

# Long-Term Developmental Changes in Children's Lower-Order Big Five Personality Facets

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## Abstract

**Objective:** This study examined long-term developmental changes in mother-rated lower-order facets of children's Big Five dimensions.

**Method:** Two independent community samples covering early childhood (2–4.5 years;  $N = 365$ , 39% girls) and middle childhood to the end of middle adolescence (6–17 years;  $N = 579$ , 50% girls) were used. All children had the Belgian nationality. Developmental changes were examined using cohort-sequential latent growth modeling on the 18 facets of the Hierarchical Personality Inventory for Children.

**Results:** In early childhood, changes were mostly similar across child gender. Between 2 and 4.5 years, several facets showed mean-level stability; others changed in the direction of less Extraversion and Emotional Stability, and more Benevolence and Imagination. The lower-order facets of Conscientiousness showed opposite changes. Gender differences became more apparent from middle childhood onward for facets of all dimensions except Imagination, for which no gender differences were found. Between 6 and 17 years, same-dimension facets showed different shapes of growth. Facets that changed linearly changed mostly in the direction of less Extraversion, Benevolence, Conscientiousness, Emotional Stability, and Imagination. Changes in facets for which nonlinear growth was found generally moved in direction or magnitude during developmental transitions.

**Conclusion:** This study provides comprehensive, fine-grained knowledge about personality development during the first two decades of life.

**Keywords:** Big Five, lower-order facets, childhood/adolescence, personality development, gender

Between early childhood and the end of middle adolescence, children develop from dependence on parents to behaviorally and psychologically autonomous individuals (Grusec & Davidov, 2010; Shonkoff & Phillips, 2000; Smetana, Campione-Barr, & Metzger, 2006). These developmental changes may be reflected by, possibly substantive, changes in children's mean-level personality characteristics, as well as children's relative standing to others (rank-order consistency). Moreover, different developmental phases can be distinguished, in each of which personality may change differently: early childhood (0–5 years), middle/late childhood (6–9 years), early adolescence (10–13 years), and middle adolescence (14–17 years; Galambos & Costigan, 2003; Smetana et al., 2006). Studies examining mean-level changes in children's Big Five characteristics below age 10 years remain very scarce, despite increasing recognition that children's individual differences can be described by the Big Five from as early as age

2 years onward (Caspi & Shiner, 2008; De Pauw, 2016; De Pauw, Mervielde, & Van Leeuwen, 2009; Shiner & DeYoung, 2013). Further, the Big Five is a hierarchical framework, with lower-order traits (facets) hierarchically organized under the higher-order traits (dimensions). Although same-dimension facets are related, they also capture unique personality information (Roberts, Walton, & Viechtbauer, 2006; Soto & John, 2012). Examining changes on the level of facets thus allows for a fine-grained analysis of personality development. Unfortunately, knowledge about long-term developmental changes in children's personality facets across developmental phases is still lacking. The current study aims to increase the knowledge base

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on child personality development by examining the stability and mean-level changes of mother ratings of boys' and girls' lower-order Big Five facets in two independent samples, which together cover early childhood (2–4.5 years) and childhood to the end of middle adolescence (6–17 years).

## Personality Development Across Developmental Phases

Throughout childhood and adulthood, rank-order consistency of all Big Five dimensions steadily increases, which is known as the cumulative continuity principle (Roberts & DelVecchio, 2000). Further, mean levels of Agreeableness, Conscientiousness, and Emotional Stability increase from early adulthood onward, which has been termed the maturity principle (Roberts et al., 2006). Personality may show different changes before adulthood, as children progress through different developmental phases (De Pauw, 2016; Soto & Tackett, 2015).

During early childhood, children exhibit dramatic growth in social, regulatory, emotional, and moral capacities (Shonkoff & Phillips, 2000), as well as in cognitive and language skills (Gleason, 2005). The developmental changes in early childhood may be reflected in pronounced changes in Agreeableness, Conscientiousness, Emotional Stability, and Openness.

In middle/late childhood, children orientate increasingly toward peers (Grusec & Davidov, 2010). Peer relationships are thought to help children gain a more sophisticated social understanding because negotiating relationships and disagreements with peers forces them to take another person's point of view and develop empathy and understanding (Kerr, Stattin, Biesecker, & Ferrer-Wreder, 2003). This stronger orientation on peers may also be associated with increased feelings of insecurity regarding relationships (Kerr et al., 2003). Children are further faced with demands for ever more sophisticated work in elementary school (Shiner & DeYoung, 2013). These changes may be associated with increases in Agreeableness and Conscientiousness, but decreases in Emotional Stability.

During early adolescence, children need to adjust to a multitude of physical, hormonal, and psychosocial changes (Galambos & Costigan, 2003; Smetana et al., 2006). Transitional phases such as early adolescence are characterized by conflicts between developmental tasks that may lead to temporary developmental regressions, particularly in the areas of self-regulation and decision making (Blakemore & Choudhury, 2006). According to the disruption hypothesis, the myriad of changes in early adolescence are associated with temporary declines in Agreeableness, Conscientiousness, and Emotional Stability (Soto, 2016).

As children progress through adolescence, they tend to seek greater autonomy from authority figures by more frequently questioning and resisting values, rules, and norms that they perceive as imposed on them by adults (Smetana et al., 2006). Simultaneously, however, youths increasingly develop and internalize abstract moral and social principles that promote pro-social and responsible behaviors, as well as continue to develop

self-regulatory skills that help them avoid risky behaviors in the interest of long-term goals (Gestsdottir & Lerner, 2008). Thus, personality may change in the direction of less Benevolence, Conscientiousness, and Emotional Stability in middle adolescence (14–17 years), although opposite changes are also possible, particularly by the end of middle adolescence.

Studies examining mean-level changes of children's higher-order personality dimensions provide rather consistent evidence for increases in Agreeableness, Conscientiousness, and Emotional Stability during early/middle childhood, followed by temporary decreases in early adolescence, which are again followed by increases in middle/late adolescence (Slobodskaya & Akhmetova, 2010; Soto, 2016; Soto, John, Gosling, & Potter, 2011; Van den Akker, Deković, Asscher, & Prinzie, 2014). For Extraversion, linear decreases from early childhood to late adolescence are usually found (Slobodskaya & Akhmetova, 2010; Soto, 2016; Van den Akker et al., 2014; Wängqvist, Lamb, Frisén, & Hwang, 2015), although one study found stability from middle adolescence onward (Soto et al., 2011). Openness has mostly been found to decrease between middle childhood and early adolescence, and to increase thereafter (Soto, 2016; Soto et al., 2011; Van den Akker et al., 2014), although girls have also been found to decrease in Openness throughout adolescence (Soto, 2016; Soto et al., 2011). One study, which unfortunately did not assess personality in early adolescence (8–15 years), found that Agreeableness and Conscientiousness consistently increased between early childhood and late adolescence, and that Openness increased until early adolescence and decreased thereafter (Wängqvist et al., 2015). Results of a literature review (Soto & Tackett, 2015) and meta-analysis (10–20 years;  $k = 14$ ; Denissen, Van Aken, Penke, & Wood, 2013) further suggest that Conscientiousness, Emotional Stability, and Openness temporarily decrease during early adolescence and increase in middle/late adolescence, and that Extraversion decreases throughout adolescence. The meta-analysis, however, found no evidence of mean-level changes in Agreeableness across adolescence (Denissen et al., 2013). Although these studies provide important knowledge about child personality development, results are not entirely consistent.

## Changes in Children's Personality Facets

A likely explanation for these inconsistent results across studies may lie in the fact that different studies use different personality models and measures. Existing studies have used child-based inventories such as the Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 1999; Van den Akker et al., 2014), the Inventory for Childhood Individual Differences (ICID; Halverson et al., 2003; Slobodskaya & Akhmetova, 2010), the California Child Q-Set (CCQ; Block & Block, 1980; Wängqvist et al. 2015), and the Little Six, which is based on the CCQ but in which activity is a separate higher-order dimension instead of a lower-order facet of Extraversion (Soto, 2016; Soto & John, 2014). Other studies have used adapted adult-based

instruments, such as the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991; Soto et al., 2011). Excellent reviews of the different childhood personality models are provided by De Pauw (2016), Soto and Tackett (2015), and Shiner and DeYoung (2013).

On the level of the lower-order facets, two studies have examined longitudinal changes in children's lower-order facets across 3 years, using parent ratings in four age groups (6/7, 8/9, 10/11, 12/13 years at first assessment; De Fruyt et al., 2006) and teacher reports of the HiPIC between middle/late childhood (6–9 years) and early adolescence (9–12 years; Prinzie & Deković, 2008). Other studies investigated cross-sectional age differences in mother-reported ICID facets across four age groups (3–6, 7–10, 11–14, 15–18 years; Slobodskaya & Akhmetova, 2010), and year-to-year changes in self-reported BFI facets from age 10 years onward (Soto et al., 2011). In the current study, changes in the facets of the HiPIC, which has been identified as one of the soundest instruments to assess personality in children (Shiner & Caspi, 2003), were examined.

Results from studies examining facet-level changes suggest that changes in overall Agreeableness may be driven solely by decreases in dominance from early/middle to middle/late childhood (Slobodskaya & Akhmetova, 2010), which are accompanied by increases in altruism in later childhood (De Fruyt et al., 2006; Prinzie & Deković, 2008). In early adolescence, temporary dips in Agreeableness may be driven by increases in dominance and decreases in altruism, and in addition, by increases in egocentrism and decreases in compliance (Prinzie & Deković, 2008; Soto et al., 2011). In middle/late adolescence, increases in altruism and compliance and decreases in irritability may drive changes in Agreeableness (De Fruyt et al., 2006; Soto et al., 2011).

Changes in overall Conscientiousness may be driven entirely by decreases in achievement striving between middle/late childhood and early adolescence (Prinzie & Deković, 2008). In early adolescence, changes in overall Conscientiousness may be driven by decreases in orderliness and perseverance (Soto et al., 2011), which are accompanied by decreases in achievement striving (De Fruyt et al., 2006; Soto et al., 2011) and decreases in perseverance (low distractible) and orderliness (organized) across middle adolescence (Slobodskaya & Akhmetova, 2010).

With regard to Emotional Stability, anxiety or fearfulness has been found to increase between middle/late childhood and the end of middle adolescence, whereas self-confidence showed mean-level stability across these phases; thus, anxiety may drive the overall decrease in Emotional Stability across these phases (De Fruyt et al., 2006; Prinzie & Deković, 2008; Slobodskaya & Akhmetova, 2010).

In middle childhood, changes in overall Extraversion may be driven by decreases in energy (activity; Slobodskaya & Akhmetova, 2010) and optimism (De Fruyt et al., 2006; Slobodskaya & Akhmetova, 2010), which are accompanied by decreases in expressiveness across the transition to adolescence (De Fruyt et al., 2006; Prinzie & Deković, 2008). In middle adolescence, changes in Extraversion may be due to decreases in activity and shyness (assertiveness, inversed; Soto et al., 2011).

Decreases in Imagination may be driven by decreases in curiosity (open) and intellect (intelligent) from early to middle childhood (Slobodskaya & Akhmetova, 2010). From middle childhood onward, decreases in creativity may underlie changes in overall Imagination (De Fruyt et al., 2006), and these changes may be accompanied by changes in curiosity and intellect by middle adolescence (Prinzie & Deković, 2008).

Together, results from these studies mostly indicate that some facets are responsible for the changes in the higher-order dimensions, rather than that all facets change similarly. However, findings are inconclusive with regard to which facets specifically drive these changes. Moreover, change may be difficult to detect across two time points only, which may explain the small number of significant mean-level changes in the two existing longitudinal studies (De Fruyt et al., 2006; Prinzie & Deković, 2008). Further, given nonlinear changes in the dimensions, facet-level changes may also differ between developmental phases. Because the current study includes four measurement occasions in two independent samples, covering early childhood (2–4.5 years) and middle childhood to late adolescence (6–17 years), it is for the first time possible to examine long-term developmental changes and shape of growth (linear, nonlinear) of the personality facets from early childhood to late adolescence.

## Gender Differences

A second important aim of this study was to explore gender differences in the developmental changes. Results until now are somewhat inconsistent. A meta-analysis examining gender differences in temperament (3-month-olds to 13-year-olds) found moderate gender differences in the facets of effortful control, all favoring girls, which were not moderated by child age (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). Mean-level changes in teacher-reported child personality facets during the transition to adolescence have been found to be similar for boys and girls (Prinzie & Deković, 2008). Gender differences in all self-reported facets in children aged 10 years and older have been reported by Soto and colleagues (2011). Specifically, girls were more altruistic, compliant (Benevolence), and orderly (Conscientiousness) than boys at all ages, and more self-disciplined (Conscientiousness) than boys by early adulthood. Although levels of anxiety, depression (Emotional Stability), assertiveness, and activity (Extraversion) were similar across gender at age 10 years, older girls scored increasingly higher than boys. Results regarding gender differences in personality development are thus rather inconsistent, yet they suggest that girls score higher than boys particularly on the facets of Conscientiousness. The current study is the first to provide a stringent test of gender differences in developmental changes of child personality facets.

## Aims and Hypotheses

The current study aims to increase the knowledge base on personality development by examining long-term developmental



changes in mother-rated child Big Five facets, across two independent samples that cover early childhood (ages 2–4.5 years) and middle childhood to the end of middle adolescence (ages 6–17 years). Additionally, stability of the facets is examined. Based on the cumulative continuity principle (Roberts & DelVecchio, 2000), it is hypothesized that stability of the facets increases over time. Based on developmental theories (Blakemore & Choudhury, 2006; Galambos & Costigan, 2003; Smetana et al., 2006) and the disruption hypothesis (Soto & Tackett, 2015), as well as longitudinal work examining long-term changes in children's Big Five dimensions (Van den Akker et al., 2014) and cross-sectional studies examining age differences across developmental phases (Slobodskaya & Akhmetova, 2010; Soto, 2016; Soto et al., 2011), it is expected that children's personality facets change in the direction of less Extraversion throughout childhood and adolescence. Further, the facets are expected to change in the direction of more Benevolence, Conscientiousness, and Emotional Stability until late childhood, followed by temporary decreases in early adolescence, which again are followed by increases in middle/late adolescence. Moreover, it is tentatively hypothesized that different same-dimension facets may change in different developmental phases, although the scarcity of studies examining long-term facet-level changes precludes formulating hypotheses regarding which facets change in each developmental phase. Regarding gender differences, girls are expected to score higher than boys on the facets of Conscientiousness (Else-Quest et al., 2006; Soto et al., 2011). Further, girls may score higher than boys on facets of Extraversion, Benevolence, and Emotional Stability, and lower on facets of Imagination (Soto et al., 2011). Moreover, gender differences in these facets are expected to become apparent only later in childhood and/or adolescence (cf. Prinzie & Deković, 2008; Soto et al., 2011).

## METHOD

### Participants and Procedure

This study uses data from two independent samples. First, data of the longitudinal Flemish Study on Temperament and Personality in Childhood were used (FSTPC; De Pauw, 2010), in which mothers reported on their children's personality characteristics on four measurement occasions across 18 months, which were timed 6 months apart. These closely timed measurement occasions are in line with the theoretical notion that changes likely are particularly pronounced in early childhood (Shonkoff & Phillips, 2000). At Time 1 (spring 2007), mothers of 317 children (40% girls) participated; at Time 2 (fall 2007), 249 mothers participated; at Time 3 (spring 2008), 293 mothers participated; and at Time 4 (fall 2008), 241 mothers participated. Because new participants were included at Time 3, the total sample size across measurement waves amounted to  $N = 365$  (39% girls). At Time 1, children's mean age was 2 years 4 months (range = 2–3 years), and mothers' mean age was 32 years 8 months ( $SD = 4.12$ , range = 23–44 years); mothers'

educational levels were as follows: secondary education, 23%; non-university higher education, 51%; and university, 26%.

Second, data of the longitudinal Flemish Study on Parenting, Personality, and Development were analyzed (FSPPD; Prinzie et al., 2003). At Time 1 (2001), mothers of 579 children (50% girls) participated. At Time 2 (2004), 492 mothers participated; at Time 3 (2007), 462 mothers participated; and at Time 4 (2009), 424 mothers participated. At Time 1, children's mean age was 7 years 6 months ( $SD = 1.11$ , range = 6–9 years), and mothers' mean age was 36 years 7 months ( $SD = 3.56$ , range = 27–52 years); mothers' educational levels were as follows: elementary school, 1%; secondary education, 41%; non-university higher education, 45%; and university, 13%.

In both studies, a cohort-sequential design was employed, and data from different cohorts were combined to approximate developmental trajectories between ages 2.0 and 4.5 years, and between ages 6 and 17 years. There were two forms of missingness in the data. First, there was planned missingness due to the cohort-sequential design. Because this form of missingness is not dependent on personality characteristics, the assumption that the data are missing at random was tenable. The second form of missingness in both samples is due to attrition. In both samples, missing values were found to be completely at random, that is, missing values were randomly distributed across all observations, and missingness can be assumed to not influence results. For the full early childhood sample (FSTPC), Little's missing completely at random test (MCAR) was  $\chi^2(1247) = 1150$ ,  $p = .97$ ; for the sample including only mothers who participated from Time 1 onward, Little's MCAR was  $\chi^2(951) = 928$ ,  $p = .70$ . Further, no significant differences were found between participants who were included from Time 1 onward and participants who were included from Time 3 onward only,  $F(1, 291) = .00$ ,  $p = .99$  to  $F(1, 239) = 3.11$ ,  $p = .08$ , regarding maternal age or educational level, child age or gender, or any of the personality facets. For the childhood/adolescence sample (FSPPD), Little's MCAR was  $\chi^2(295) = 327$ ,  $p = .09$ . To deal with missing data, full information maximum likelihood (FIML), which produces unbiased parameter estimates under the condition that missing data are MCAR, was employed in Mplus 7 (Muthén & Muthén, 1998–2012).

### Measures

**Child Personality.** In both studies, mothers rated children's Big Five facets using the Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 1999). All 18 facets are assessed using eight items (144 items in total), which are rated on a 5-point scale ranging from 1 (*almost not characteristic*) to 5 (*very characteristic*). Example items for each of the facets are shown in Table 1. In the early childhood sample (FSTPC), Cronbach's alphas ranged from .71 (self-confidence, T1) to .91 (intellect, T2), with a mean of .84. In the childhood/adolescence sample (FSPPD), Cronbach's alphas ranged from .76 (self-confidence, T1) to .91 (orderliness, T4), with a mean of .85.

**Table 1** Example Items and Rank-Order Stability Coefficients of the Facets for Boys and Girls in Early Childhood (FSTPC, 2–4.5 Years) and Between Childhood and Adolescence (FSPPD, 6–17 Years)

Dimension Facet (example item)	Early Childhood (FSTPC)				Childhood/Adolescence (FSPPD)		
	T1-T2	T2-T3	T3-T4	T1-T4	T1-T2	T2-T3	T3-T4
<b>Extraversion</b>							
Energy ( <i>has a lot of energy</i> )	.79	.82	.87	.67	.67	.71	.77
Expressiveness ( <i>talks about own feelings</i> )	.70	.68	.76	.53	.71	.71	.74
Optimism ( <i>sees the bright side of things</i> )	.69	.67	.72	.53	.65	.70	.74
Shyness ( <i>finds it hard to make contact</i> )	.74	.77	.78	.59	.69	.70	.80
<b>Benevolence</b>							
Altruism ( <i>defends the weak</i> )	.61	.65	.71	.53	.63	.70	.72
Compliance ( <i>accepts authority</i> )	.64	.67	.73	.46	.62	.61	.69
Dominance ( <i>acts bossy</i> )	.71	.73	.74	.52	.67	.73	.76
Egocentrism ( <i>is mostly concerned with himself</i> )	.60	.67	.72	.44 <sup>a</sup>	.68 <sup>b</sup>	.65	.69
Irritability ( <i>is quick to argue</i> )	.66	.68	.74	.47 <sup>a</sup>	.71 <sup>b</sup>	.69	.72
<b>Conscientiousness</b>							
Achievement striving ( <i>strives for perfection</i> )	.76	.77	.74	.56	.64	.67	.77
Concentration ( <i>works with sustained attention</i> )	.73	.78	.81	.66	.72	.72	.74
Orderliness ( <i>likes things orderly</i> )	.70	.76	.80	.62	.68	.72	.81
Perseverance ( <i>persists if things get difficult</i> )	.68	.74	.60	.63	.66	.72	.73
<b>Emotional Stability</b>							
Anxiety ( <i>quickly panics</i> )	.59	.68	.70	.46	.57	.67	.73
Self-confidence ( <i>is confident in own abilities</i> )	.67	.70	.64	.55	.61	.76 <sup>a</sup> /.58 <sup>b</sup>	.72
<b>Imagination</b>							
Creativity ( <i>has original ideas</i> )	.71	.76	.74	.54	.67	.76	.78
Curiosity ( <i>likes to learn new things</i> )	.68	.74	.78	.56	.67	.71	.75
Intellect ( <i>quickly understands things</i> )	.77	.79	.83	.62	.74	.79	.80

Note. All coefficients are significant at  $p < .001$ . Coefficients with different superscripts are significantly different ( $p < .001$ ); for self-confidence in the childhood/adolescence sample (FSPPD), the coefficient before the slash is for boys, behind the slash for girls. FSTPC = Flemish Study on Temperament and Personality in Childhood; FSPPD = Flemish Study on Parenting, Personality, and Development.

## Plan of Analyses

First, it was examined whether the facets were invariant across (a) age (samples), (b) gender, and (c) time. Given the number of facets and following recommendations, omnibus tests of the equality of covariance matrices across groups (sample, gender) or time (occasions) were examined first (Vandenberg & Lance, 2000). For sample and gender, multigroup models with sample or gender as the grouping variable were examined. In each model, variances of all items, intercepts of all items, and covariances between all items within and across measurement occasions were constrained to be equal across samples or gender. To assess measurement invariance across time, the following parameters were constrained to be equal: intercepts of the same items across time (i.e., intercept  $X_{T1}$  = intercept  $X_{T2}$  = intercept  $X_{T3}$  = intercept  $X_{T4}$ ), variances of the same items across time (variance  $X_{T1}$  = variance  $X_{T2}$  = variance  $X_{T3}$  = variance  $X_{T4}$ ), within-time item covariances across occasions ( $X_{T1}$ - $Y_{T1}$ - $Z_{T1}$  =  $X_{T2}$ - $Y_{T2}$ - $Z_{T2}$ , etc.), and across-time item covariances between adjacent ( $X_{T1}$ - $X_{T2}$  =  $X_{T2}$ - $X_{T3}$  =  $X_{T3}$ - $X_{T4}$ ) and nonadjacent waves ( $X_{T1}$ - $X_{T3}$  =  $X_{T2}$ - $X_{T4}$ ). If the fully constrained variance matrices fit the data well, measurement invariance holds, and further tests of specific aspects of measurement non-invariance are therefore unnecessary.

Then rank-order consistency of the facets was assessed using rank-order stability coefficients (Pearson correlation

coefficients). Using Fisher's  $r$ -to- $z$  tests, it was investigated whether the coefficients differed for boys versus girls, and whether the stability coefficients increased across time.

Subsequently, mean-level changes of the lower-order facets were examined. First, the kind of growth (linear, quadratic, cubic) that best described the data was assessed for each facet and for boys and girls separately, using univariate latent growth models (LGM; e.g., Duncan, Duncan, & Stryker, 2006) in Mplus 7 (Muthén & Muthén, 1998–2012). A latent intercept factor and latent linear slope factor (and, where supported, a latent quadratic and cubic slope factor) are indicated by the observed personality scores at the different age points. To examine shape of growth, linear growth models were compared with quadratic models. If the quadratic model fit the data significantly better than the linear model, a cubic model was compared to the quadratic model. For facets for which gender differences were found in the shapes of growth of boys and girls (e.g., linear and quadratic), no further tests of gender differences were conducted. If boys and girls had similar shapes of growth (e.g., both linear), then gender differences in the growth parameters were examined using multigroup (boys, girls) modeling. Models in which the growth parameters were freely estimated were compared to models in which all parameters were constrained to be equal across child gender. If this omnibus test was indicative of gender differences, constraints were imposed for each parameter

separately. Given the number of tests, a conservative significance level ( $p < .001$ ) was employed for the chi-square difference tests with which gender differences and shape of growth in the models were examined.

## RESULTS

### Measurement Invariance

It was first examined whether the facets were invariant across samples, gender, and time. The variance matrices that were fully constrained across samples ( $CFI \geq .91$ ,  $RMSEA \leq .068$ ), gender ( $CFI \geq .98$ ,  $RMSEA \leq .036$ ), and time ( $CFI \geq .96$ ,  $RMSEA \leq .042$ ) all showed excellent fit to the data (supplementary online material, Appendix 1). Thus, measurement invariance held for all facets, and observed scale scores can be meaningfully compared across samples, gender, and time.

### Descriptive Statistics, Within Time Correlations, and Rank-Order Consistency Coefficients

For both samples, descriptive statistics (means, standard deviations) are shown in Appendixes 2–3 (supplementary online material), and correlations between same-dimension facets at each measurement occasion can be found in Appendixes 4–8. Fisher's  $r$ -to- $z$  tests indicated that only one out of 108 rank-order stability coefficients was significantly different for boys versus girls; stability of self-confidence between T2 and T3 in the childhood/adolescence sample was stronger for boys than girls. None of the stability coefficients increased significantly across time. Stability coefficients are shown in Table 1, and they indicate that stability between adjacent time points was strong for all facets in both the early childhood sample ( $r$ s ranged from .59 [T1-T2] for anxiety to .87 [T3-T4] for energy) and the childhood/adolescence sample ( $r$ s ranged from .57 [T1-T2] for anxiety to .81 [T3-T4] for orderliness). Across the 1.5 years from the first to last measurement occasion in early childhood, stability of all facets was strong, with three exceptions: Egocentrism ( $r = .44$ ), irritability ( $r = .47$ ), and anxiety ( $r = .46$ ) showed moderate stability.

### Mean-Level Changes

Results of the model comparisons in which shape of growth was examined for boys and girls separately are shown in Appendix 9 (supplementary online material). For facets for which similar shapes of growth were found for boys and girls, data from both genders were combined into one model, and tests of gender differences in the growth parameters were conducted. Model comparisons for these tests are displayed in Appendix 10. Final model fits, an overview of shapes of growth, and gender differences in the final models are displayed in Table 2. Growth parameter means, variances, and plausible values ranges ( $PVR = \text{parameter mean} \pm 1.96 * \text{parameter variance}^{1/2}$ )

based on original scale scores are presented in Table 3 for the early childhood sample, and in Table 4 for the childhood/adolescence sample. Model-implied changes are further graphically presented in Figures 1–5. To better interpret effect sizes, these figures are based on the  $T$ -score metric;  $T$ -scores are standard scores with a mean of 50 and a standard deviation of 10. In terms of Cohen's (1988) now conventional guidelines, differences/changes of 2  $T$ -scores represent small effects, of 5  $T$ -scores represent medium effects, and of 8  $T$ -scores represent large effects. In the Figures, Reverse-oriented facets are inversed; thus, higher values on all facets reflect higher scores on the respective Big Five dimension.

**Extraversion.** In early childhood, children became somewhat less energetic (change of 4  $T$ -scores) but did not change in optimism or shyness. Further, girls and boys became less optimistic, but for boys, the increase in shyness decelerated across time (quadratic change; Table 3, Figure 1). Between middle childhood and the end of middle adolescence, all facets changed in the direction of less Extraversion (Table 4, Figure 1). Boys and girls differed somewhat in their initial levels of energy by 2  $T$ -scores; boys and girls decreased similarly and substantially in energy over time, by almost 8  $T$ -scores between ages 6 and 17 years. Boys and girls did not differ in initial levels of expressiveness, but boys decreased significantly more in expressiveness than girls; by age 17 years, the difference between boys and girls was almost 6  $T$ -scores. Girls showed a linear decrease in optimism, but boys showed a U-shaped change; although boys decreased more than girls in optimism until around age 14, by then they started to increase in optimism again and by age 17, boys and girls again had similar levels of optimism. No gender differences were found for the change in shyness; both boys and girls became slightly shyer between middle childhood and the end of adolescence, with a difference of almost 2  $T$ -scores.

**Benevolence.** In early childhood, altruism and compliance increased by almost 4  $T$ -scores, egocentrism decreased by almost 4  $T$ -scores, and irritability showed mean-level stability. Girls were initially more dominant than boys (by 4  $T$ -scores), and boys and girls decreased similarly in dominance by 3  $T$ -scores (Table 3, Figure 2). From childhood to adolescence, compliance decreased slightly by 2  $T$ -scores, and irritability did not change (Table 4, Figure 2). For altruism, dominance, and egocentrism, different shapes of growth were found for boys and girls. Whereas boys did not change in altruism, girls became initially more altruistic, but by age 13, girls again became less altruistic. Conversely, whereas girls did not change in dominance or egocentrism, boys initially became less dominant and egocentric, but by middle adolescence, they increased in dominance and egocentrism.

**Conscientiousness.** All facets of Conscientiousness showed linear changes in the early childhood sample, and no gender differences were found. Achievement striving and concentration increased significantly but modestly by almost 2  $T$ -scores,

**Table 2** Gender Differences, Shapes, and Fit Indices of the Final Models for Each of the Facets

Dimension: Facet	Gender Differences	Shape	Model Fit Indices			
			$\chi^2$	df	CFI	TLI
E: Energy						
FSTPC (2–4.5 years)	None	Linear	81.60***	34	0.94	0.97
FSPPD (6–17 years)	Intercept mean	Linear	144.02**	102	0.96	0.98
E: Expressiveness						
FSTPC (2–4.5 years)	None	Linear	58.66**	34	0.96	0.98
FSPPD (6–17 years)	Slope mean	Linear	109.02	102	0.99	1.00
E: Optimism						
FSTPC (2–4.5 years)	Shape:	Boys: Quadratic	60.33**	33	0.91	0.95
		Girls: Linear	42.88	34	0.95	0.98
FSPPD (6–17 years)	Shape:	Boys: Quadratic	39.08	43	1.00	1.01
		Girls: Linear	46.15	47	1.00	1.00
E: Shyness						
FSTPC (2–4.5 years)	None	Linear	44.00	34	0.98	0.99
FSPPD (6–17 years)	None	Linear	64.47*	47	0.98	0.99
B: Altruism						
FSTPC (2–4.5 years)	None	Linear	39.08	34	0.99	0.99
FSPPD (6–17 years)	Shape:	Boys: Linear	69.79*	47	0.95	0.97
		Girls: Quadratic	49.84	43	0.99	0.99
B: Compliance						
FSTPC (2–4.5 years)	None	Linear	55.12**	34	0.96	0.98
FSPPD (6–17 years)	None	Linear	59.71	47	0.98	0.99
B: Dominance						
FSTPC (2–4.5 years)	Intercept mean	Linear	112.68**	75	0.93	0.97
FSPPD (6–17 years)	Shape:	Boys: Quadratic	51.70	43	0.98	0.99
		Girls: Linear	77.98**	47	0.94	0.97
B: Egocentrism						
FSTPC (2–4.5 years)	None	Linear	44.64	34	0.98	0.99
FSPPD (6–17 years)	Shape:	Boys: Quadratic	56.64	43	0.97	0.98
		Girls: Linear	58.08	47	0.98	0.99
B: Irritability						
FSTPC (2–4.5 years)	None	Linear	41.29	34	0.98	0.99
FSPPD (6–17 years)	None	Linear	79.80**	47	0.97	0.98
C: Achievement striving						
FSTPC (2–4.5 years)	None	Linear	46.42*	34	0.98	0.99
FSPPD (6–17 years)	Shape:	Boys: Cubic	50.64	42	0.98	0.99
		Girls: Linear	78.61**	47	0.94	0.97
C: Concentration						
FSTPC (2–4.5 years)	None	Linear	62.91**	34	0.96	0.98
FSPPD (6–17 years)	Intercept mean	Linear	147.43**	102	0.96	0.98
C: Orderliness						
FSTPC (2–4.5 years)	None	Linear	51.28*	34	0.97	0.99
FSPPD (6–17 years)	Shape:	Boys: Quadratic	47.10	43	0.99	1.00
		Girls: Linear	61.39	47	0.98	0.99
C: Perseverance						
FSTPC (2–4.5 years)	None	Linear	48.88*	34	0.97	0.99
FSPPD (6–17 years)	Slope mean	Linear	136.22*	102	0.96	0.98
S: Anxiety						
FSTPC (2–4.5 years)	None	Linear	43.87	34	0.98	0.99
FSPPD (6–17 years)	Shape:	Boys: Quadratic	88.20***	46	0.90	0.95
		Girls: Linear	70.60*	47	0.94	0.97
S: Self-confidence						
FSTPC (2–4.5 years)	None	Linear	45.33	34	0.97	0.99
FSPPD (6–17 years)	Shape:	Boys: Quadratic	72.08**	43	0.94	0.97
		Girls: Linear	74.53**	47	0.93	0.96
I: Creativity						
FSTPC (2–4.5 years)	None	Linear	38.11	34	0.99	1.00
FSPPD (6–17 years)	None	Linear	67.47*	47	0.98	0.99



**Table 2** (Continued)

Dimension: Facet	Gender Differences	Shape	Model Fit Indices			
			$\chi^2$	df	CFI	TLI
I: Curiosity						
FSTPC (2–4.5 years)	None	Linear	64.91**	34	0.95	0.97
FSPPD (6–17 years)	None	Linear	56.91	47	0.99	1.00
I: Intellect						
FSTPC (2–4.5 years)	None	Linear	92.52***	34	0.93	0.96
FSPPD (6–17 years)	None	Linear	83.79***	47	0.97	0.99

Note. E = Extraversion; B = Benevolence; C = Conscientiousness; S = Emotional Stability; I = Imagination; FSTPC = Flemish Study on Temperament and Personality in Childhood; FSPPD = Flemish Study on Parenting, Personality, and Development.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

and orderliness did not change. Perseverance decreased across early childhood by almost 4 *T*-scores (Table 3, Figure 3). Between childhood and adolescence, developmental changes of all facets differed between boys and girls (Table 4, Figure 3). Girls initially scored 4 *T*-scores higher than boys on concentration; boys and girls decreased similarly (not statistically different) in concentration by 3 *T*-scores. Boys and girls had similar initial levels of perseverance, but whereas boys decreased in perseverance, girls did not change in this facet; by the end of middle adolescence, girls scored almost 6 *T*-scores higher than boys. Girls became slightly less orderly throughout childhood and adolescence by 2 *T*-scores. Boys decreased more in orderliness than girls, but this decrease decelerated as boys progressed through adolescence; by the end of middle adolescence, boys scored almost 4 *T*-scores

lower than in middle childhood. Girls decreased consistently in achievement striving by 4 *T*-scores. Although boys initially increased (not significantly) in achievement striving, by early adolescence, boys decreased in this facet; however, by the end of middle adolescence, this decrease decelerated (cubic growth). By the end of middle adolescence, boys scored almost 5 *T*-scores lower on achievement striving than in middle childhood.

**Emotional Stability.** Changes in the facets of Emotional Stability were similar for boys and girls in early childhood (Table 3, Figure 4); children became slightly more anxious by 2 *T*-scores, and somewhat less self-confident by 3 *T*-scores. Between middle childhood and the end of middle adolescence, girls increased somewhat in anxiety and decreased somewhat in self-

**Table 3** Growth Parameter Means (*M*), Variances ( $\sigma$ ), and Plausible Values Ranges (PVR) in the Early Childhood (FSTPC) Sample

	Intercept			Linear Slope			Quadratic Slope
	<i>M</i>	$\sigma$	PVR	<i>M</i>	$\sigma$	PVR	<i>M</i>
E: Energy	4.07	0.40***	(2.83, 5.31)	−0.78***	1.87***	(−3.46, 1.90)	—
E: Expressiveness	3.91	0.34***	(2.77, 5.05)	0.09	1.85***	(−2.58, 2.76)	—
E: Optimism: Boys	4.34	0.18***	(3.51, 5.17)	−1.19***	1.06**	(−3.21, 0.83)	1.42* <sup>c</sup>
E: Optimism: Girls	4.37	0.20***	(3.49, 5.25)	−0.49**	0.64	(−2.06, 1.08)	—
E: Shyness	2.31	0.50***	(0.92, 3.70)	−0.002	2.25***	(−2.94, 2.94)	—
B: Altruism	3.50	0.29***	(2.44, 4.56)	0.57***	1.16**	(−1.54, 2.68)	—
B: Compliance	3.23	0.25***	(2.25, 4.21)	0.46***	1.56***	(−1.99, 2.91)	—
B: Dominance: Boys	2.97 <sup>a</sup>	0.41***	(1.70, 4.22)	−0.37**	1.90***	(−3.03, 2.37)	—
B: Dominance: Girls	3.27 <sup>b</sup>	0.41***	(2.02, 4.54)	−0.47**	1.90***	(−3.14, 2.26)	—
B: Egocentrism	2.65	0.29***	(1.59, 3.71)	−0.53***	1.66***	(−3.06, 2.00)	—
B: Irritability	2.65	0.41***	(1.39, 3.91)	−0.18	2.89***	(−3.51, 3.15)	—
C: Achievement striving	3.46	0.40***	(2.22, 4.70)	0.24	1.50***	(−2.16, 2.64)	—
C: Concentration	3.45	0.38***	(2.24, 4.66)	0.28**	1.32***	(−1.97, 2.53)	—
C: Orderliness	3.15	0.48***	(1.79, 4.51)	0.08	1.73***	(−2.50, 2.66)	—
C: Perseverance	3.41	0.30***	(2.34, 4.48)	−0.52***	0.62*	(−2.06, 1.02)	—
S: Anxiety	2.39	0.35***	(1.23, 3.55)	0.31*	1.10***	(−1.75, 2.37)	—
S: Self-confidence	3.98	0.23***	(3.04, 4.92)	−0.46***	1.31***	(−2.70, 1.78)	—
I: Creativity	3.95	0.26***	(2.95, 4.95)	0.10	1.63***	(−2.40, 2.60)	—
I: Curiosity	4.20	0.22***	(3.28, 5.12)	0.02	0.99***	(−1.93, 1.97)	—
I: Intellect	4.01	0.40***	(2.77, 5.25)	0.57***	1.47***	(−1.81, 2.95)	—

Note. Different superscripts indicate significant ( $p < .001$ ) gender differences for this parameter. <sup>c</sup>Variance of the quadratic slope for boys' optimism was not estimated due to a nonsignificant negative value for this parameter. E = Extraversion; B = Benevolence; C = Conscientiousness; S = Emotional Stability; I = Imagination.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .



**Table 4** Growth Parameter Means (*M*), Variances ( $\sigma$ ), and Plausible Values Ranges (PVR) in the Childhood/Adolescence (FSPPD) Sample

Dimension: Facet	Intercept			Linear Slope			Quadratic Slope			Cubic Slope
	<i>M</i>	$\sigma$	PVR	<i>M</i>	$\sigma$	PVR	<i>M</i>	$\sigma$	PVR	
E: Energy: Boys	3.76 <sup>a</sup>	0.37***	(2.57, 4.95)	-0.46***	0.43***	(-1.75, 0.83)	—	—	—	—
E: Energy: Girls	3.54 <sup>b</sup>	0.37***	(2.35, 4.73)	-0.46***	0.43***	(-1.75, 0.83)	—	—	—	—
E: Expressiveness: Boys	3.55	0.39***	(2.33, 4.77)	-0.62*** <sup>a</sup>	0.37***	(-1.81, 0.57)	—	—	—	—
E: Expressiveness: Girls	3.55	0.39***	(2.33, 4.77)	-0.25*** <sup>b</sup>	0.37***	(-1.44, 0.94)	—	—	—	—
E: Optimism: Boys	3.91	0.37***	(2.72, 5.10)	-0.57***	2.39***	(-3.60, 2.46)	0.32*	1.63**	(-2.18, 2.82)	—
E: Optimism: Girls	3.90	0.33***	(2.77, 5.03)	-0.21***	0.36***	(-1.39, 0.97)	—	—	—	—
E: Shyness	2.28	0.37***	(1.09, 3.47)	0.20***	0.35***	(-0.96, 1.36)	—	—	—	—
B: Altruism: Boys	3.60	0.30***	(2.53, 4.67)	0.02	0.29***	(-1.04, 1.08)	—	—	—	—
B: Altruism: Girls	3.64	0.36***	(2.46, 4.82)	0.71***	1.42**	(-1.63, 3.05)	-0.54***	0.70	(-2.18, 1.10)	—
B: Compliance	3.56	0.30***	(2.49, 4.63)	-0.13***	0.31***	(-1.22, 0.96)	—	—	—	—
B: Dominance: Boys	2.86	0.39***	(1.64, 4.08)	-0.56***	0.93	(-2.45, 1.33)	0.41**	0.42	(-0.86, 1.68)	—
B: Dominance: Girls	2.79	0.37***	(1.60, 3.98)	-0.06	0.23***	(-1.00, 0.88)	—	—	—	—
B: Egocentrism: Boys	2.44	0.33***	(1.31, 3.57)	-0.21	2.16**	(-3.09, 2.67)	0.15	1.70**	(-2.41, 2.71)	—
B: Egocentrism: Girls	2.30	0.31***	(1.21, 3.39)	0.04	0.15**	(-0.72, 0.80)	—	—	—	—
B: Irritability	2.57	0.51***	(1.17, 3.97)	0.007	0.46***	(-1.32, 1.34)	—	—	—	—
C: Achievement striving: Boys	3.43	0.50***	(2.04, 4.82)	0.65	2.97*	(-2.73, 4.03)	-2.05*	1.31	(-4.29, 0.19)	0.94 <sup>c</sup>
C: Achievement striving: Girls	3.64	0.41***	(2.38, 4.90)	-0.30***	0.31***	(-1.39, 0.79)	—	—	—	—
C: Concentration: Boys	3.51 <sup>a</sup>	0.41***	(2.25, 4.77)	-0.19***	0.37***	(-1.38, 1.00)	—	—	—	—
C: Concentration: Girls	3.79 <sup>b</sup>	0.41***	(2.53, 5.05)	-0.19***	0.37***	(-1.38, 1.00)	—	—	—	—
C: Orderliness: Boys	3.16	0.44***	(1.86, 4.46)	-0.52*	3.81***	(-4.35, 3.31)	0.18	1.98*	(-2.58, 2.94)	—
C: Orderliness: Girls	3.30	0.66***	(1.71, 4.89)	-0.18**	0.56***	(-1.65, 1.29)	—	—	—	—
C: Perseverance: Boys	3.28	0.36***	(2.10, 4.46)	-0.32*** <sup>a</sup>	0.34***	(-1.46, 0.82)	—	—	—	—
C: Perseverance: Girls	3.28	0.36***	(2.10, 4.46)	0.07 <sup>b</sup>	0.34***	(-1.07, 1.21)	—	—	—	—
S: Anxiety: Boys	2.47	0.47***	(1.13, 3.81)	0.69***	0.31***	(-0.40, 1.78)	-0.94***	<sup>c</sup>	—	—
S: Anxiety: Girls	2.66	0.46***	(1.33, 3.99)	-0.20**	0.34***	(-1.34, 0.94)	—	—	—	—
S: Confidence: Boys	3.61	0.38***	(2.40, 4.82)	-0.76***	3.23**	(-4.28, 2.76)	0.63***	2.03**	(-2.16, 3.42)	—
S: Confidence: Girls	3.55	0.22***	(2.63, 4.47)	-0.16**	0.19**	(-1.01, 0.69)	—	—	—	—
I: Creativity	3.80	0.32***	(2.69, 4.91)	-0.41***	0.22***	(-1.33, 0.51)	—	—	—	—
I: Curiosity	4.04	0.35***	(2.88, 5.20)	-0.57***	0.31***	(-1.66, 0.52)	—	—	—	—
I: Intellect	3.95	0.42***	(2.68, 5.22)	-0.24***	0.23***	(-1.18, 0.70)	—	—	—	—

Note. Different superscripts indicate significant gender differences in the parameter. <sup>a</sup>Variance was not estimated due to a nonsignificant negative estimate for this parameter. E = Extraversion; B = Benevolence; C = Conscientiousness; S = Emotional Stability; I = Imagination.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

confidence, by 3 *T*-scores. Although boys became more anxious until around early adolescence, they decreased substantially in anxiety from then onward; by the end of middle adolescence, boys scored 5 *T*-scores lower on anxiety than in middle childhood. Further, boys became less self-confident until around middle adolescence, but from around age 14 years onward, boys started to increase in self-confidence (Table 4, Figure 4).

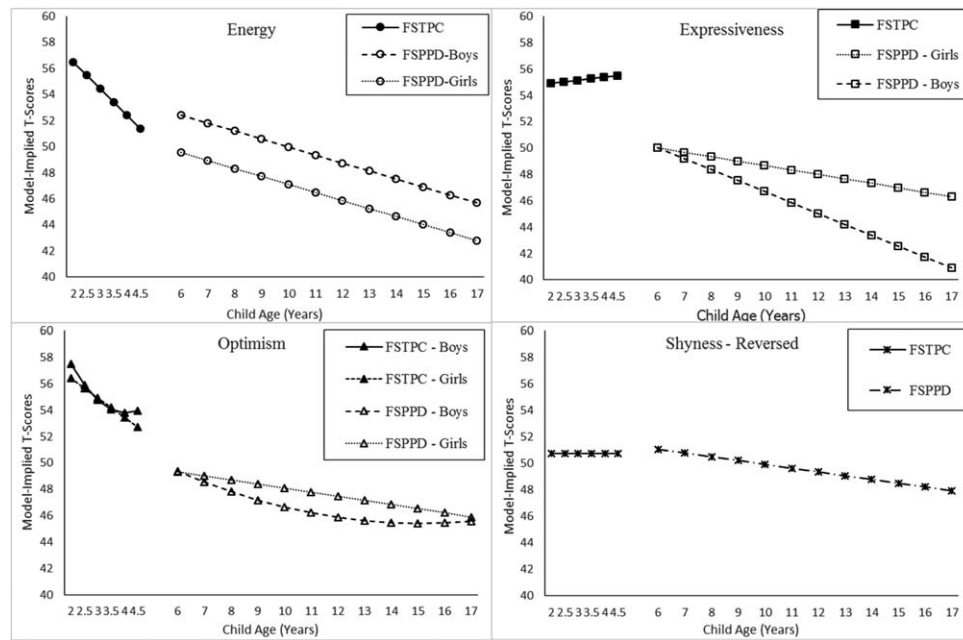
**Imagination.** In early childhood, creativity and curiosity showed mean-level stability, and intellect increased by almost 4 *T*-scores (Table 3, Figure 5). Between childhood and adolescence, children decreased in all facets of Imagination, although the decrease for intellect was smaller (3 *T*-scores) than for creativity (5 *T*-scores) or curiosity (7 *T*-scores; Table 4, Figure 5).

## DISCUSSION

From early childhood to the end of middle adolescence, children experience a multitude of developmental changes (Galambos &

Costigan, 2003; Shonkoff & Phillips, 2000; Smetana et al., 2006), which are likely reflected by changes in children's personality characteristics. Lower-order facets of the same higher-order dimensions, although related, capture unique personality information (Roberts et al., 2006; Soto et al., 2011), and different lower-order facets may drive changes in the higher-order dimensions in different developmental phases. The current study was the first to examine long-term development of boys' and girls' Big Five facets in two independent community samples, covering early childhood (2–4.5 years) and childhood to the end of middle adolescence (6–17 years). By examining changes of children's lower-order facets, this study provides unique, fine-grained knowledge of developmental changes in children's personality.

Children's personality facets were moderately to strongly stable across adjacent measurement occasions, and only one (out of 108) stability coefficients differed for boys versus girls. Although previous studies found that stability increased with increasing age (Roberts & DelVecchio, 2000), in the current study, no evidence of increasing stability in either early



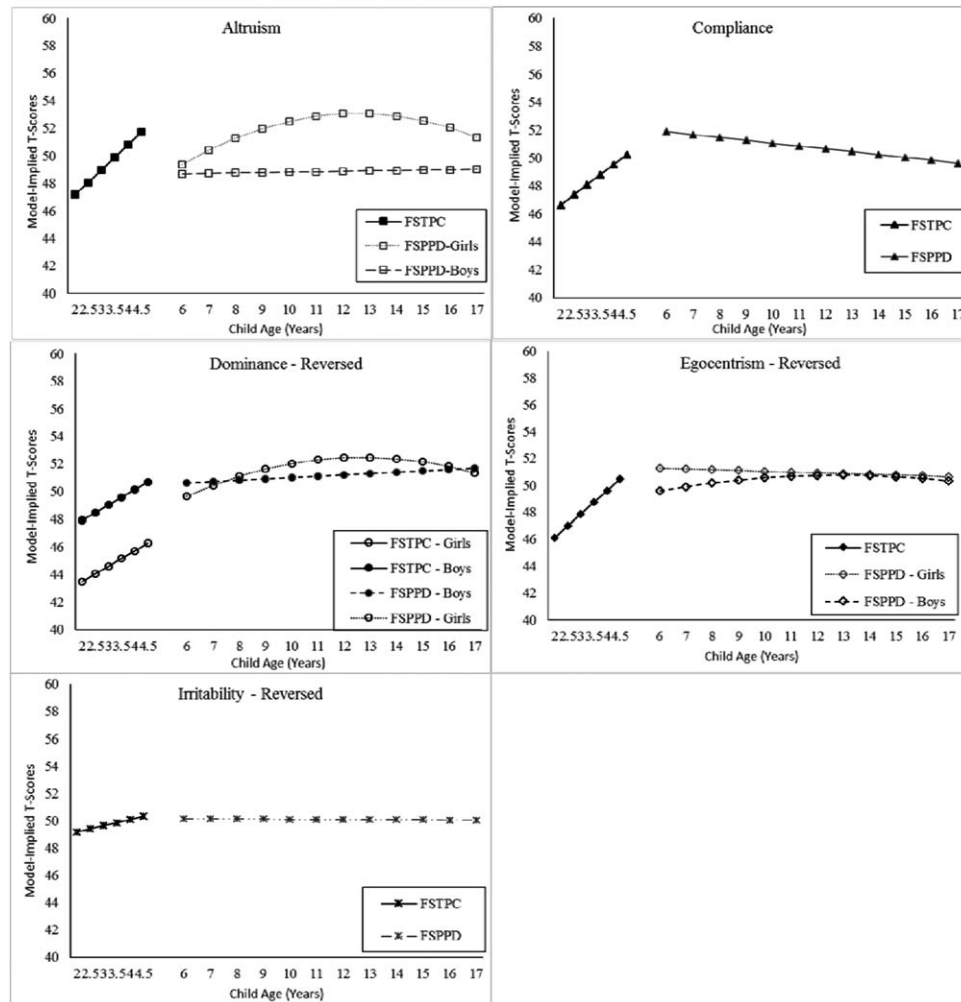
**Figure 1** Model-implied changes for facets of Extraversion in early childhood (FSTPC) and childhood/adolescence (FSPPD).

childhood or between middle childhood and the end of middle adolescence was found. Likely, this is due to relatively small differences between time intervals. In the early childhood sample, personality was assessed every 6 months, and in the childhood/adolescence sample, personality was measured every 2–3 years. Longer time intervals are probably necessary to detect changes in stability coefficients over time. Moreover, strict significance levels were used, which makes detecting differences less likely. Together, results from this study suggest that children's personality facets are already moderately stable from early childhood onward, and that stability of the personality facets is similar for boys and girls.

Mean-level changes in many facets of Benevolence differed across developmental phases. The only exception was found for irritability, which did not change in early childhood or between middle childhood and the end of middle adolescence, consistent with several previous studies (Prinz & Deković, 2008; Slobodskaya & Akhmetova, 2010). Further, boys and girls became more altruistic in early childhood. Although boys did not change in altruism from middle childhood onward, girls became more altruistic until around early adolescence, after which they decreased. Possibly, girls' increasing orientation toward peers may lead them to show increasing empathy for others (cf. Kerr et al., 2003), although this may not affect boys' altruism, and for girls, it may be a temporary phenomenon only. Young children became more compliant, and less dominant and egocentric, consistent with developmental theories asserting that social, regulatory, emotional, and moral capacities dramatically progress during early childhood (Shonkoff & Phillips, 2000). In contrast, from middle childhood onward, children became less compliant; children's striving for autonomy may thus lead them to oppose

rules and regulations from authority figures (Smetana et al., 2006). Further, although boys decreased in dominance until around early adolescence, they increased in dominance thereafter; girls did not change in dominance from middle childhood onward. Results from this study thus suggest that changes in boys' dominance, and in boys' and girls' compliance, may drive the decreases found in Agreeableness in early adolescence (Soto & Tackett, 2015). Moreover, changes in overall Agreeableness may be driven by changes in altruism, compliance, dominance, and egocentrism in early childhood, and by changes in altruism (girls), compliance, and dominance (boys) between middle childhood and the end of middle adolescence.

During early childhood, achievement striving and orderliness did not change, concentration increased, but perseverance decreased. The unanticipated decrease for perseverance may be attributable to the fact that in Belgium, children transition from the relatively safe environment of small-scaled kindergartens to more structured and demanding preschool education at around 2.5–3 years, which may be reflected by a (temporary) decrease in perseverance around this age. From middle childhood onward, most facets showed, sometimes substantive, changes. Boys and girls decreased in concentration and orderliness (cf. Soto et al., 2011), and boys but not girls decreased in perseverance. Girls decreased in achievement striving from middle childhood onward, but for boys, this decrease only appeared from early adolescence onward, and this decrease decelerated by the end of middle adolescence. Inconsistent with the disruption hypothesis (Soto & Tackett, 2015), changes in several Conscientiousness facets were linear. Possibly, the myriad of changes in early adolescence (cf. Galambos & Costigan, 2003; Smetana et al., 2006) consistently negatively affect the Conscientiousness



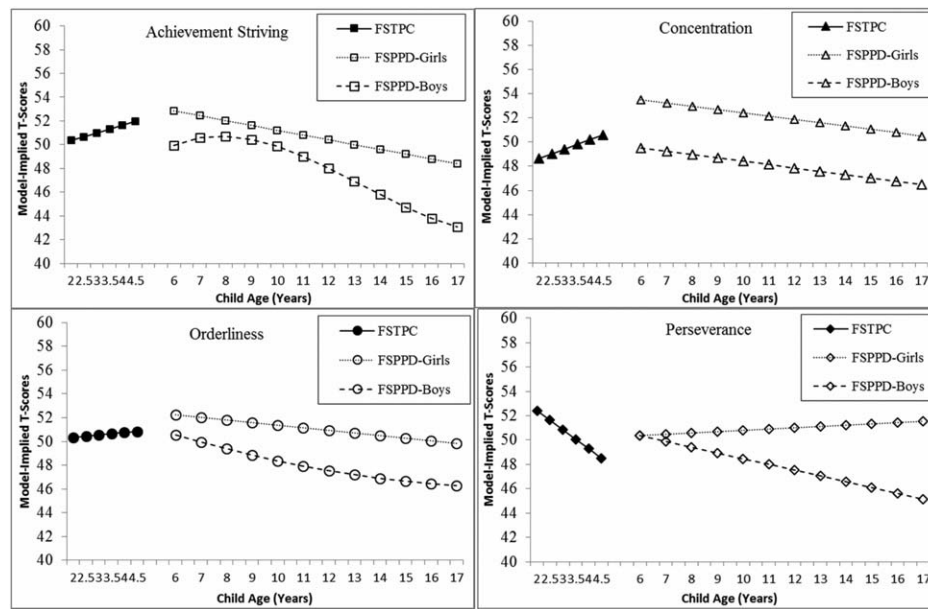
**Figure 2** Model-implied changes for facets of benevolence in early childhood (FSTPC) and childhood/adolescence (FSPPD).

facets. For example, popularity concerns may lead children to become less achievement oriented throughout childhood and adolescence, and demands from an increasingly diverse social world (e.g., school, friends, family) may consistently negatively affect children's concentration and orderliness. Together, these results suggest that changes in Conscientiousness may be driven mostly by concentration and perseverance in early childhood, but by changes in all facets from middle childhood onward.

In early childhood, children decreased in self-confidence and increased in anxiety; these changes in the direction of less Emotional Stability may arise because young children become increasingly aware of their surroundings (cf. Shonkoff & Phillips, 2000), which may become apparent at earlier ages in the current study because children in Belgium go to elementary school from 2 years onward. From middle childhood onward, gender differences in the facets appeared. Girls became consistently, but modestly, less self-confident and more anxious from middle childhood onward. Although boys initially showed changes similar to girls, by early adolescence, boys decreased substantially in anxiety, and by middle adolescence, they started

to increase in self-confidence. The U-shaped changes in boys' anxiety and self-confidence are supportive of the disruption hypothesis (Soto & Tackett, 2015), although the linear declines for girls instead suggest that decreases in girls' Emotional Stability may be long term. Changes in both facets may drive the changes in overall Emotional Stability, and, moreover, gender differences in these facets (and the overall Emotional Stability dimension) may appear in early to middle adolescence.

Regarding the lower-order facets of Extraversion, children were found to become consistently less energetic and optimistic across developmental phases. Although expressiveness and shyness also decreased from middle childhood onward, during early childhood, children did not change in these facets. Other studies examining facet-level changes similarly found that energy and optimism decreased in all phases (De Fruyt et al., 2006; Slobodskaya & Akhmetova, 2010), but that expressiveness changed only from early adolescence onward (De Fruyt et al., 2006; Prinzie & Deković, 2008). Existing work on long-term changes in Extraversion typically finds that Extraversion linearly decreases across developmental phases (Soto, 2016; Soto et al.,

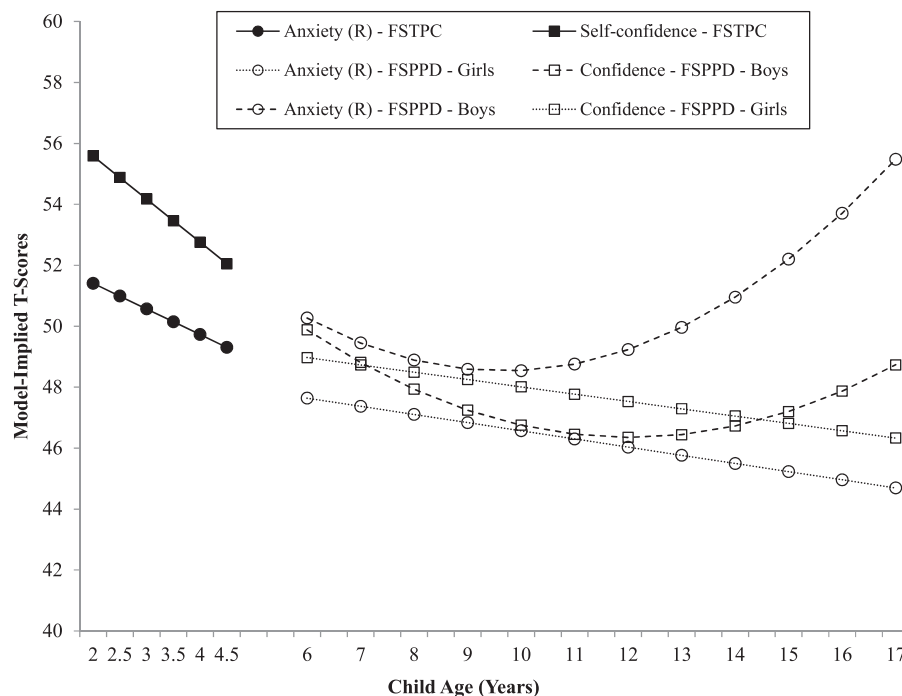


**Figure 3** Model-implied changes for facets of Conscientiousness in the early childhood (FSTPC) and childhood/adolescence samples (FSPPD).

2011; Van den Akker et al., 2014; Wängqvist et al., 2015). Results from this study show that changes in overall Extraversion in early childhood may be driven by decreases in energy and optimism only, but by decreases in all lower-order facets from middle childhood onward.

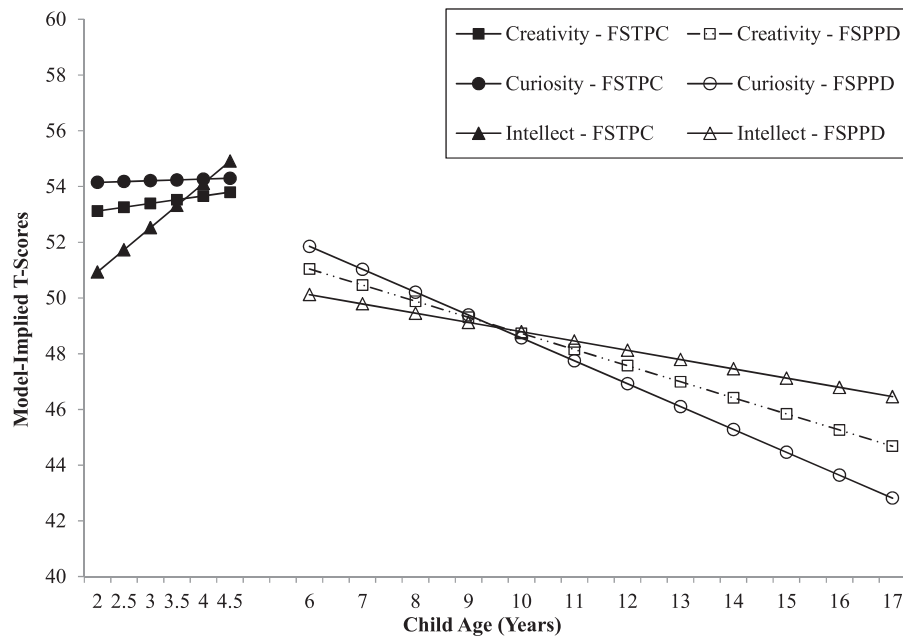
Children increased in intellect but did not change in creativity or curiosity during early childhood, consistent with

increasing cognitive and language skills in this phase (Gleason, 2005). From middle childhood onward, in contrast, children decreased in all Imagination facets, although changes in intellect were smaller than in creativity or curiosity. No gender differences were found for the changes in these facets. Results from this study show that changes in overall Imagination are driven by increasing intellect in early childhood, and by



**Figure 4** Model-implied changes for facets of Emotional Stability in early childhood (FSTPC) and childhood/adolescence (FSPPD).





**Figure 5** Model-implied changes for facets of imagination in early childhood (FSTPC) and childhood/adolescence (FSPPD).

decreases in all Imagination facets from middle childhood onward.

Overall, the current study found more evidence of change than previous longitudinal studies about changes in children's personality facets that examined changes across two measurement occasions only (De Fruyt et al., 2006; Prinzie & Deković, 2008), although results from the current study are in line with cross-sectional work covering large age ranges (Soto et al., 2011). Together, these results provide important evidence of not only linear but also nonlinear developmental changes in children's personality facets between early childhood and the end of middle adolescence.

### Gender Differences

Results indicate that gender differences may become apparent in middle childhood, as substantially more gender differences were found in the childhood/adolescence sample (eight out of 18 facets) than in the early childhood sample (two out of 18 facets). Soto and colleagues (2011) similarly found that gender differences in assertiveness, activity, and self-discipline were negligible in early adolescents but became increasingly salient at older ages. Our findings that girls scored higher than boys on altruism and orderliness are further in line with results of this previous study. However, although we found that girls and boys did not differ on compliance, Soto and colleagues (2011) reported consistently higher scores for girls than boys on compliance. Thus, whereas girls perceive themselves as more compliant than boys do, mothers view girls and boys similarly compliant. Moreover, whereas a meta-analysis on gender differences in temperament traits related to Conscientiousness (Else-Quest et al., 2006)

found that between ages 3 months and 13 years, girls consistently scored higher than boys, we found gender differences only from age 6 years onward, but not in children aged 2–4.5 years. Overall, the current study's results suggest that gender differences may originate at some point in middle childhood. Biosocial models of gender assert that biologically based gender differences are very small in infancy and become enhanced during early and middle childhood because other people do respond to them (Maccoby, 1990); such processes may be particularly at work for the facets of Conscientiousness and Extraversion. Overall, this study answered the call to chart the development of gender differences in mean levels of personality traits from early childhood onward (Caspi, Roberts, & Shiner, 2005), and results suggests that, although the causes of (early) personality change may be the same across gender, from middle childhood onward, gender-specific processes may become more apparent. Of course, our interpretation of these results is tentative given that gender differences in early childhood and in middle childhood to adolescence were investigated in two different samples. More research is needed to further understand when and how gender differences in personality become apparent.

### LIMITATIONS AND FUTURE RESEARCH

Several limitations of the current study should be noted. First, because the two independent samples did not overlap in age ranges, it was not possible to statistically test whether diverging trends were significantly different between samples and, moreover, to examine whether opposing directions of change reflect nonlinear growth or are due to methodological differences between the samples. That is, although both samples used

similar data collection frames and were collected in the same region in Belgium (Flanders), they may systematically differ on unmeasured background variables. Researchers who are interested in examining long-term changes across independent samples are strongly encouraged to use parallel samples with overlapping age ranges.

Further, although the HiPIC has been validated in preschoolers (De Pauw et al., 2009) and adolescents (De Fruyt et al., 2006), it was originally developed for the 5–12-year period. The sampled behavioral repertoire may thus not comprehensively address all important aspects of children's trait variability in younger age groups and in adolescent samples. More research is needed to determine the definite set of dimensions underlying the broad phenomenology of children's individuality at each point in development (see, e.g., De Pauw, 2016; Soto & John, 2014). Nevertheless, our use of a single, child-based instrument across measurement occasions provides a single framework of reference against which personality change can be studied.

For comparability of the information in the two samples, only mother ratings of child personality facets were used, although for the older sample (FSPPD), information from other informants (most notably, self-reports) was available. Using other-reports to examine personality in the younger age groups is consistent with other studies (De Fruyt et al., 2006; Prinzie & Deković, 2008). However, self-reports are more common in older age groups, particularly older adolescents (Soto et al., 2011). Adolescents themselves may use different frames of reference when assessing their own personality (e.g., interactions with peers, teachers) than parents use when they assess their child's personality (e.g., interactions with family members). Moreover, the self-regulation model of personality development asserts that personality development is driven by increasing expectations of mature behavior that others have of children (Denissen et al., 2013). That is, mothers may hold their children up to increasingly higher norms and standards, and it may take children a while to develop the resources and practices to live up to these increasing expectations; as such, mothers may perceive their children to become (temporarily) *less* mature. Nevertheless, a previous study that examined mean-level changes of the Big Five dimensions, using mother and self-reports on partly the same sample as the current study, found few diverging trends between the two informant ratings (Van den Akker et al., 2014). More generally, information obtained from close others or self-reports contains the risk of social desirability, whereas observational data provide more objective information. However, although using questionnaire data may result in higher mean levels of (desirable) personality facets across time, patterns of developmental changes are not necessarily different when using questionnaire versus observational data. Future research could empirically test this assumption.

Further, although this study provides important descriptive knowledge about *how* children's personality changes, it offers no insights as to *why* these changes happen. According to social investment theory, the environment may importantly affect adult personality development, particularly investment in age-graded

social roles (Roberts & Jackson, 2008). Before adulthood, other environmental factors, such as (the transition to) elementary school, may be the predominant factors for personality development (Shiner & DeYoung, 2013). Studies that examine personality in different societies, where children transition to elementary school at different ages, may provide valuable knowledge about how this and other age-salient environmental factors shape child personality development (Bleidorn et al., 2013).

Moreover, studies should examine how long-term changes in personality come about. It has been asserted that repeated day-to-day expressions of personality traits (personality states) may affect long-term changes in personality traits (Magidson, Roberts, Collado-Rodriguez, & Lejeuz, 2014). Studies that empirically test this hypothesis, combining intensive, short-term assessments of personality with long-term developmental trends, would substantially enhance our understanding of the (day-to-day) processes through which personality development takes place.

## GENERAL CONCLUSIONS

This study advances existing knowledge about children's personality development in important ways. First, results from this study show that mean-level change is much more prevalent than mean-level stability in the facets, particularly in early childhood. Moreover, personality facets change in both linear and nonlinear ways. For facets that change in nonlinear ways, changes in the direction or strength of change often occur during transitions between developmental phases. Although overall we mostly found evidence for all facets of a higher-order dimension changing similarly, differences between same-dimension facets became more prevalent as children grew older. Second, results suggest that gender differences in personality development may become noticeable from middle childhood onward, and that boys and girls differ most on facets of Conscientiousness, Emotional Stability, and Extraversion.

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## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

**Appendix 1** Model Fit Indices of Fully Constrained Variance-Covariance Matrices: Assessing Measurement Invariance across Samples, Gender, and Time.

**Appendix 2** Means and Standard Deviations of the Facets at each Measurement Occasion in FSTPC.

**Appendix 3** Means and Standard Deviations of the Facet at each Measurement Occasion in FSPPD.

**Appendix 4** Correlations between facets of Extraversion, within and across time, for FSTPC (below diagonal) and FSPPD (above diagonal).

**Appendix 5** Correlations between facets of Benevolence, within and across time, for FSTPC (below diagonal) and FSPPD (above diagonal).

**Appendix 6** Correlations between facets of Conscientiousness, within and across time, for FSTPC (below diagonal) and FSPPD (above diagonal).

**Appendix 7** Correlations between facets of Emotional Stability, within and across time, for FSTPC (below diagonal) and FSPPD (above diagonal).

**Appendix 8** Correlations between facets of Imagination, within and across time, for FSTPC (below diagonal) and FSPPD (above diagonal).

**Appendix 9** Chi-Square Differences: Testing Shapes of Growth for Boys and Girls Separately.

**Appendix 10** Chi-Square Differences: Testing Gender Differences for Growth Parameters in the Early Childhood (FSTPC; 2–4.5 years) and Childhood/Adolescence (FSPPD; 6–17 years) Samples.