent increases their scolding even more. Thus, the child's misbehavior is negatively reinforced, resulting in a feedback loop that increases misbehavior over time, and the child maintains or even increases their antisocial behavior until the parent disengages. Thus, it would be important to incorporate paths from children to parents when modeling the association between parenting practices and child personality as the causal direction may flow from the child to the parent also.

Existing Studies on the Associations between Parenting and Child Big Five Personality Traits

Although the associations between parenting and a wide range of child characteristics and outcomes have been investigated in prior research, less has been done on the longitudinal associations between parenting and child Big Five personality traits. Some studies have examined these associations using cross-sectional data. For example, it was found that parental warmth was positively associated with child extraversion, agreeableness, conscientiousness, openness to experience, and negatively associated with child neuroticism (Fadda et al., 2015; Lianos, 2015; Nyhus & Webley, 2013). Furthermore, it was found that parental behavioral control was positively correlated with child conscientiousness (Nyhus & Webley, 2013).

On the other hand, only a handful of studies have looked at the associations between parenting and child personality traits using longitudinal data. Three of these studies have used prospective designs where early parenting was used to predict later child personality, while one study examined the links between early child personality and later parenting. For example, Heaven and Ciarrochi (2008) found that family authoritativeness at age 13, which is characterized by high warmth and high behavioral control, was positively correlated with child conscientiousness at age 14. On the other hand, family permissiveness at age 13, which is characterized by high warmth and low behavioral control, was negatively correlated with child conscientiousness at age 14. Also, previous research has shown that, when the child was 13 years old, positive parenting (defined as a combination of high warmth and low psychological control) predicted greater agreeableness, conscientiousness, and lower neuroticism after controlling for prior personality levels (Schofield et al., 2012). The same results were found when examining links between early levels of parenting (when the child was 15 years old) and later child personality at age 17. Despite the positive findings in the aforementioned studies, Baardstu et al. (2017) found non-significant associations between parental warmth measured when children were 8.5, and child agreeableness measured at age 16.5. As for the influence of child's personality on parenting, it was found that child's Big Five personality traits, which were measured at age 11, predicted parental warmth, overreaction, and psychological control 5 years later (Egberts et al., 2015). Although these longitudinal designs provide useful information about parent-child associations, they focused on either the influence of parenting at Time 1 on child personality at Time 2 or the influence of child personality at Time 1 on parenting at Time 2 without taking into consideration that both parenting practices and child personality change over time and that these changes may be related also.

In addition to these four studies, we are aware of only two studies that used structural equation modeling techniques to study longitudinal associations between parenting and child personality traits. The first one used bivariate latent growth models to examine the correlated change between overreactive parenting, which is the tendency to respond with irritation to child's problematic behavior, and child personality traits (van den Akker et al., 2010). Positive

correlations were found between initial levels of child agreeableness and changes in overreactive parenting, as well as positive correlations between initial levels of overreactive parenting and changes in child's agreeableness and emotional stability. Also, researchers found that increases in overreactive parenting were related to decreases in child agreeableness and emotional stability. Despite its relatively sophisticated design, the main limitation of the study was that it included only 290 participants, which may not provide adequate statistical power to detect complex, multivariate associations such as these. The second study (N = 400-500) used a latent difference score model to investigate bidirectional associations between parental warmth, overreactivity, and the child's Big Five traits from age 8.5 to 10.5 (van den Akker et al., 2014). It was found that changes in parental warmth were positively associated with changes in child's extraversion, agreeableness, conscientiousness, and openness to experience. On the other hand, changes in overreactivity were negatively associated with changes in agreeableness, conscientiousness, and openness to experience.

Present Study

The general aim of the present study was to explore the longitudinal associations among four parenting dimensions (parental academic involvement, parental structure, parental cultural stimulation, parental goals) and child Big Five personality traits using data from the Tradition and Innovation in Educational Systems (TRAIN) longitudinal study. Specifically, we fit bivariate growth models to the data to examine the changes in parenting, changes in child personality, and the associations between them. This way, our study attempted to clarify the static and dynamic aspects of parenting, child personality, and the associations between them. Parent-child effects were examined through correlating parenting at Time 1 with later changes in child personality (i.e., intercept-slope association), while child-parent effects were examined through correlating personality at Time 1 with later changes in parenting (i.e., intercept -slope association). We also examined how changes in parenting were related to changes in child personality traits (i.e., slope-slope association).

The theoretical models of parent-child relationships do not make specific predictions about parenting influence on child Big Five traits per se. However, based on these theories, it is reasonable to expect that positive parenting practices will be associated with positive child development, whereas negative parenting practices will be related to negative personality development. Drawing from existing theories and past research, we hypothesize that parental involvement, parental structure, parental cultural stimulation, and parental goals on one hand will be positively associated with child's extraversion, agreeableness, conscientiousness, and openness to experience on the other hand. Moreover, we hypothesize that each of the parenting measures will be negatively associated with child's neuroticism.

Method

Participants

We used data from the Tradition and Innovation in Educational Systems (TRAIN) longitudinal study, which is hosted by the Center for Educational Sciences and Psychology at the University of Tübingen. The sampling procedure followed two steps. First, 99 schools were selected in two federal states in Germany. Second, one or two classes were selected from each of these schools, resulting in a total of 136 classes. The total number of participants in the study was 3,880 students, who were in the fifth grade during the first assessment. Follow-up assessments took place in the first six weeks of school when the students were in grades 6, 7, and 8. The mean age of the participants at the first assessment was 11.10 (SD = .56). The gender distribution in the sample was 45.00% female, 54.80% male, and 0.2% did not report gender information. The students were enrolled in one of three school tracks; 1,595 students in Hauptschule (non-academic track school), 878 students in Realschule (intermediate-track school), and 1,311 students in Mittelschule (school that combines Hauptschule and Realschule).

Instruments

Appendix A shows the Cronbach's alpha reliabilities of the scales at each assessment wave, and a list of the items for the parenting measures used in the present study. [Table A1](#) in Appendix A reports the waves at which each parenting and personality measure was assessed.

Child Personality

Participants' Big Five personality traits were assessed at each of the four assessment occasions (grades 5, 6, 7, and 8) using the German version of the Big Five Inventory (BFI; John & Srivastava, 1999; Lang et al., 2001). Participants rated themselves using a 5-point scale (1=Strongly disagree, 5= Strongly agree). The number of items per trait were: extraversion (8), agreeableness (8), conscientiousness (9), neuroticism (8), and openness to experience (11). However, a closer examination of the scales with the complete set of items showed low reliabilities, and these low reliabilities were due to the negatively formulated items in each scale (see Göllner et al., 2017, for details).¹ Therefore, we decided to omit the negatively worded items in the data analyses to improve the reliabilities of the scales.^{2,3} Specifically, we omitted three, four, four, three, and three negatively worded items from the extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience

scales, respectively. Cronbach's alpha reliabilities of the scales after omitting these items ranged between .66 (agreeableness Time 3) and .83 (openness to experience Time 2 and Time 3).

Parental Involvement

Parents rated the extent of involvement in their child's school using a 4-point scale (1=not true, 4=very true). The scale consisted of six items such as "I have enough time and energy to get involved in my child's school". Parental involvement was assessed in the first and fourth waves of the study. Cronbach's alpha reliability of the scale was .81 at both assessments.

Parental Structure

Parents rated the extent to which they enforce structure in their child's life using a 4-point scale (1=not true, 4=very true). Parental structure was assessed in the four waves of the study. However, only data from waves 1 and 4 were used to be consistent with other parenting measures. A sample item of this scale was: "I make sure that my child does his homework at fixed times every day". A total of eight items were used to assess parental structure. Cronbach's alpha reliabilities of the scale were .64 and .75 at Time 1 and Time 4, respectively.

Parental Cultural Stimulation

The extent to which parents exposed their children to cultural stimulation, such as taking them to museums, concerts, and book readings, was captured using a five-item scale rated by the parents. The scale was administered in the first and fourth waves of the study. A sample item of the scale was "How often do you go to a museum with your child?", and the ratings were 1 (never) to 4 (more than three times a year). Cronbach's alpha reliabilities of the scale were .64 and .68 at Time 1 and Time 4, respectively.

Parental Goals

In the first and fourth assessment waves, participants' parents were asked about the importance they placed on raising children who have skills that help them become successful in various domains. Using a scale from 1 (less important) to 4 (extremely important), they were asked to rate 17 items based on the importance they think that the family should teach them. Sample items include: "order and discipline", "intellectual curiosity", and "righteous and helpful behavior". Cronbach's alpha reliabilities of the scale were .89 and .90 at Time 1 and Time 4, respectively.

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- 1 Cronbach's alpha reliabilities of the scales before and after removing the negatively worded items are reported on Open science Framework https://osf.io/qnjp3/?view_only=a2eaa14f0ae640b1ab7572026e4821e7.
 - 2 Rieger (2018) used the same child personality scales in the TRAIN dataset. He also omitted the reverse coded items. To check for robustness, he re-ran the analyses with the complete set of items. The results remained unchanged.
 - 3 We reran the analyses with personality scales that include all the items. Results were similar. They can be found on Open Science Framework https://osf.io/qnjp3/?view_only=a2eaa14f0ae640b1ab7572026e4821e7

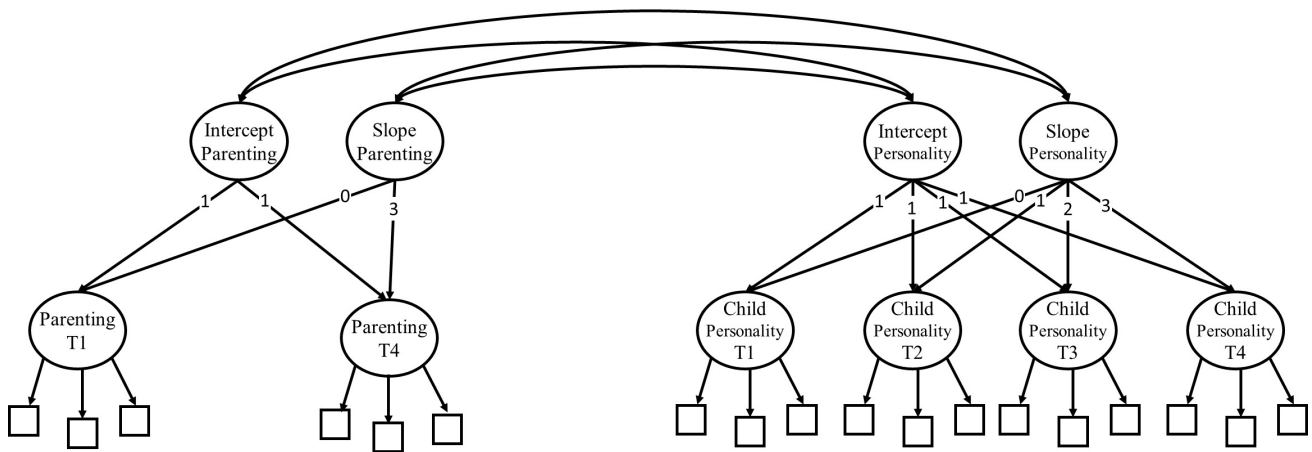


Figure 1. Example of Bivariate Latent Growth Model fitted to TRAIN data

For simplicity, associations between indicators are omitted.

Control Variables

Child Age. Child’s age was recorded at the first assessment wave.

Child Gender. Child’s gender was recorded at the first assessment wave (0=female, 1=male).

Parental Socioeconomic status. Parental socioeconomic status was measured using the International Socio-Economic Index (ISEI), which consists of measures of education, occupational status, and income that are typical to each occupation (Ganzeboom, De Graaf, & Treiman). Parental socioeconomic status was measured at each wave. The highest ISEI rating of the mother and the father across all waves was used.

Parent Personality. Both mothers and fathers rated their personalities at the four assessment waves using the Ten Item Personality Inventory. Only ratings of the first assessment were used. This instrument assessed each of the Big Five personality traits using two items. Items were rated using a 5-point scale (1=Strongly disagree, 5= Strongly agree). Composite scores for each of the Big Five traits were created through averaging the scores of the two items. Separate composite scores were created for the mothers and fathers.

Analytic Plan

We conducted a preliminary set of analyses to determine the factor structure and invariance of the parenting domains over time. First, we examined the factor structure of the parenting variables, and one-factor solutions were retained for all parenting variables. Because the parental structure and parental goals scales had more than six items, we used a parceling technique to reduce the number of estimated parameters when conducting the growth models. Then, prior to implementing the latent growth curve models, we examined longitudinal measurement invariance of the parenting and personality domains. Appendix B contains more in-depth details about the factor analyses for the parenting domains, the parceling technique, and the procedure used to test longitudinal measurement invariance.

After conducting these preliminary analyses, the longi-

tudinal associations between parenting and child personality were examined by fitting univariate and bivariate latent growth models (Figure 1). Univariate growth models were fit to child personality variables to examine whether they exhibited linear or quadratic growth before fitting the bivariate growth models. If the fit indices of the quadratic growth models did not show significant improvement, the more parsimonious linear growth models were selected. Improvement in model fit was decided based on Chen’s (2007) criteria. If changes in CFI, RMSEA, and SRMR were less than .01, .02, and .01, then they were considered non-significant.

Next, two latent factors were defined using the occasion-specific factors for each of the parenting and personality variables. A latent intercept was identified by fixing all loadings to one. As a result, the mean of the intercept represents the mean of parenting or child personality at Time 1. The variance of the intercept represents the amount of individual differences in parenting or child personality at Time 1. A latent slope was identified through fixing its loading at Time 1 to zero, and its loading at Time 2, Time 3, and Time 4 to 1, 2, and 3, respectively for child personality. A latent slope for parenting was identified through fixing its loading at Time 1 to zero and its loading at Time 4 to “3”. Consequently, the mean of the slope reflects the mean change between two adjacent measurement time points for child personality (1 to 2, 2 to 3, 3 to 4) and from the first to last measurement time points for parenting (1 to 4), and the variance of the slope indicates the individual differences in the amount of change across these periods. In addition to these univariate parameters, bivariate latent growth curve models allow for the estimation of the: a) concurrent correlations between parenting and child personality at Time 1, b) correlations between initial level of latent parenting at Time 1 and change in latent child personality (and vice versa), and c) correlations between changes in parenting and changes in child personality. Residual variances of the same indicator were allowed to correlate with each other across the different assessment points.

All models controlled for child gender, SES, and age through adding paths from these variables to the intercepts and slopes of the parenting and child personality latent variables. Also, we controlled for parents’ personality traits

Table 1. Means and Standard Deviations of Variables in TRAIN Dataset

	Time 1	Time 2	Time 3	Time 4
Parental Involvement	3.26 (.54)	---	---	3.10 (.57)
Parental Structure	3.74 (.28)	---	---	3.56 (.40)
Parental Cultural Stimulation	1.43 (.42)	---	---	1.38 (.41)
Parental Goals	3.07 (.47)	---	---	3.07 (.49)
Child Extraversion	3.46 (.82)	3.48 (.79)	3.51 (.77)	3.47 (.77)
Child Agreeableness	3.58 (.85)	3.59 (.81)	3.54 (.76)	3.53 (.76)
Child Conscientiousness	3.65 (.82)	3.58 (.81)	3.53 (.80)	3.42 (.77)
Child Neuroticism	2.84 (.88)	2.79 (.82)	2.74 (.80)	2.78 (.79)
Child Openness to Experience	3.54 (.80)	3.53 (.78)	3.47 (.76)	3.39 (.73)
Mother Extraversion	3.80 (.88)	---	---	---
Mother Agreeableness	3.42 (.76)	---	---	---
Mother Conscientiousness	4.37 (.68)	---	---	---
Mother Neuroticism	2.60 (.85)	---	---	---
Mother Openness to Experience	3.60 (.93)	---	---	---
Father Extraversion	3.59 (.99)	---	---	---
Father Agreeableness	3.12 (.87)	---	---	---
Father Conscientiousness	4.23 (.83)	---	---	---
Father Neuroticism	2.36 (.88)	---	---	---
Father Openness to Experience	3.28 (.96)	---	---	---
Parental socioeconomic status	47.16 (12.46)	---	---	---

Standard deviations are inside the parentheses.

to rule out the possibility that the association between parenting and child personality traits is due to parents' personality traits. We also controlled for multiple testing by adjusting the alpha level of statistical significance using Bonferroni's correction. The conventional alpha level was divided by the total number of tests ($.05 / 20 = .003$). A sensitivity power analysis was conducted to compute the raw correlations between parenting and child Big Five traits that can be detected for power of .80. The analysis revealed that effect sizes with magnitudes of .06 could be detected, given our sample size and adjusted alpha level.

All longitudinal analyses were conducted using Mplus 5.1 software (Muthén & Muthén, 2007). The analytic plan was preregistered on the Open Science Framework (https://osf.io/qnjp3/?view_only=a2eaa14f0ae640b1ab7572026e4821e7).⁴ Example scripts of the analyses are also available on the Open Science Framework. Missing values were handled using full information maximum likelihood (FIML) procedure, which provides less biased parameter estimates compared

to listwise or pairwise deletion methods (Graham, 2009). FIML estimates the model parameters using all available data. The function COMPLEX in Mplus 5.1 (Muthén & Muthén, 2007) was used to account for the nested structure of the data. Model fit was inspected using chi-square, RMSEA, and CFI statistics. Good model fit was inferred when χ^2 is low and not statistically significant, RMSEA is below .06, and CFI is above .95 (L.-T. Hu & Bentler, 1999).

Results

Descriptive Statistics

[Table 1](#) provides the means and standard deviations of parenting, child personality, and control variables. [Table 2](#) shows correlations between observed parenting and child personality variables across time. In total, the magnitudes of the correlations between parenting variables and child personality were small, averaging .05.

⁴ The preregistered hypotheses and analytic plan are found in the Introduction and Methods documents on OSF.

Table 2. Correlations between Parenting and Child Personality Variables in TRAIN Dataset

	E1	E2	E3	E4	A1	A2	A3	A4	C1	C2	C3	C4	N1	N2	N3	N4	O1	O2	O3	O4
Inv1	.09	.03	.07	.07	.06	.06	.06	.03	.12	.12	.07	.10	.01	-.03	-.06	-.03	.07	.04	.03	.02
Inv4	.10	.06	.08	.09	.08	.11	.05	.08	.12	.12	.11	.12	.08	-.02	-.03	-.04	.08	.05	.06	.07
Str1	.03	.03	.05	.007	.03	.05	.08	.03	.06	.07	.09	.05	-.001	-.001	-.04	-.03	.04	.03	.03	.009
Str4	.04	.009	.03	.04	.03	.02	.03	.07	.07	.08	.12	.11	.03	-.04	-.11	-.09	.03	.05	.04	.04
CS1	.07	.005	.03	.09	.09	.02	.03	.06	.07	.04	.05	.07	.02	.003	-.05	-.01	.08	.03	.08	.11
CS4	.08	.03	.007	.05	.10	.07	.03	.04	.05	.04	.04	.05	.002	-.09	-.07	-.05	.10	.09	.07	.09
PG1	.09	.05	.09	.07	.10	.05	.05	.07	.09	.06	.06	.07	.02	.03	.02	.021	.09	.06	.10	.03
PG4	.13	.10	.09	.06	.10	.11	.05	.07	.07	.09	.07	.08	.08	.02	-.02	-.02	.10	.08	.10	.08

Inv=Involvement; Str=Structure; CS=Cultural Stimulation; PG= Parental Goals; E=Extraversion; A=Agreeableness; C=Conscientiousness; N=Neuroticism; O=Openness to Experience

Bold Font: $p < .001$

Table 3. Model Fit Indices of Bivariate Latent Growth Models Fitted to TRAIN Dataset

	Parental Involvement		Parental Structure		Parental Cultural Stimulation	
	CFI	RMSEA	CFI	RMSEA	CFI	RMSEA
Extraversion	.94	.02	.95	.02	.93	.02
Agreeableness	.96	.02	.99	.01	.96	.02
Conscientiousness	.96	.02	.95	.02	.96	.02
Neuroticism	.94	.02	.95	.02	.93	.02
Openness to Experience	.97	.02	.99	.01	.97	.02
	Parental Goals					
	CFI	RMSEA				
Extraversion	.96	.02				
Agreeableness	.99	.01				
Conscientiousness	.98	.02				
Neuroticism	.95	.02				
Openness to Experience	.99	.01				

Results of Longitudinal Analyses

Details of measurement invariance tests are provided in Appendix B. These analyses showed that changes in model fit indices of child personality variables across the nested models were not larger than the recommended cutoffs, and therefore, the child Big Five domains exhibited strong invariance across waves. As for the parenting variables, changes in the fit indices between metric and scalar models were slightly larger than the recommended cutoffs, except for parental goals. This means that full scalar invariance was not supported. Instead, partial scalar invariance held after freeing one or more parameters in each model.

After measurement invariance was tested, univariate growth models were fit to the child personality variables to examine whether linear or quadratic trends were a better representation of the data. None of the quadratic models showed significant improvement over the linear models based on Chen's (2007) criteria. Therefore, linear models for personality variables were retained. As for parenting variables, linear trends were assumed as two assessment points were available only. Results of the univariate analyses are reported in Appendix C.

Following that, second-order bivariate latent growth models were fit to the data. Table 3 provides model fit indices for each model. All models demonstrated good fit. After testing model fit, the means and variances of the bivariate growth models were examined. The first and second columns of Table 4 provides the means and variances of initial levels of parenting and child personality variables. We also formally tested for change over time by examining the average slope values for each variable, as shown in the third and fourth columns of Table 4. Results show that parental academic involvement and parental structure decreased across time as shown by the negative slope estimates (slope = -0.21, $p < .003$; slope = -0.17, $p < .003$, respectively). This means that as children were growing up, parents were becoming less involved in their children's academic environments and provided them with less structure. The magnitude of the rates of change in these parenting dimensions

was small-to-medium, corresponding to .45 and .60 standardized units of change across time respectively. The variances of the parenting slopes represent the existence of inter-individual differences in changes in parenting. The variance of the slope of parental academic involvement was relatively larger than the variance of parental structure, which means that there was more variation in changes in parental involvement trajectories across the two assessment points. Notably, the mean slopes of parental cultural stimulation and parental goals were not statistically significantly different from zero.

In addition to providing information about changes in parenting, Table 4 shows the results of changes in children's Big Five traits across time. As children were getting older, they became less conscientious and less open to experience, as shown by the negative slopes. The rates of change were small, ranging between -0.05 and -0.08. These numbers correspond to .37 and .31 standardized units of change across time. Interestingly, the mean slopes of child extraversion, agreeableness, and neuroticism were not statistically significantly different from zero.

It is important to note that the examination of individual differences in change necessitates the existence of reliable variance in change. The slope variance parameter is typically inspected for statistically significant variance to justify examining the correlations of change over time. In the current case, all parenting and child personality variables exhibited statistically significant variance in slopes over time, justifying the examination of predictors and correlates of individual differences in change.

Next, we tested the concurrent associations between parenting and child personality (intercept to intercept correlation) and the associations between changes in parenting dimensions and changes in child personality over time (slope to slope correlations). We follow two approaches for interpreting the results of the longitudinal analyses. In the first approach, we highlight the statistically significant results only, and ignore statistically non-significant ones. In the second approach, we interpret the effect sizes regardless of whether they reached statistical significance or not.

Table 4. Means and Variances of Intercepts and Slopes in TRAIN Dataset

	Intercept		Slope	
	Mean	Variance	Mean	Variance
Parental Involvement	3.35	.24	-.21	.22
Parental Structure	3.78	.05	-.17	.08
Parental Cultural Stimulation	1.52	.22	-.05	.13
Parental Goals	3.79	.36	-.08	.04
Child Extraversion	3.74	.21	-.001	.02
Child Agreeableness	3.71	.26	-.02	.03
Child Conscientiousness	3.79	.37	-.08	.04
Child Neuroticism	2.26	.32	-.02	.03
Child Openness to Experience	3.44	.32	-.05	.03

Bold font: $p < .003$

Intercept-Intercept Correlations

Column 1 in Table 5 shows the correlations between parenting and child personality intercepts at Time 1. Following the first approach for interpreting the results, only four correlations were significant at the adjusted alpha level of $p < .003$ out of 20 correlations. There was a significant positive association between parental involvement and child conscientiousness ($r = .13, p < .003$); a significant positive association between parental structure and child agreeableness ($r = .13, p < .003$); an association between parental cultural stimulation and child conscientiousness ($r = .15, p < .003$), and an association between parental goals and child agreeableness ($r = .10, p < .003$). No other statistically significant findings at $p < .003$ were found, suggesting that there were few associations between parenting and child personality at Time 1.

Focusing on the magnitudes of the associations rather than their statistical significance, we found that all correlations were small or very small. In general, the four statistically significant results that we observed were small in size, ranging between .10 and .15. The average correlation between parenting and child personality intercepts was .08, and few correlations exceeded .10.

Intercept-Slope Correlations

We examined the correlations between intercepts and slopes as shown in Table 5. None of the correlations between parenting at Time 1 and changes in child personality were statistically significant at $p < .003$. Similarly, none of the correlations between personality at Time 1 and changes in parenting were statistically significant at $p < .003$.

Focusing on the magnitudes of the associations instead of statistical significance, we found that the correlations between parenting at Time 1 and changes in child personality between Time 1 and Time 4 were also very small in all models, ranging from .02 to .07. Comparably, the correlations between personality at Time 1 and changes in parenting were also very small. Only the correlation between changes in parental involvement and neuroticism exceeded .10.

Slope-Slope Correlations

Regarding the correlations between changes in parenting and changes in child personality, none of the correlations were statistically significant at $p < .003$. However, the magnitude of several slope-slope correlations exceeded .10 including: changes in parental involvement and changes in child conscientiousness ($r = .12$), neuroticism ($r = -.14$), and openness to experience ($r = .10$); changes in parental structure and changes in agreeableness ($r = .12$) and neuroticism ($r = -.19$); changes in parental cultural stimulation and changes in extraversion ($r = -.15$); changes in parental goals and changes in neuroticism ($r = -.15$).

Discussion

The main goal of our research was to explore the associations among four parenting dimensions and children's Big Five personality traits. The present study has several strengths. First, we used a large dataset ($N = 3,880$) that provided adequate statistical power to detect effects if they existed. Second, we examined the associations between multiple parenting measures and child Big Five personality traits. Third, we went beyond traditional cross-sectional methods through fitting bivariate latent growth models. These models captured an important aspect about parenting and child personality, which is their changeability across time, and allowed for examining the correlations between these changes. Furthermore, bivariate latent growth models provided information about the extent to which change trajectories were uniform or variable across individuals.

There are many theories that suggest parenting and child development are related to each other, including Social Learning Theory, Attachment Theory, and the Psychological Resources Principle. However, these theories do not make specific predictions about the links between parenting and child personality development per se. We expected that positive parenting practices would be associated with the positive development of child extraversion, agreeableness, conscientiousness, emotionality stability, and openness to experience, whereas negative parenting practices would be related to negative trait development. Controlling for child

Table 5. Results of Correlations between Intercepts and Slopes of Parenting and Child Personality Variables in TRAIN Dataset

	Parental Involvement			
	i1 with i2	i1 with s2	i2 with s1	s1 with s2
Extraversion	.09[.02,.16]	-.04[-.11,.04]	-.01[-.11,.08]	.08[-.02,.18]
Agreeableness	.11[.03,.19]	-.06[-.17,.04]	.01[-.09,.11]	.06[-.07,.19]
Conscientiousness	.13[.07,.19]	-.03[-.11,.05]	-.02[-.10,.07]	.12 [0,.23]
Neuroticism	-.02[-.09,.04]	-.04[-.15,.07]	.13[.04,.22]	-.14[-.27, -.01]
Openness to Experience	.05[-.02,.12]	-.07[-.15,.02]	-.002[-.09,.09]	.10[-.01,.21]
	Parental Structure			
	i1 with i2	i1 with s2	i2 with s1	s1 with s2
Extraversion	.08[-.006,.16]	-.06[-.16,.04]	-.003[-.10,.10]	.04[-.08,.17]
Agreeableness	.13[.05,.21]	-.03[-.14,.07]	-.03[-.14,.08]	.12[-.009,.26]
Conscientiousness	.10[.02,.18]	-.02[-.12,.09]	.05[-.06,.16]	.09[-.03,.22]
Neuroticism	.02 [-.06,.10]	-.06[-.18,.06]	.03[-.08,.13]	-.19[-.34, -.04]
Openness to Experience	.04[-.04,.12]	-.06[-.17,.05]	.03[-.07,.14]	.05[-.08,.18]
	Parental Cultural Stimulation			
	i1 with i2	i1 with s2	i2 with s1	s1 with s2
Extraversion	.08[.008,.15]	.04[-.08,.15]	.09[-.03,.22]	-.15[-.30,.002]
Agreeableness	.11[.03,.19]	-.02[-.14,.10]	.02[-.09,.13]	-.04[-.20,.12]
Conscientiousness	.15[.08,.21]	-.02[-.12,.08]	-.02[-.12,.09]	-.002[-.13,.13]
Neuroticism	.01[-.07,.10]	-.05[-.17,.06]	-.09[-.22,.04]	.09[-.09,.26]
Openness to Experience	.08[.01,.14]	.04[-.07,.15]	.06[-.04,.16]	-.05[-.20,.10]
	Parental Goals			
	i1 with i2	i1 with s2	i2 with s1	s1 with s2
Extraversion	.09[.03,.15]	-.02[-.09,.06]	.07[-.02,.15]	-.05[-.17,.07]
Agreeableness	.10[.04,.16]	.06[-.03,.16]	-.001[-.08,.08]	-.02[-.15,.11]
Conscientiousness	.08[.01,.14]	-.03[-.12,.06]	.01[-.07,.09]	.08[-.02,.19]
Neuroticism	.02[-.05,.09]	.03[-.08,.14]	.08[-.02,.18]	-.15[-.29, -.02]
Openness to Experience	.09[.03,.16]	.03[-.05,.11]	.03[-.05,.11]	.05[-.07,.17]

i1 = intercept of parenting variable; s1= slope of parenting variable; i2=intercept of child personality variable; s2= slope of child personality variable
 Bold font: statistically significant at $p < .003$

age, gender, socioeconomic status, and parents Big Five personality traits, along with corrections for multiple testing, we found several interesting findings regarding the longitudinal associations between parenting and child personality.

First, parenting changed across time, which is consistent with results of previous studies (e.g., van den Akker et al., 2010). The general trend was a decrease in parenting behaviors. As children entered adolescence, parents became less involved in their children’s academic lives and provided less structure. It is understandable that parents’ roles change during this period because adolescence is characterized by children’s striving for autonomy and independence (Galambos & Costigan, 2003). The strongest decrease was in parental involvement in their child’s academics. Parental goals and parental cultural stimulation showed no mean-level change across time. An important finding to note is that the variances of parenting variables were generally small, ranging from .04 and .22, indicating that there were

few individual differences in how parenting practices change over time.

Second, child personality also changed across time. Children perceived themselves as less conscientious and less open to experience. The decrease in child conscientiousness shows that adolescents were not developing in the direction of maturation, which is consistent with findings of previous research (Atherton et al., 2020; van den Akker et al., 2014). Another thing to note is that the rates of change and variability in change were modest, which is also consistent with past studies.

Third, surprisingly, there was a preponderance of statistically non-significant results when examining the associations among parenting practices and child personality. After adjusting the alpha level using the conservative Bonferroni’s adjustment, only four correlations were statistically significant. The four significant correlations were between initial levels of parenting and initial levels of child personality (i.e., concurrent associations) and their magni-

tudes ranged from .10 to .15. The correlations were between parental involvement and child conscientiousness; parental structure and child agreeableness; parental cultural stimulation and child conscientiousness; parental goals and child agreeableness.

Because focusing on statistical significance only can obscure important information about the phenomenon under investigation (Fraley & Marks, 2007), we also interpreted the magnitudes of the associations regardless of their statistical significance. In general, the associations between initial levels or changes in parenting and child personality were small or very small. The average correlations between the initial levels of parenting and child personality was .08. The average correlation between initial levels of parenting and changes in child personality was .04. The average correlation between changes in child personality and initial levels of parenting was .04. The average correlation between changes in parenting and changes in child personality was .08. Taken together, using either statistical significance or effect size metrics leads to the conclusion that parenting dimensions and child personality dimensions are not strongly related to one another, either cross-sectionally or longitudinally, in this dataset.

Theoretical and Practical Implications

What do the pervasively small and non-significant associations between parenting and child personality mean for our understanding of the association between parenting and child personality? Using Cohen's (1988) standards, most of the obtained correlations between parenting and child personality were small or very small. However, Funder and Ozer (2019) have warned against dismissing small effect sizes. They argued that magnitudes of effect sizes are better evaluated when compared against "benchmarks" such as correlations that are believed to be well-understood or average correlations in psychology research. Following their recommendations, it becomes clear that correlations between parenting and child personality are comparable to associations found between other environmental factors and child personality such as parental socioeconomic status (Ayoub et al., 2018) and birth order (Damian & Roberts, 2015), which are also small in magnitude.

On a related note, the fact that the cumulative evidence appears to point to a preponderance of small associations between different environmental factors and personality trait development should modify our thinking about how personality development comes about. Instead of searching for a few large environmental factors that make or break our personalities, whether it is parenting, peers, or birth order, we should acknowledge that such factors with large effects probably do not exist. Rather, evidence points to the fact that personality development is influenced by a large number of environmental factors, each of which makes a small contribution to children's personality development. This framework of personality development parallels the infinitesimal model in genetics, which is currently widely used in behavior genetics research (see Z. Hu et al., 2012; Turelli, 2017). Consensus is growing in genetics that phenotypes are influenced by a very large number of genes, that each has an infinitesimal contribution, rather than "candi-

date genes" that explain large amount of variance in the phenotype. It appears that an analogous situation holds for personality development in childhood and adolescence. Much like the threads of a tapestry, environmental factors combine in an intricate and complex way to drive personality development, and each factor is an essential, yet small thread that contributes to the tapestry that is personality.

Third, and more practically, our findings should not discourage research on, and the implementation of, parenting interventions. Effect sizes that are modest at the individual level could be consequential at the population level. The modest change in parenting and child personality that parenting interventions can do are important when multiplying the effect by the number of people who underwent the interventions. It could also be comforting for parents to realize that parenting goes both ways. The link between parenting and child personality is complex, transactional, and dynamic.

Limitations and Future Directions

There are several limitations of the present study worth noting. First, the present study is not the final word on this topic – future work should replicate the present findings with both similar and different samples, in order to determine the replicability and generalizability of these findings. Second, this study examined longitudinal associations between parenting and child personality between late childhood and adolescence. Therefore, the conclusions we can draw from them are limited to this age group. It would be interesting to examine these longitudinal associations in younger children and compare them to our age groups. Third, our study included measures that were related to parental behavioral control, but no measures that were related to parental warmth and parental psychological control. It will be more informative to examine in future studies whether associations between parental warmth, parental psychological control, and child Big Five personality are comparable in effect size to the results of our study. Fourth, there was little to learn about the shape of the developmental trajectories of parenting because they were assessed across only two waves. It is preferable that future studies have at least four assessment points for parenting in order to examine non-linear change patterns, as well as wave-to-wave dynamics in change. Fifth, the measurement of child personality and the parenting domains were not ideal in the present study. For example, the reverse coded items of child personality variables had to be omitted because children's misunderstanding of them grossly reduced the scales' reliabilities. Moreover, it is worth noting that the parental goals measure had more items compared to the other measures; therefore, it had a higher reliability. It is preferable that all parental measures have similar high reliabilities in future studies. Furthermore, parenting measures, such as parental academic involvement were specific to academic domains; yet it is unknown what the relations between broad parental involvement and child personality would be. This is analogous to examining associations at the facet level vs broad level of the variable. Future studies that involve broad personality traits should include broad parenting measures, so that both parenting and child personality are examined at

the same level of granularity. Fifth, although using longitudinal data helps us to infer some directionality, we did not randomly assign participants to experimental conditions and therefore, causal inference in the strictest sense is not possible. Sixth, although we controlled for parents' personality traits to rule out the possibility that the association between parenting and child personality traits is due to parents' personality traits, it could be that parents' personality is part of the process linking parenting and child personality (see Rohrer, 2018).

Conclusion

The longitudinal associations between multiple parenting dimensions such as parental involvement, structure, cultural stimulation, goals, and children's Big Five personality traits were examined using a large longitudinal dataset. Using bivariate latent growth models, we found that the correlations between initial levels of parenting and child personality, or changes in parenting and changes in child personality, were small or very small. Very few associations reached statistical significance after adjusting for multiple testing. The obtained small associations were comparable in magnitude to ones between other environmental factors and child personality, such as parental socioeconomic status and birth order. The recurrent small effects provoke thoughts about personality development in childhood and adolescence. Instead of assuming that there is one factor that makes or breaks personality, evidence shows that each environmental factor, including parenting,

has little contribution to make towards personality development.

Contributions

Contributed to conception and design: Mona Ayoub
 Contributed to acquisition of data: Richard Göllner, Ulrich Trautwein
 Contributed to analysis and interpretation of data: Mona Ayoub, Bo Zhang
 Drafted and/or revised the article: Mona Ayoub, Bo Zhang, Richard Göllner, Olivia E. Atherton, Ulrich Trautwein, and Brent W. Roberts
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Competing Interests Statement

No competing interests exist.

Data Accessibility Statement

Material related to the study such as data as variance-covariance matrices and Mplus scripts can be accessed using this Open Science Framework link: https://osf.io/qnjp3/?view_only=a2eaa14f0ae640b1ab7572026e4821e7

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Appendices

Appendix A

Items of Instruments in TRAIN Dataset

Parental Involvement

I have enough time and energy to

1. talk intensively about school day
2. take care that child is doing his/her homework
3. go through schoolwork with child
4. get involved in child school
5. go to parents' evenings
6. study classwork with child

Parental Structure

I make sure that

1. my child goes to bed early on school days
2. my child does his homework at fixed times everyday
3. my child has breakfast in the morning
4. we get up together and have breakfast at the weekend
5. my child brushes his/her teeth in the morning and in the evening
6. my child packs the school bag for the next day in the evening
7. family eats together at least once a day
8. my child gets up on time in the morning on school days

Parental Cultural Stimulation

How often does it happen that you

1. go to the theater together with your child
2. go to the museum together with your child
3. go to classical concerts together with your child
4. go to an opera / ballet performance together
5. go to a book reading with your child

Parental Goals

In your opinion, how important that family teaches child

1. personal independence
2. performance and effort
3. order and discipline
4. versatile knowledge
5. political judgement
6. sound knowledge in main subjects
7. social responsibility
8. appropriate social manners
9. respect/respect for parents
10. mastery of cultural skills
11. willingness to learn

12. righteous and helpful behavior
13. knowledge for profession
14. moral judgment
15. enjoy life
16. Awareness of religious beliefs
17. Intellectual curiosity

Child Big Five Personality Traits

I am someone who is

1. is talkative, likes to talk (E1)
2. tends to criticize others (A1R)
3. does the tasks thoroughly (C1)
4. is eclectic (O1)
5. is depressed (N1)
6. is original, develops new ideas (O2)
7. is reserved (E2R)
8. is helpful and selfless towards others (A2)
9. conventional, prefers tradition (O3R)
10. can be careless (C2R)
11. is relaxed, cannot be disturbed by stress (N2R)
12. is often involved in quarrels (A3R)
13. works reliably and conscientiously (C3)
14. can be tense (N3)
15. is rather quiet and taciturn (E3Reversed)
16. appreciates artistic and aesthetic impressions (O4)
17. tends to be messy (C4R)
18. is balanced, not easily upset (N4)
19. has a vivid imagination, is imaginative (O5)
20. does not give up until the job is done (C5)
21. can be rude and dismissive to others (A4R)
22. is inventive and resourceful (O6)
23. full of energy and zest for action (E4)
24. prefers routine and simple tasks (O7R)
25. worries a lot (N5)
26. is sometimes shy and inhibited (E5Reversed)
27. is not resentful, forgives others easily (A5)
28. works well and fast (C6)
29. can be moody (N6)
30. is profound, likes to think about things (O8)
31. is enthusiastic and can carry others along (E6)
32. can behave cold and distant (A6R)
33. makes and executes plans (C7)
34. stays calm, even in tense situations (N7R)
35. trusts others (A7)
36. is negligent (C8R)
37. likes to reflect, play with ideas (O9)
38. is considerate and empathetic to others (A8)
39. gets a bit nervous and unsure (N8)
40. knows music, art and literature well (O10)
41. is assertive and energetic (E7)
42. is easily distractible (C9R)
43. is outgoing, sociable (E8)
44. has little artistic interests (O11R)

Information about Instruments in TRAIN Dataset

Table A1. Information about Variables in TRAIN Dataset

Variable	Rater	Waves Assessed
Child Personality	Child	1,2,3,4
Parental involvement	Parents (unspecified)	1,4
Parental Structure	Parents (unspecified)	1,2,3,4
Parental Cultural Stimulation	Parents (unspecified)	1,4
Parental Goals	Parents (unspecified)	1,4

Table A2. Cronbach’s Alpha Reliabilities of Scales in TRAIN Dataset

	Time 1	Time 2	Time 3	Time 4
Parental Involvement	.81	---	---	.81
Parental Structure	.64	---	---	.75
Parental Cultural Stimulation	.64	---	---	.68
Parental Goals	.89	---	---	.90
Child Extraversion	.71	.73	.76	.77
Child Agreeableness	.67	.67	.66	.67
Child Conscientiousness	.77	.80	.80	.81
Child Neuroticism	.71	.68	.69	.72
Child Openness to Experience	.82	.83	.83	.82

Appendix B

Determining the Factor Structure of Parenting Variables and Testing Measurement Invariance

Factor Structure of Parenting Variables

A series of exploratory factor analyses were conducted to determine the underlying factor structure of the parenting constructs using *Mplus*. The default GEOMIN rotation was applied. The number of retained factors was decided based on the examination of the scree plot and using common sense to interpret the factors' meaning. In Study 1, one-factor solutions were decided for parental involvement, structure, and cultural stimulation. Regarding parental goals, it was clear from the scree plot that multiple factors underlie the items. However, the two or three factor structures did not make sense; therefore, a one-factor solution was decided for parental goals as well. This one factor was called "Success Parental Goals" and includes a list of skills that parents think they are important for the child to have to be successful. Because parental structure and parental goals scales had more than six items, a parceling technique was used to reduce the number of items when the cross-lag and growth models were estimated. Parceling was conducted through the following steps. First, factor loadings of the items were arranged in descending order. Second, the highest loading item was assigned to parcel 1, the second highest loading to parcel 2, and the third highest loading to parcel 3. Third, the remaining items were assigned to parcels in the reverse order to achieve item-content balancing. Each parcel constituted the average score of the included items. Exploratory factor analyses were followed by a series of confirmatory factor analyses to test the robustness of the chosen models. Model fit was inspected using χ^2 , RMSEA, and CFI statistics. Good model fit is inferred when χ^2 is low and not statistically significant, RMSEA is below .06, and CFI is above .95 (L.-T. Hu & Bentler, 1999). In Study 2, one-factor models were selected for all the variables. Items of parental monitoring, routines, and goals were assigned to three parcels. Similarly, items of the child personality traits were assigned to parcels to reduce their number. The same parceling procedure in Study 1 was used.

Measurement Invariance

Measurement equivalence of latent factors across the study waves was tested before running the longitudinal models. This was done to make sure that changes in the latent factors represent real changes in the constructs rather than changes in the relations between the factor and its indicators across time. Measurement invariance was tested through analyzing a series of models that varied in the level of imposed invariance. The first model (Baseline Model) was the least restrictive as it had no invariance constraints on any parameters. The second model (Metric Model) constrained the factor loadings to be invariant. The third model (Scalar Model) fixed the factor loadings and the intercepts to be invariant. The CFI, RMSEA, and SRMR fit indices of the different models were compared to each other. Measurement invariance was concluded if there was no or little

change in these indices. We followed the recommendations by Chen (2007) suggesting changes in CFI ($-.01$), RMSEA ($-.02$), and SRMR ($-.01$) to indicate no substantial change in model fit.

Table B. Results of Measurement Invariance Tests in TRAIN Dataset

	Parental Involvement			Parental Structure			Parental Cultural Stimulation		
	CFI	RMSEA	SRMR	CFI	RMSEA	SRMR	CFI	RMSEA	SRMR
Baseline	.97	.04	.04	1	.02	.02	.95	.04	.04
Metric	.97	.04	.04	1	.02	.03	.95	.04	.04
P Metric	---	---	---	---	---	---	---	---	---
Scalar	.95	.04	.04	.98	.04	.06	.93	.04	.04
P Scalar	.96	.04	.05	1	.03	.04	.94	.04	.04
	Parental Goals			Child Extraversion			Child Agreeableness		
	CFI	RMSEA	SRMR	CFI	RMSEA	SRMR	CFI	RMSEA	SRMR
Baseline	1	0	.009	.97	.03	.03	.99	.02	.02
Metric	1	.005	.02	.97	.03	.03	.99	.02	.02
P Metric	---	---	---	---	---	---	---	---	---
Scalar	1	.007	.02	.96	.03	.03	.99	.02	.03
P Scalar	---	---	---	---	---	---	---	---	---
	Child Conscientiousness			Child Neuroticism			Child Openness to Experience		
	CFI	RMSEA	SRMR	CFI	RMSEA	SRMR	CFI	RMSEA	SRMR
Baseline	.98	.03	.02	.97	.03	.03	1	.01	.01
Metric	.98	.02	.03	.97	.03	.03	1	.01	.02
P Metric	---	---	---	---	---	---	---	---	---
Scalar	.97	.03	.03	.96	.03	.03	1	.01	.02
P Scalar	---	---	---	---	---	---	---	---	---

P Metric= Partial Metric; P Scalar= Partial Scalar

Appendix C

Results of Univariate Latent Growth Models

Table C. Model Fit Indices of Linear and Quadratic Univariate Models (TRAIN Dataset)

	Linear			Quadratic		
	CFI	RMSEA	SRMR	CFI	RMSEA	SRMR
Child Extraversion	.96	.03	.03	.96	.03	.03
Child Agreeableness	.99	.02	.03	.98	.02	.03
Child Conscientiousness	.95	.04	.04	.95	.04	.04
Child Neuroticism	.96	.03	.04	.96	.03	.03
Child Openness to Experience	.95	.03	.04	.95	.03	.04

SUPPLEMENTARY MATERIALS

Peer Review History

Download: https://collabra.scholasticahq.com/article/29766-longitudinal-associations-between-parenting-and-child-big-five-personality-traits/attachment/74895.docx?auth_token=CNJcf1ZHTnAW-Z8ocGtP
