Big Five Personality Stability, Change, and Codevelopment Across Adolescence and Early Adulthood

Borghuis, Jeroen; Denissen, Jaap J A; Oberski, Daniel; Sijtsma, Klaas; Meeus, Wim H J; Branje, Susan J. T.; Koot, Hans M.; Bleidorn, Wiebke

published in
Journal of Personality and Social Psychology
2017

DOI (link to publisher)
10.1037/pspp0000138

document version
Publisher's PDF, also known as Version of record

citation for published version (APA)
Borghuis, J., Denissen, J. J. A., Oberski, D., Sijtsma, K., Meeus, W. H. J., Branje, S. J. T., Koot, H. M., & Bleidorn, W. (2017). Big Five Personality Stability, Change, and Codevelopment Across Adolescence and Early Adulthood. *Journal of Personality and Social Psychology*, *113*(4), 641-657. https://doi.org/10.1037/pspp0000138

Journal of Personality and Social Psychology
2017, Vol. 113, No. 4, 641–657

0022-3514/17/$12.00 http://dx.doi.org/10.1037/pspp0000138

Big Five Personality Stability, Change, and Codevelopment Across Adolescence and Early Adulthood

Jeroen Borghuis and Jaap J. A. Denissen
Tilburg University

Daniel Oberski
Utrecht University

Klaas Sijtsma
Tilburg University

Wim H. J. Meeus
Utrecht University and Tilburg University

Susan Branje
Utrecht University

Hans M. Koot
Vrije Universiteit Amsterdam

Wiebke Bleidorn
University of California, Davis, and Tilburg University

Using data from 2 large and overlapping cohorts of Dutch adolescents, containing up to 7 waves of longitudinal data each (N = 2,230), the present study examined Big Five personality trait stability, change, and codevelopment in friendship and sibling dyads from age 12 to 22. Four findings stand out. First, the 1-year rank-order stability of personality traits was already substantial at age 12, increased strongly from early through middle adolescence, and remained rather stable during late adolescence and early adulthood. Second, we found linear mean-level increases in girls' conscientiousness, in both genders' agreeableness, and in boys' openness. We also found temporal dips (i.e., U-shaped mean-level change) in boys' conscientiousness and in girls' emotional stability and extraversion. We did not find a mean-level change in boys' emotional stability and extraversion, and we found an increase followed by a decrease in girls' openness. Third, adolescents showed substantial individual differences in the degree and direction of personality trait changes, especially with respect to conscientiousness, extraversion, and emotional stability. Fourth, we found no evidence for personality trait convergence, for correlated change, or for time-lagged partner effects in dyadic friendship and sibling relationships. This lack of evidence for dyadic codevelopment suggests that adolescent friends and siblings tend to change independently from each other and that their shared experiences do not have uniform influences on their personality traits.

Keywords: adolescence, mean-level change, peer influence, personality development, rank-order stability

Supplemental materials: http://dx.doi.org/10.1037/pspp0000138.supp

Most research on personality trait development has focused on the period of early adulthood (for reviews, see Bleidorn, 2015; Denissen, Van Aken, & Roberts, 2013; Luhmann, Orth, Specht, Kandler, & Lucas, 2014). By contrast, relatively little attention has been devoted to personality trait development in adolescence, which is an otherwise intensively studied developmental period, marked by rapid and oftentimes long-lasting biological, psychological, and social changes (Blakemore, 2008; Casey, Jones, & Hare, 2008; Koepke & Denissen, 2012; Weisfeld, 1999). This is unfortunate, because a better understanding of the general shape and the underlying conditions of personality trait development in adolescence would not only advance personality development theory, but would also increase insight into the conditions of (un)desirable personality changes during adolescence.

To address this gap, the present research aimed at shedding more light on the patterns and conditions of personality trait development during adolescence by analyzing longitudinal personality data from two large and partly overlapping cohorts. We examined (a) stability and change in the rank-order stability and mean levels of Big Five personality traits from adolescence through early adulthood, (b) the extent to which adolescents differ from each other with respect to their personality trait change, and (c) whether individual differences in adolescents' personality trait

This article was published Online First March 2, 2017.

Jeroen Borghuis and Jaap J. A. Denissen, Department of Developmental Psychology, Tilburg University; Daniel Oberski, Department of Methodology and Statistics, Utrecht University; Klaas Sijtsma, Department of Methodology and Statistics, Tilburg University; Wim H. J. Meeus, Research Centre Adolescent Development, Utrecht University, and Department of Developmental Psychology, Tilburg University; Susan Branje, Research Centre Adolescent Development, Utrecht University; Hans M. Koot, Department of Developmental Psychology, Vrije Universiteit Amsterdam; Wiebke Bleidorn, Department of Psychology, University of California, Davis, and Department of Developmental Psychology, Tilburg University.

Correspondence concerning this article should be addressed to Jeroen Borghuis, Department of Developmental Psychology, Tilburg University, P.O. Box 90153, 5000 LE Tilburg, the Netherlands. E-mail: j.borghuis@tilburguniversity.edu

change are related to the personality trait levels and trajectories of their friends and siblings.

Previous Research on Big Five Stability and Change in Adolescence

Previous studies on personality trait development have mainly focused on (a) rank-order stability (i.e., the maintenance of the relative standing of individuals on a trait dimension within a population over time), on (b) mean-level change (i.e., change in the average trait levels of a population over time), and on (c) individual differences in change (i.e., individual deviations from the population mean-level pattern of change). Next, we review previous findings on these topics in adolescence and point out limitations of this research that we aimed to address in the present study.

Rank-Order Stability

One important conclusion from previous research is that personality/temperament traits are moderately stable in preschool years and become increasingly stable until middle adulthood (Bazana & Stelmack, 2004; Briley & Tucker-Drob, 2014; Roberts & DelVecchio, 2000). This robust finding has been referred to as the cumulative continuity principle of personality development (Roberts & Mroczek, 2008). However, because meta-analyses have aggregated rank-order stability findings across broad age categories (e.g., ages 12–18), relatively little is known about differences in rank-order stability across narrower age categories. One study that has attempted to address this gap found that the 1-year rank-order stability of Big Five traits indeed increased across early, middle, and late adolescence (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2009). However, finer-grained studies across circumscribed age periods are needed to describe the exact shape of rank-order stability and change across the life span.

Mean-Level Change

Previous research on mean-level change in personality traits has mainly focused on the period of early adulthood and found that young adults increase on average in their absolute levels of agreeableness, emotional stability, conscientiousness, and social dominance (Roberts, Walton, & Viechtbauer, 2006). These normative increases have been referred to as the maturity principle of personality development (Roberts & Mroczek, 2008). That is because being agreeable, conscientious, and emotionally stable corresponds quite closely to definitions of maturity that emphasize functioning in society and social relationships, such as being liked, respected, and admired (Hogan & Roberts, 2004; Roberts & Mroczek, 2008; Roberts, Wood, & Caspi, 2008).

In contrast with the maturity principle, the disruption hypothesis proposes that adolescents tend to experience temporal dips in personality maturity as a result of biological, social, and psychological transitions from childhood to adolescence (Soto & Tackett, 2015). Other reasons why adolescence may not fit the maturity principle are that adolescents often temporarily conform to deviant peer norms (Moffitt, 1993) and that they may experience difficulties in adjusting to increasingly mature expectations (Denissen, Van Aken, Penke, & Wood, 2013). Indeed, both a recent meta-analysis (Denissen, Van Aken, Penke, et al., 2013) and a large-scale cross-sectional study (Soto, John, Gosling, & Potter, 2011) found that in adolescence, mean levels of most Big Five traits tend to first decrease and then increase (i.e., U-shaped change). Specifically, these studies both found evidence for temporary mean-level decreases in conscientiousness, openness, extraversion, and emotional stability (among girls) in early adolescence, whereas they found mean-level increases in conscientiousness, emotional stability, and openness in late adolescence and early adulthood. In addition, though contrary to Denissen, Van Aken, Penke, et al. (2013); Soto et al. (2011) also found evidence for U-shaped change in agreeableness.

Perhaps surprisingly, normative personality trait change during the period of childhood seems to be more consistent with the propositions of the maturity principle than the periods of early and middle adolescence. This is evidenced by increasing self-regulation capacity and agreeableness and by decreasing negative emotionality in childhood (for a review see Shiner, 2015). However, previous studies typically employed cross-sectional designs or longitudinal designs with few or infrequent measurement occasions per individual, which hampers strong conclusions about the exact shape of mean-level change in adolescence (Kraemer, Yesavage, Taylor, & Kupfer, 2000; Luhmann et al., 2014).

Individual Differences in Change

Previous research has focused more on normative change than on individual deviations from normative change trajectories (i.e., individual differences in change). The few studies on adolescent personality trait development that have examined individual differences in change have rarely interpreted or tried to explain these individual differences (e.g., Kawamoto & Endo, 2015; Klimstra et al., 2009).

Notable exceptions are the studies by Branje, van Lieshout, and Gerris (2007) and by Van den Akker, Dekovic, Asscher, and Prinzie (2014). These studies provided estimates for the degree of individual differences in change for each trait and gender and attempted to associate this variability with individual differences in maternal parenting behaviors, pubertal timing, and life events. However, although many associations were tested, few proved to be significant. Furthermore, although these studies agreed that variance in the magnitude of individual change trajectories was small for conscientiousness, moderate for openness, and large for emotional stability, Branje et al. (2007); Klimstra et al. (2009), and Van den Akker et al. (2014) found inconsistent results for extraversion and agreeableness. Thus, to date, little is known about the degree and possible sources of individual differences in adolescents' personality trait change.

Personality Codevelopment in Friendship and Sibling Dyads

Theory and empirical studies suggest that peers play an important role in explaining individual differences in adolescents' personality trait change (e.g., Briley & Tucker-Drob, 2014; Harris, 1995; Reitz, Zimmermann, Hutteman, Specht, & Neyer, 2014; Sullivan, 1953). The dynamics between personality and social relationships have received ample attention in previous research (e.g., Back et al., 2011; Mund & Neyer, 2014). Among the most prominent theoretical models are transactional models, which emphasize the reciprocal nature of the links between personality traits and social relationships (Wrzus, Zimmermann, Mund, & Neyer, 2015). According to such models, personality transactions might occur among members of dyadic relationships, resulting in codevelopment on personality traits. We use the term *codevelopment* to refer to the tendency of dyad or group members to show interrelated development on a trait because of their social connectedness. This codevelopment results in (a) convergence if dyad members become more similar over time, (b) correlated change if the change trajectories of dyad members are correlated (i.e., are more or less similar than the change trajectories of unrelated individuals), and (c) time-lagged partner effects if one dyad member's change is associated with the other's previous trait level.

Dyadic personality trait codevelopment might result from various processes, which may operate unconsciously (Dishion & Tipsord, 2011). First, personality trait change might result from social learning processes. In case of model learning, personality trait change occurs through watching and imitating other people's personality expressions (Biddle, Bank, & Marlin, 1980; Caspi & Roberts, 2001; Hartup, 1996; Moffitt, 1993). In case of active reinforcement learning, individuals may change if they receive persistent positive or negative reactions from others (e.g., verbal feedback, or a smile or frown) on their personality expressions (Bandura, 1971; Harris, 1995; Hartup, 1996; Hawley, 2006; Moffitt, 1993; Roberts et al., 2008; Wrzus & Roberts, 2016). These social learning mechanisms might be asymmetrical or unidirectional, as older and more popular dyad members have been found to be more influential than younger and less popular dyad members (Brody, Stoneman, MacKinnon, & MacKinnon, 1985; Dishion & Tipsord, 2011; Wallace, 2015; Zukow, 1989). Social learning processes may not result in correlated change, though they would result in increasing dyadic trait similarity over time. They may also result in positive time-lagged partner effects if social influence is associated with personality traits. For example, if influential dyad members tend to be extraverted, higher initial extraversion of one dyad member will become associated with more positive extraversion change in the other dyad member.

A second possible mechanism for codevelopment is conformity to shared norms for behavior and other personality expressions (Berndt, 1999; Dishion & Tipsord, 2011; Harris, 1995; Reitz et al., 2014). Shared norms might be established at the level of dyads or peer groups (Harris, 1995; Reitz et al., 2014) and might result from individuals' preference for similarity, which facilitates trust and predictability and reduces relationship conflict (Byrne, 1971). Evidence has suggested that socialization effects occur most strongly in same-sex and strongly connected dyads (Dishion & Tipsord, 2011; Rose, Kaprio, Williams, Viken, & Obremski, 1990; Rowe & Gulley, 1992; Slomkowski, Rende, Novak, Lloyd-Richardson, & Niaura, 2005; Trim, Leuthe, & Chassin, 2006; Wallace, 2015). This symmetrical convergence process would result in increasing similarity and positive partner effects. In addition, it would result in negatively correlated change if dyad members tend to converge toward their average trait level (i.e., higher-scoring dyad members decrease whereas lower-scoring dyad members increase). Alternatively, it might also result in positively correlated change if dyad members are initially very similar and tend to establish new norms (as occurs e.g., in deviancy training; Dishion & Tipsord, 2011).

Finally, in addition to personality transactions between individuals, similarity in personality trajectories (i.e., positively correlated change) might also emerge from shared environmental experiences, given that these have uniform influences on dyad members' personality traits (Caspi, Herbener, & Ozer, 1992). Examples of shared experiences among friends or siblings are exposure to the same parents or teachers, joining the same sports team, and witnessing similar levels of neighborhood violence.

Previous research provides some evidence to suggest that friends and siblings might codevelop on Big Five personality traits, particularly during adolescence. Previous research has found that adolescents are particularly susceptible to peer influences (e.g., Berndt, 1979; Gardner & Steinberg, 2005; Smith, Steinberg, Strang, & Chein, 2015). Furthermore, friends have been shown to influence each other's behaviors (e.g., aggressive behavior), affect (e.g., negative emotionality), and motives (e.g., motivation for educational achievement; e.g., Dishion & Tipsord, 2011; Hogue & Steinberg, 1995; Ojanen, Sijtsema, & Rambaran, 2013; Ryan, 2000). Moreover, although growing up together in a shared home environment has been found to be unrelated to personality trait levels in adulthood (Bouchard & Loehlin, 2001), it has often been suggested that older siblings act as important socializing agents (Brody et al., 1985; McHale, Updegraff, & Whiteman, 2012; Whiteman, Bernard, & Jensen, 2011; Zukow, 1989). Indeed, one study has found that changes in some personality traits are positively correlated among siblings (Branje, Van Lieshout, & Van Aken, 2004), and genetically informed studies have found evidence for sibling influence regarding delinquency, substance use, weight gain, and neuroticism (McCaffery et al., 2011; Rose et al., 1990; Slomkowski et al., 2005; Wallace, 2015). In conclusion, there is evidence for social influences among adolescent friends and siblings with respect to various behaviors and traits, which suggests that they may also influence each other's Big Five personality trait trajectories.

To summarize, compared with adulthood, relatively little is known about personality trait stability and change in adolescence, especially with regard to the sources of individual differences in change. Theory and empirical studies suggest that these individual differences may at least partly be accounted for by individual differences in their friends' and siblings' personality development. However, to date, there is only preliminary and indirect evidence to support this prediction.

The Present Study

The present study focused on the general shape and conditions of Big Five personality trait development in adolescence by using data from two large and partly overlapping cohorts of Dutch adolescents, which contain six to seven waves of longitudinal personality data each. Our first goal was to provide a detailed description of the 1-year rank-order stability and mean levels of Big Five personality traits from early adolescence (age 12) through early adulthood (age 22). We predicted that the rank-order stability of all Big Five traits increases with age and that most traits exhibit U- or J-shaped mean-level change (i.e., mean-level stability or a decrease in early adolescence followed by a mean-level increase in late adolescence and early adulthood). Our second goal was to estimate the magnitude of individual differences in adolescents' personality trait change. Our third goal was to examine whether the personality trait trajectories of adolescent friends or siblings were interrelated. We predicted increasing personality trait similarity across relationship duration, positively correlated change, and positive time-lagged partner effects. Fourth, to explore potential boundary conditions of codevelopment, we examined the effects of several potential moderators. We predicted that codevelopment would be most pronounced in same-sex dyads and dyads with higher perceived relationship quality, and that older dyad members produced stronger partner effects than younger dyad members. We also explored whether the degree of codevelopment differed between male dyads and female dyads.

Method

Participants and Research Design

The participants in this study were drawn from the Research on Adolescent Development and Relationships (RADAR) study. RADAR is an ongoing prospective cohort-sequential study of Dutch-speaking families in the Netherlands, including target adolescents (aged 13–18), their parents, one sibling, and the target adolescents' self-nominated best friend. Between 2005 and 2012, data were collected in two cohorts. In the present study, we analyzed the self-reported personality data from the target adolescents, their friend, and their sibling from all waves available at the time of analyzing the data (i.e., seven and six annual measurement waves in the younger and older cohort, respectively). At the first measurement occasion, participants in the younger cohort were 13.5 years old ($SD = 1.8$); participants in the older cohort were 16.5 years old ($SD = 1.8$). The younger cohort contains personality data from 681 target adolescents (six adolescents did not provide personality data) and the older cohort contains personality data from 239 target adolescents (five adolescents did not provide personality data). Siblings ($n = 649$) and friends ($n = 705$) of these target adolescents participated in all but the last wave in the two cohorts. In total, personality data from 1,128 boys (50.6%) and 1,102 girls (49.4%) were used in our analyses ($N = 2,230$). We created age groups based on the participants' age in years. Table 1 provides an overview of the combined sample sizes per age category.

In the younger cohort, target adolescents who were at risk of developing delinquent behaviors were oversampled. In an initial survey one year earlier, teacher ratings of 3,237 children's externalizing behavior were collected. Children with a score at or above the borderline clinical range (i.e., externalizing t scores $\geq$60) were oversampled in a subsequent selection such that 284 (41%) target adolescents from the younger cohort had a t score $\geq$60, whereas 16% of the larger initial sample had a t score $\geq$60. Compared with control families, families of 'at-risk' adolescents had a lower SES and more often reported that one of the parents had left the household. Furthermore, at-risk target adolescents had lower mother-reported relationship quality, more mental health problems, and more self- and parent-reported behavioral problems than control group adolescents, with effects around medium size (Van Lier et al., 2011). Families were only enrolled after the mother, the father, the target adolescent, as well as a sibling ($\geq$10 years of age) agreed to participate for five years. The majority (73.6%) of the participants listed Dutch as their main ethnic identity; the largest non-Dutch ethnic identity was Moroccan (20.4%). Participants and their parents had a higher socio-economic status than the general Dutch population (for more information about the sample and sampling procedure, see Keijsers et al., 2012; Van Lier et al., 2011).

At each measurement occasion, target adolescents could nominate at most one friend and one sibling to participate in the study. Of the 920 target adolescents in RADAR, 218 (23.7%) did not have a friend who participated in the study, 306 (33.3%) had one friend, and 407 (44.2%) had more than one friend participating across the different waves. Furthermore, 282 (30.7%) target adolescents did not have a participating sibling, 625 (67.9%) had one participating sibling, and 24 (2.6%) had multiple participating siblings across the different waves. In case of multiple participating friends or siblings per target adolescent, we retained only the responses of the most frequently participating friend or sibling. We identified 10 friends who were nominated by two target adolescents; only the duplicate case that participated the longest in the study was retained in the data. Thus, we analyzed personality development of at most one friend and one sibling per target adolescent. In total, we analyzed codevelopment in 662 friendship and 631 sibling dyads.

Dropout and Missing Data

In Wave 4, dropout rates among target adolescents were 6% in the older cohort and 16% in the younger cohort. Dropout rates increased to 12% in Wave 6 in the older cohort and to 40% in Wave 7 in the younger cohort (which was largely attributable to discontinued sampling of Moroccan adolescents after Wave 5). Most siblings (86%) and almost half of the friends (45%) participated at least five years (see Table 2). Dropouts (i.e., those respondents who participated in the first wave but not in the last wave of their cohort; $n = 610$) differed from continued participators ($n = 1,355$) in their Wave 1 Big Five levels only with respect to openness and conscientiousness. Compared with continued participators, dropouts scored slightly lower with respect to openness

Table 1
Sample Size and Proportion of Missing Data per Age Category (Used to Model Rank-Order and Mean-Level Stability and Change)

	Age										
Gender	12	13	14	15	16	17	18	19	20	21	22
Boys	338	587	651	700	791	775	502	435	351	123	120
Girls	287	506	567	624	761	739	540	489	405	130	165
Total	625	1093	1218	1324	1552	1514	1042	924	756	253	285
Missing data	.72	.51	.45	.41	.30	.32	.53	.59	.66	.89	.87

Table 2
Number of Dyads (Used to Model Codevelopment)

		Observed relationship duration (years)					
Dyad	Cohort	0	1	2	3	4	5
Friends	Younger	442	407	372	298	221	167
	Older	220	194	155	114	75	—
	Total	662	601	527	412	296	167
Siblings	Younger	424	391	385	376	354	334
	Older	207	201	194	195	191	—
	Total	631	592	579	571	545	334

[$t(937.29) = 3.18$, $p = .002$, $d = .18$] and slightly higher with respect to conscientiousness [$t(1008.60) = -2.32$, $p = .020$, $d = .13$]. Table 1 shows that the cohort-sequential design, variable friendship nominations, and dropout resulted in large percentages of missing data, ranging between 30% (age 16) and 89% (age 21) missing data across age categories. In the younger cohort, personality data were largely missing in older age groups (age >20), whereas in the older cohort, personality data were largely missing in younger age groups (age <16).

Procedures

Participants from the younger cohort were recruited from randomly selected elementary schools in the western and central regions of the Netherlands. Participants from the older cohort were recruited from various high schools located in the central-region province of Utrecht. Before participating, participants received written information about the aims of the study and parents provided informed consent of all participating family members. Participants were annually interviewed at home by trained interviewers (Keijsers et al., 2012; Van Lier et al., 2011). Participating families received €100 (equivalent to US $104) for each home visit. The RADAR study has been approved by the Medical Ethical Testing Committee of the Utrecht University Medical Centre (protocol number 05–159/K; "RADAR: Research on Adolescent Development and Relationships").

Measures

Personality. Personality traits were measured using the shortened Dutch version of Goldberg's Big Five Questionnaire (Vermulst & Gerris, 2005). This questionnaire contains 30 adjectives—six per personality dimension—such as "creative" (openness), "systematic" (conscientiousness), "talkative" (extraversion), "sympathetic" (agreeableness), and "worried" (emotional stability, reverse coded). The participants indicated on a Likert scale ranging from 1 (*completely untrue*) to 7 (*completely true*) to what extent the adjectives described their own personality. Previous studies have shown that this instrument has adequate reliability and validity when administered among adolescents (Klimstra et al., 2009). Reliability was estimated using coefficient alpha (Cronbach, 1951). Reliability tended to increase with age. The range of coefficient alphas across ages 12 to 22 was as follows: openness (.68–.82); conscientiousness (.81–.92); extraversion (.75–.91); agreeableness (.78–.86); and emotional stability (.78–.86).

Relationship quality. Perceived relationship quality was measured using eight items from the Support scale of the Network of Relationship Inventory (Furman & Buhrmester, 1985). Target adolescents, friends, and siblings reported their perceived degree of support in their dyadic relationships with each other on a 5-point Likert scale (1 = *little or none*; 5 = *could not be more*). A sample item is "How much does your best friend/brother/sister really care about you?" Reliability was high across raters and age categories, with coefficient alphas ranging from .83 to .91. For each dyad, we computed the mean relationship quality score across dyad members and across waves. Averaging the scores across waves and between dyad members was justified by the sufficiently high stability of scores over time (1-year stability correlations ranged from $r = .60$ to $r = .76$), and the sufficiently large correlations between the aggregated scores of dyad members ($r = .49$ between friends and $r = .50$ between siblings). The double-aggregated mean relationship quality scores were approximately normally distributed in friendship dyads ($n = 704$, $M = 3.36$; $SD = 0.49$) and sibling dyads ($n = 648$, $M = 3.19$; $SD = 0.49$).

Statistical Analyses

We briefly describe the most important steps of our statistical analyses. We refer readers to the supplemental materials for more details, explanation, and example syntax for each type of model. Table S1 in the supplemental materials shows the *M*s and *SD*s of the manifest personality variables in each age category.

We used latent variables to correct for measurement error. Therefore, stability and change in the rank-order stability and mean levels of personality traits are not confounded with temporal change in measurement reliability. Moreover, the use of latent variables allowed us to test and correct for possible lack of measurement invariance across age categories, genders, and cohorts. Measurement invariance indicates that the same construct is being measured across different groups (McArdle, 2009). We created three parcels (i.e., combined items that are used as observed variables) from the six items per trait via the item-to-construct balance technique (Little, Cunningham, Shahar, & Widaman, 2002). The main analyses were conducted by means of the *lavaan* (0.5–20) package (Rosseel, 2012) in R (3.2.3). We used full information maximum likelihood estimation to handle missing data. Because our analyses were exploratory rather than confirmatory, we conducted two-tailed tests.

Rank-order stability. We estimated the 1-year rank-order stability coefficients for each trait and gender group separately across ages 12–22 by means of multiple-group (boys and girls) latent simplex models (Spiel, 1998); henceforth referred to as latent stability models (see Figure 1). In these structural equation models, between-person personality differences at one age year (e.g., age 16) were regressed on between-person personality differences measured in the previous age year (e.g., age 15). The regression coefficients estimated for each age year the stable variation in personality scores after accounting for measurement error.

Mean-level change and individual differences in change. Mean-level change and individual differences in change were estimated by means of latent growth curve models (LGCMs; Duncan, Duncan, Strycker, Li, & Alpert, 1999) for single personality variables across ages 12–22 (see Figure 2). In the LGCMs, the mean estimates of the latent intercept and slopes represent the mean personality score at age 17 and the mean rate of linear and quadratic change per year, respectively. The variance estimates of the intercept and two slopes represent the variance of the individual growth trajectories around the mean growth trajectory, and indicate the degree of between-person variability in the individual intercept and slope parameters (i.e., interindividual differences in personality levels and intraindividual change). We computed standard errors for the LGCM estimates that were corrected for the nested data structure (target adolescents, their friend and their sibling were nested within family household numbers) by means of the R package *lavaan.survey* (Oberski, 2014).

To avoid convergence problems regarding the LGCMs, residual terms of the personality factors were constrained not to covary, personality factor loadings and intercepts were constrained to be equal across time only at ages 15–19, and we did not use a multiple-group analysis for evaluating gender differences. Instead, gender and cohort were regressed on the intercept and two slopes to test for gender and cohort differences in growth trajectories. Modeling gender as a predictor of the intercept and slopes instead of a grouping variable had the advantage that all LGCMs converged, but it prohibited the option to correct for lack of measurement invariance across gender groups. Because we found lack of measurement invariance across gender groups for conscientiousness and emotional stability (see ‘Measurement Invariance’), gender differences in the growth trajectories of these traits should be interpreted with caution.

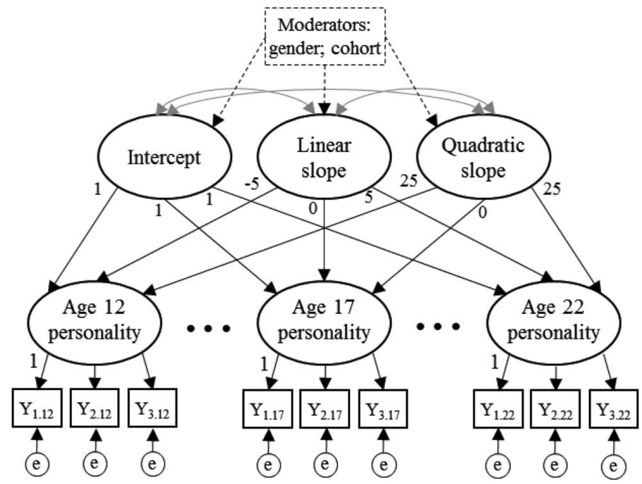

Figure 2. Latent growth curve model, used to estimate linear and quadratic mean-level change and individual differences in change in Big Five personality traits between ages 12 and 22. See Figure 1 for more explanation.

Codevelopment. We centered the personality assessments of each dyad at the first year of available reports by both dyad members. We modeled codevelopment from the first measurement occasion at which both dyad members participated (‘observed relationship duration = 0’) until (a) the cohort’s last measurement occasion, or (b) the last measurement occasion before one or both dyad members dropped out of the study. In other words, we estimated codevelopment across observed relationship duration quantified in years, with zero duration indicating the dyad’s first measurement occasion. Table 2 provides an overview of the number of dyads included in the data at each relationship duration year.

We tested whether dyadic personality trait similarity changed across relationship duration in two ways. First, we tested whether the strength of the correlation between both dyad members’ latent personality traits at zero duration differed between ‘preexisting’ friendships that were already present at Wave 1 ($n = 466$ dyads) and ‘newly formed’ friendships that were first observed after Wave 1 ($n = 196$ dyads; 30%). For obvious reasons, this was not tested among

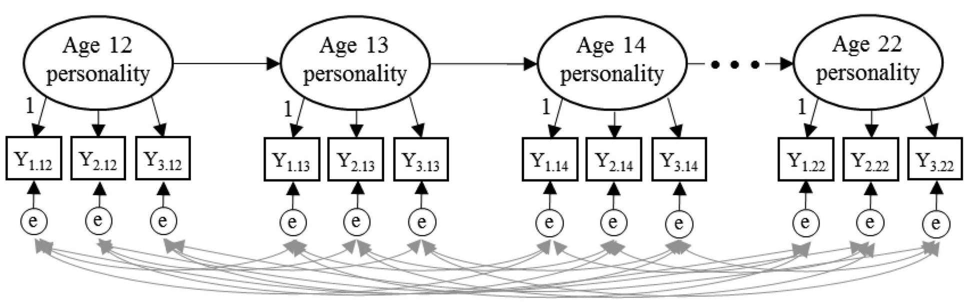

Figure 1. Latent stability model, used to estimate stability and change in the 1-year rank-order stability in Big Five personality traits between age 12 and 22. Latent variables are shown in ovals; manifest parcels are shown in rectangles, with subscripts indicating the parcel number (i.e., 1, 2, or 3) and the age category (i.e., 12–22) of the manifest personality variable (‘Y’). Bidirectional curved arrows indicate that residual terms (‘e’) of observed variables were allowed to covary. Numerical labels next to arrows represent fixed path coefficients.

siblings. Second, we examined among friends and siblings whether the strength of the associations between both dyad members' latent personality traits significantly changed over relationship duration years. We evaluated this by observing the pattern of correlation coefficients over time and by comparing two nested structural equation models in which the dyadic covariances were either freely estimated, or constrained to be equal across all six relationship duration years.

Furthermore, dyadic LGCMs were used to investigate correlated change and cross-lagged partner effects between target adolescents and their friend/sibling (see Figure 3). In these models, we estimated separate linear growth trajectories across relationship duration for both dyad members, and allowed their intercepts and slopes to covary. Significant slope-slope correlations indicated correlated change, whereas significant intercept-slope correlations indicated cross-lagged partner effects in which one dyad member's personality change was predicted by the other dyad member's relative standing on a personality trait at zero observed relationship duration. We also evaluated whether partner effects differed between older and younger dyad members. The average age difference between friends was 0.70 years (SD = 1.08) and the average age difference between siblings was 2.97 years (SD = 1.29). In all models, we tested codevelopment separately for friends and siblings and for each personality trait. The intercept and slope estimates were controlled for cohort.

Hertzog, Lindenberger, Ghisletta, and von Oertzen (2006) evaluated the statistical power to detect correlated change as a function of sample size, number of measurement occasions, and measurement error variance. Their results suggested that we had sufficient power ($1 - \beta = .80$) to detect a medium-sized correlation of r = .40.[1]

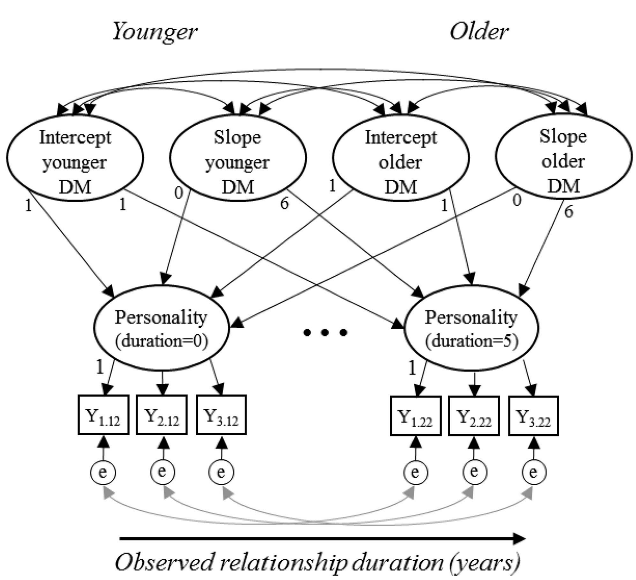

Figure 3. Dyadic latent growth curve model, used to estimate Big Five personality codevelopment between younger and older dyad members (DMs) in friendship and sibling relationships. The loadings and intercepts of the personality factors were constrained to be equal across dyad members and relationship duration years. See Figure 1 for more explanation.

Results

Measurement Invariance

We tested for each personality trait whether parcel loadings and intercepts were invariant across gender groups, age categories, and cohorts to evaluate whether the same personality constructs were being measured across different groups. Tables S2, S3, and S4 in the supplemental materials show the results of these analyses.

To summarize, for agreeableness, openness, and extraversion, the data were consistent with scalar invariance across gender groups, as indicated by nonsignificantly different factor loadings and intercepts between boys and girls. For conscientiousness and emotional stability, the data were partially consistent with scalar invariance across gender groups, as indicated by significant gender differences in some of the intercepts at some age categories. Similarly, the data were consistent with scalar invariance across age categories for openness, emotional stability, and conscientiousness, whereas the data were partially consistent with scalar invariance across age categories for extraversion and agreeableness. Finally, the data were fully consistent with scalar invariance across cohorts for all Big Five traits. Based on these results, we estimated some intercepts freely across gender groups and age categories to allow for a meaningful interpretation of gender and age differences in latent personality variables. These results justified collapsing of data across cohorts as well as interpreting age and gender differences between latent personality scores.

Rank-Order and Mean-Level Stability and Change in Personality Traits

The first goal of this study was to estimate stability and change in the rank-ordering and mean levels of Big Five personality traits from adolescence through early adulthood. Table S5 shows that model fit of the latent stability models (CFIs .95–.98 and RMSEAs .02–.03) and the LGCMs (CFIs: .82–.94; RMSEAs: .06–.03) was generally good, with the exception of the LGCM for openness (CFI = .82; RMSEA = .06).

Rank-order stability. Model comparison tests did not reveal evidence for cohort effects in rank-order stability at age lags 16–17 and 17–18 (where both cohorts overlapped the most). Figure 4 shows developmental stability and change in the 1-year stability of the five personality traits. Except between age 16 and 17, the average 1-year stability of personality traits increased substantially during early and middle adolescence, with standardized 1-year rank-order stability coefficients increasing from .68 to

[1] This rough approximation was obtained by inspecting Hertzog et al.'s (2006) statistical power estimation regarding a study with 500 dyads, 5 measurement occasions, and relatively high (.90) growth curve reliability. Choosing for 500 dyads and 5 measurement occasions seemed a fair compromise between (a) the fact that we were able to analyze data from a larger number of dyads (i.e., > 600 at the first measurement occasion) and a larger number of assessment waves (i.e., 6) and (b) the fact that our sample size decreased substantially due to attrition, especially among friends. We assumed that our growth curve reliability was relatively high because in contrast with Hertzog et al.'s (2006) simulations, we used multiple-indicator instead of single-indicator measurement models. Such models account for measurement unreliability, leaving only latent regression residuals to influence the growth curve reliability (Hertzog et al., 2006).

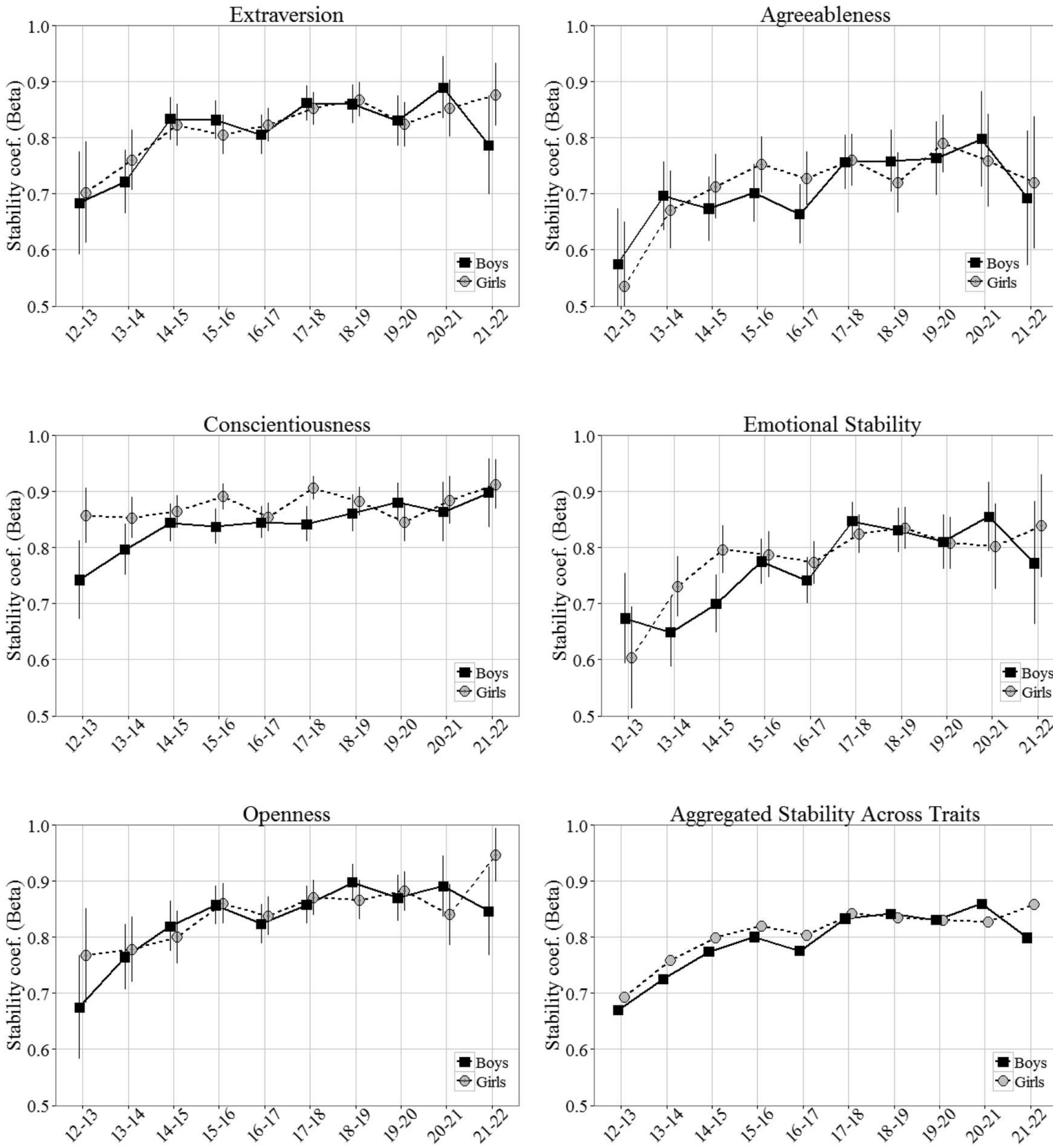

Figure 4. Graphical representation of the estimated 1-year standardized rank-order stability coefficients (on *y* axis) and 95% confidence intervals for boys and girls across age years (on *x* axis).

.84 between ages 12 and 17. However, in late adolescence and early adulthood (ages 17–22), the stability coefficients did not increase further. This pattern was similar in both gender groups. None of the Big Five traits deviated substantially from this aggregated pattern.

Mean-level change. The results of the LGCMs estimating mean-level personality change are presented in Table 3 and Figure 5. Except for agreeableness (see below), there were no statistically significant effects of cohort on the intercept and slopes estimates. In both genders, extraversion showed a small mean-level decrease in early adolescence followed by a small mean-level increase in late adolescence and early adulthood, although the quadratic slope was marginally significant among boys. Agreeableness increased similarly among both gender groups, but there was a cohort effect on the shape of the mean-level increase. The younger cohort showed a relatively small and linear increase, whereas the older cohort experienced a relatively strong but slightly decelerating increase. Conscientiousness increased substantially and linearly among girls throughout the study period, whereas boys first slightly decreased in early adolescence and then decreased in late adolescence and early adulthood. Emotional stability showed no statistically significant linear or quadratic mean-level change among boys, whereas girls' emotional stability decreased during early and middle adolescence and thereafter increased during late adolescence and early adulthood. Openness increased linearly among boys, whereas girls' openness showed an inverse U-shaped mean-level change (i.e., an increase followed by a decrease).

Table 3
Latent Growth Curve Model Coefficients (N = 2,230)

		Intercepts (age 17)				Linear slopes				Quadratic slopes			
		Mean		Variance		Mean		Variance		Mean		Variance ($\times 10^{-4}$)	
Gender	Trait	Est	95% CI	Est	95% CI	Est	95% CI	Est	95% CI	Est	95% CI	Est	95% CI
Boys	E	6.36*	[6.17; 6.55]	1.29*	[1.20; 1.38]	−.002	[−.022; .018]	.017*	[.013; .022]	.009	[−.001; .018]	6.28*	[2.72; 9.85]
	A_y	5.14*	[4.96; 5.32]	0.24*	[.21; .27]	.034*	[.022; .046]	.005*	[.004; .006]	−.001	[−.007; .005]	0.92	[−.06; 1.91]
	A_o	5.21*	[5.03; 5.39]	0.24*	[.21; .27]	.049*	[.037; .061]	.005*	[.004; .006]	−.006	[−.012; .000]	0.92	[−.06; 1.91]
	C	3.84*	[3.77; 3.92]	1.22*	[1.14; 1.31]	.033*	[.020; .046]	.018*	[.015; .022]	.012*	[.008; .016]	5.38*	[2.77; 7.99]
	ES	5.71*	[5.53; 5.89]	1.06*	[.99; 1.14]	.017	[−.003; .037]	.018*	[.013; .022]	.003	[−.007; .013]	6.22*	[2.82; 9.61]
	O	4.83*	[4.65; 5.00]	0.79*	[.74; .84]	.024*	[.008; .040]	.011*	[.009; .014]	.000	[−.008; .008]	5.03*	[3.01; 7.06]
Girls	E	6.34*	[6.15; 6.53]	1.29*	[1.20; 1.38]	.012	[−.008; .031]	.017*	[.013; .022]	.014*	[.004; .023]	6.28*	[2.72; 9.85]
	A_y	5.32*	[5.14; 5.50]	0.24*	[.21; .27]	.029*	[.017; .041]	.005*	[.004; .006]	−.003	[−.009; .003]	0.92	[−.06; 1.91]
	A_o	5.38*	[5.20; 5.56]	0.24*	[.21; .27]	.044*	[.033; .056]	.005*	[.004; .006]	−.008*	[−.014; −.002]	0.92	[−.06; 1.91]
	C	4.33*	[4.25; 4.40]	1.22*	[1.14; 1.31]	.066*	[.052; .079]	.018*	[.015; .022]	.003	[−.001; .007]	5.38*	[2.77; 7.99]
	ES	5.09*	[4.91; 5.27]	1.06*	[.99; 1.14]	.002	[−.018; .022]	.018*	[.013; .022]	.012*	[.002; .022]	6.22*	[2.82; 9.61]
	O	5.02*	[4.85; 5.19]	0.79*	[.74; .84]	.001	[−.015; .017]	.011*	[.009; .014]	−.006	[−.014; .002]	5.03*	[3.01; 7.06]

Note. E = extraversion; A_y = agreeableness in the younger cohort; A_o = agreeableness in the older cohort; C = conscientiousness; ES = emotional stability; O = openness; 95% CI = 95% confidence intervals. Underlined coefficients indicate statistically significantly gender differences ($p < .05$). Cohort-specific estimates for agreeableness are shown because of a statistically significant cohort difference in mean intercept and slope estimates.
* $p < .05$.

Because the LGCMs did not converge after adding cubic change factors, the mean-level change results were restricted to linear and quadratic shapes. To inspect whether the data showed more complex change patterns, we also compared the LGCM results with the observed mean-levels in each age group (Table S1). Both analyses yielded almost similar results, with a few exceptions for the mean-levels of boys' openness, agreeableness, and extraversion.

Individual Differences in Change

The second goal of this study was to estimate the magnitude of individual variation in personality trait change in adolescence, which is represented by the variance estimates of the linear and quadratic change parameters of the LGCMs (see Table 3). In the current model specification, in which we used gender as a moderator instead of a grouping variable to avoid convergence problems, we were unable to estimate gender differences in variance estimates. However, the results of an alternative multiple-group model showed that gender differences in intercept and slope variances were small.

The results show that individual differences in change were statistically significant for all traits, though the magnitude of these individual differences differed substantially across traits. Slope variance was highest for extraversion, emotional stability, and conscientiousness, somewhat lower for openness, and considerably and statistically significantly lower for agreeableness. To illustrate this difference, Figure 6 shows the individual trajectories of boys' conscientiousness, which exhibited high slope variance, and boys' agreeableness, which exhibited the lowest slope variance. These trajectories were based on 500 regression curves that were randomly drawn from a simulated multivariate normal distribution based on the LGCM parameter estimates.

Dyadic Personality Trait Codevelopment

The third goal of this study was to test whether the personality trait changes of adolescent dyad members in friendship and sibling relationships were interrelated.

Trait similarity across relationship duration. We first investigated whether personality traits were correlated among dyad members and whether the strength of the correlations changed across relationship duration. Table 4 shows the estimated correlations between dyad members' latent personality traits at each relationship duration year. The personality traits of dyad members tended to be positively but weakly correlated among siblings and among friends. We found no evidence for similarity with respect to siblings' conscientiousness.

Table 4 also shows that for most traits, dyadic similarity tended to remain rather stable over time. Except for decreases in the similarity of friends' extraversion and siblings' openness, there appeared to be no systematic increases or decreases of similarity across relationship duration. We conducted model comparison tests for each trait and type of dyad to test whether the degree of similarity significantly varied across relationship duration years ($df = 5$). All 10 model comparison tests revealed no significant differences in model fit, suggesting that dyadic personality trait similarly did not significantly vary over time.

In addition, the strength of the correlations between friends' personality traits was not significantly different between dyads that were already formed at Wave 1 and dyads that were first reported after Wave 1 and hence may represent relationships with a shorter duration. The results were marginally significant with respect to emotional stability and openness, but the group differences were not in line with our convergence hypothesis: Similarity was higher among 'new friends' than among 'preexisting' friends. In summary, we found no evidence for increasing or decreasing dyadic personality trait similarity over time.

Correlated change and partner effects. Second, we fitted dyadic LGCMs to investigate whether the linear personality trait trajectories of dyad members were interrelated (i.e., correlated slopes) and whether higher relative trait levels at zero observed relationship duration of one dyad member predicted the direction of change in the other dyad member (i.e., intercept-slope correlations). Table S6 shows that all models fitted the data well (CFIs ≥ .95; RMSEAs ≤ .05). We

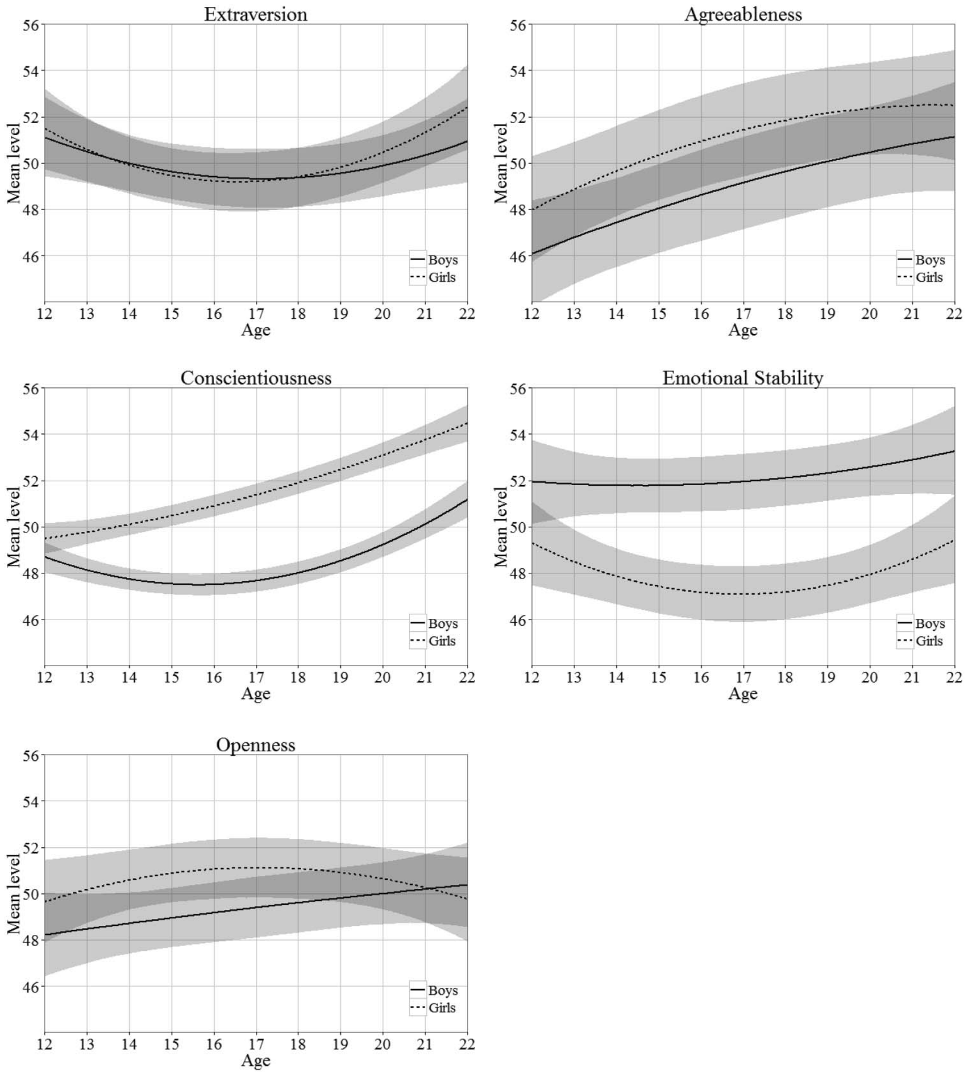

Figure 5. Mean-level change and 95% parametric bootstrap confidence intervals in Big Five personality traits across ages 12 to 22 for boys and girls, presented on a *t* score metric (standard scores with $M = 50$ and $SD = 10$) to facilitate interpretation of effect sizes. Using Cohen's (1988) rules of thumb, a difference of 2 *t* score points represents a small effect, a 5-point difference represents a medium effect, and an 8-point difference represents a large effect.

used the Holm-Bonferroni correction to address multiple hypothesis testing, thus testing at $\alpha = .005$ given 10 tests (see Table 5).

In line with the previous correlational analysis, we found evidence for a small degree of initial similarity (i.e., intercept-intercept correlations) between friends with respect to conscientiousness, extraversion, and agreeableness. Among siblings, we found evidence for a small degree of initial similarity regarding openness and emotional stability. Contrary to our predictions, we found no evidence for correlated change or partner effects. None of the slope-slope and intercept-slope associations were statistically significant after applying the Holm-Bonferroni correction. Moreover, all 30 effect sizes testing codevelopment were small in magnitude (rs $< |.21|$; $M|r| = .07$). Thus, adolescents' personality trait change was not significantly predicted by their friend's or sibling's personality trait change in the same period, nor by their friend's or sibling's relative standing on a personality trait at the intercept.[2]

Moderating effects of differences in age, relationship quality, and gender. Finally, we explored the moderating effects of (a) an age difference and (b) a gender difference within dyads, and

[2] We also estimated a series of autoregressive cross-lagged panel models across six relationship duration years to provide an alternative test for codevelopment over annual assessment waves. Specifically, we compared nested models in which 10 partner effect parameters and five correlated change parameters between dyad members were either fixed to zero or freely estimated (i.e., $df = 15$). We used the Holm-Bonferroni correction to correct for potential α inflation due to multiple testing (corrected $\alpha = .005$). Consistent with the results of our dyadic LGCM analyses, these models did not provide evidence for codevelopment among friends or siblings.

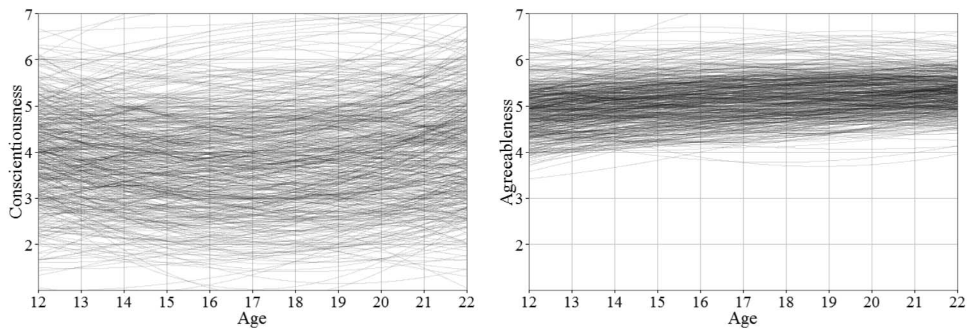

Figure 6. Graphical representation of the magnitude of individual differences in boys' personality trait change in conscientiousness and agreeableness. The regression curves represent development of individuals across age. Regression curves (N = 500) were drawn from a simulated multivariate normal distribution based on the parameter estimates presented in Table 3.

(c) a perceived relationship quality difference and (d) a gender difference between dyads. First, to evaluate the potential moderating effect of an age difference within dyads, we tested whether the partner effect (i.e., intercept-slope association) of older dyad members on younger dyad members was different from the partner effect of younger dyad members on older dyad members. Constraining the two partner effects to be equal did not significantly affect the model fit for any of the five traits. This suggested that the partner effects of older dyad members were not significantly different from the partner effects of younger dyad members.

Second, to evaluate the moderating effect of a gender difference within dyads, we tested whether same-sex dyads differed from different-sex dyads with respect to the strength of the intercept-intercept, slope-slope, and two intercept-slope associations. We tested this only in sibling dyads because friends were usually (95%) of the same sex. For the Holm-Bonferroni corrected α = .010, model comparison tests did not reveal evidence for a gender difference, suggesting that initial similarity and codevelopment were not significantly different between same-sex and different-sex sibling dyads.

Third, to evaluate the moderating effect of a relationship quality difference between dyads, we tested whether the intercept-intercept, slope-slope, and two intercept-slope associations were moderated by the dyads' aggregated level of perceived relationship quality. We used a median split to construct two groups with high versus low relationship quality. We did not find significant differences between the two relationship quality groups, suggesting that the magnitude of initial similarity and codevelopment was not significantly different between high and low relationship quality dyads.

Fourth, to evaluate the moderating effect of a gender difference between dyads, we tested whether male dyads differed from female dyads with respect to the strength of the intercept-intercept, slope-slope, and two intercept-slope associations. We tested this in subsamples of same-sex friends (n = 631; 95% of the friendship dyads) and same-sex siblings (n = 319; 51% of the sibling dyads). Using the Holm-Bonferroni corrected α = .005, we did not find evidence for a gender difference in initial similarity and codevelopment.

Discussion

Compared with early adulthood, little is known about the general shape and conditions of personality trait development in adolescence. Using data from two partly overlapping cohorts, the present study investigated (a) rank-order and mean-level stability and change in Big Five personality traits from adolescence through early adulthood, (b) individual differences in change, and (c) personality trait codevelopment in adolescent friendship and sibling dyads. To summarize, the results of the present research suggest that adolescents tend to become more stable in their ranking on personality trait dimensions and tend to grow linearly or curvilinearly (i.e., U-shaped) in the direction of greater psychological maturity (as defined by growing conscientiousness, agreeableness, and emotional stability). Furthermore, adolescents differed substantially with respect to their personality trait trajectories, but these individual differences in change were not related to the personality trajectories of their friends and siblings.

Rank-Order Stability and Change in Personality Traits

We found that the 1-year rank-order stability of Big Five traits increased substantially in early and middle adolescence. Notably, these changes occurred even though the present rank-order stability estimates at age 12 were already larger than those that have been typically found among children, adolescents, and young adults (cf. Roberts & DelVecchio, 2000). By contrast, rank-order stability levels appeared not to increase further in late adolescence and early adulthood. These findings bear at least two important implications. First, the strongly increasing rank-order stability in early adolescence suggests that this is a particularly important formative period in adolescence because rank-order differences are still relatively fluid compared with later phases in adolescence, but are quickly becoming more stable during this period. It therefore seems valuable to study potential sources of stability and change in-depth in this age period. Second, our findings suggest that there may be periods in adolescence that deviate from the cumulative continuity principle of increasing rank-order stability.

Genetically informed longitudinal studies have found that the observed increases in personality trait stability can be traced back

Table 4

Personality Trait Correlations Between Adolescent Dyad Members Across Observed Relationship Duration Years

	Personality trait										
	Extraversion		Agreeableness		Conscientiousness		Emotional stability		Openness		
Duration	Friends	Siblings	Friends	Siblings	Friends	Siblings	Friends	Siblings	Friends	Siblings	Mean
0	.14 (.04)*	.09 (.05)	.15 (.05)*	.08 (.05)	.18 (.04)*	.01 (.04)	.14 (.04)*	.18 (.05)*	.02 (.05)	.11 (.05)*	.11
1	.15 (.05)*	.07 (.05)	.17 (.05)*	.14 (.05)*	.23 (.04)*	.08 (.05)	.09 (.05)*	.04 (.05)	.11 (.05)*	.17 (.05)*	.13
2	.15 (.05)*	.13 (.05)*	.19 (.05)*	.06 (.05)	.17 (.04)*	.06 (.05)	.05 (.05)	.16 (.05)*	.08 (.05)	.14 (.05)*	.12
3	.07 (.05)	.04 (.05)	.13 (.06)*	.05 (.05)	.16 (.05)*	.00 (.04)	.10 (.05)	.07 (.05)	.08 (.05)	.09 (.05)	.08
4	.06 (.06)	.10 (.05)*	.13 (.06)	.12 (.05)*	.18 (.06)*	.05 (.05)	.09 (.06)	.08 (.05)	.03 (.06)	.09 (.05)	.09
5	−.01 (.08)	.05 (.06)	.23 (.08)*	.10 (.06)	.17 (.07)*	.09 (.05)	.17 (.08)*	.14 (.06)*	.18 (.08)*	.04 (.06)	.12
Mean	.09	.08	.17	.09	.20	.05	.10	.11	.08	.11	.11

Note. Standard errors in parentheses.
* $p < .05$.

to increases in the stability of environmental influences on personality, rather than to increases in genetic stability (for a review and meta-analysis, see Bleidorn, Kandler, & Caspi, 2014; Briley & Tucker-Drob, 2014). Future research is needed to identify the most important environmental factors that exert increasingly stable influences on personality traits across early and middle adolescence. Promising candidate factors are increases in the stability of social relationships (Hardy, Bukowski, & Sippola, 2002), identity maturation (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2010), and decreasing gene activity or brain development in areas related to personality traits (Mills, Lalonde, Clasen, Giedd, & Blakemore, 2014). Such factors may contribute to increasingly consistent situational experiences during adolescence, which likely promotes personality consistency (Roberts et al., 2008).

Mean-Level Stability and Change in Personality Traits

Our results regarding normative personality trait changes partly fit the maturity principle, which holds that young adults experience mean-level increases in agreeableness, conscientiousness, and emotional stability, and partly fit the disruption hypothesis, which posits that adolescents experience a temporal dip in these traits. In line with the maturity principle, we found that throughout adolescence and early adulthood, boys and girls showed increasing agreeableness and girls showed increasing conscientiousness. Consistent with the disruption hypothesis, we found temporal declines in boys' conscientiousness and girls' emotional stability. In general, our results are partly consistent with a meta-analysis (Denissen, Van Aken, Penke, et al., 2013) and two large-scale cross-sectional studies among North Americans (Soto, 2016; Soto et al., 2011), which found evidence for U-shaped mean-level changes in conscientiousness, openness, and emotional stability during adolescence. Our mean-level results are particularly consistent with a similar cohort-sequential study among Dutch adolescents (Klimstra et al., 2009), which suggests that results replicate well among studies that use similar methods and investigate similar populations.

The substantial mean-level increases in conscientiousness and agreeableness may be rooted in the continuous improvements in effortful control in childhood (Shiner, 2015) and may be driven by further increases in self-regulation capacity in adolescence (Casey et al., 2008) and early adulthood (Jensen-Campbell et al., 2002). More generally, Denissen, Van Aken, Penke, et al. (2013) have proposed that personality maturation among adolescents may be indirectly

Table 5

Dyadic Latent Growth Curve Model Intercept (I) and Slope (S) Correlations Among Younger and Older Adolescent Dyad Members

		$r(I_{younger}, I_{older})$		$r(S_{younger}, S_{older})$		$r(I_{younger}, S_{older})$		$r(I_{older}, S_{younger})$	
Dyad	Trait	Est.	95% CI	Est.	95% CI	Est.	95% CI	Est.	95% CI
Friends	E	.19*	[.09; .29]	−.10	[−.33; .14]	.00	[−.16; .16]	−.06	[−.24; .13]
	A	.19*	[.08; .31]	.11	[−.16; .38]	−.21†	[−.42; −.00]	.03	[−.14; .21]
	C	.21*	[.12; .31]	.21	[−.01; .43]	−.05	[−.21; .11]	−.04	[−.20; .11]
	ES	.14†	[.04; .24]	−.06	[−.28; .16]	.04	[−.12; .20]	−.03	[−.19; .14]
	O	.06	[−.04; .17]	.16	[−.10; .43]	−.03	[−.21; .16]	.01	[−.17; .19]
Siblings	E	.13†	[.03; .23]	−.04	[−.25; .17]	−.10	[−.27; .07]	.06	[−.08; .19]
	A	.10	[−.02; .22]	.04	[−.19; .27]	.03	[−.15; .21]	.02	[−.14; .18]
	C	.05	[−.04; .15]	.06	[−.11; .23]	−.05	[−.18; .08]	.06	[−.06; .19]
	ES	.18*	[.07; .29]	.06	[−.14; .25]	−.04	[−.19; .11]	−.03	[−.18; .12]
	O	.20*	[.09; .30]	.10	[−.11; .31]	−.22†	[−.39; −.06]	.00	[−.14; .15]

Note. $r(I_{young}, I_{old})$ indicates the correlations between the younger and older dyad members' personality traits at the dyads' first measurement occasion; $r(S_{young}, S_{old})$ indicates the correlation between both dyad members' linear personality trait change; $r(I_{young}, S_{old})$ indicates the correlation between the younger dyad members' intercept and the older dyad members' slope; $r(I_{old}, S_{young})$ indicates the correlation between the older dyad members' intercept and the younger dyad members' slope.
† $p < .05$. * $p < .005$ (Bonferroni-corrected α).

driven by increasing expectations concerning adolescents' behavior, thoughts, and feelings, and directly by incremental practice of self-regulatory mechanisms to meet these expectations. According to this account, the temporal dips in maturity may be partly explained by a temporary mismatch between external expectations and adolescents' actual behavior, affect, and cognition (Denissen, Van Aken, Penke, et al., 2013). One may indeed expect that parents and teachers stimulate conscientious behaviors (e.g., doing homework) and agreeable behaviors (e.g., being kind) more than, for example, extraverted behaviors (e.g., being talkative), for which we found no mean-level increase. Consistent with the idea that personality maturation is driven by incremental practice, one study found that investment in scholarly goals mediated conscientiousness increases among hi-schoolers that approached graduation (Bleidorn, 2012).

In addition, one could argue that personality trait maturation in late adolescence is driven by increasingly mature expectations among adolescents themselves. Early adolescents might be more concerned with getting along and getting ahead among peers than with aiming to meet adult expectations (Harris, 1995; Hawley, 2006). For example, sloppy, careless, insensitive, or antisocial behaviors, which are indicative of low conscientiousness and agreeableness, may be more accepted among early adolescent peers than among late adolescent peers. Future research may investigate whether personality maturation in adolescence is mainly driven by increasingly mature expectations from adults, peers, or themselves, by social role transitions, or by other mechanisms, including biological processes such as growth in the prefrontal cortex that might underlie increases in self-regulatory capacity (Casey et al., 2008).

Individual Differences in Personality Trait Change

How well do mean-level changes describe the personality trait changes of individuals? We found that individual differences in change were relatively small in magnitude for agreeableness, but substantial for extraversion, conscientiousness, and emotional stability. This suggests that the average trajectory in agreeableness provides an accurate summary for the change in most individuals, whereas the average trajectories in extraversion, conscientiousness, and emotional stability provide less accurate descriptions for individuals' change in these traits.

The relatively homogeneous increase in agreeableness could be explained by the presence of a norm regarding agreeable behavior that (a) changes gradually from adolescence through early adulthood, (b) is shared among many adolescents (i.e., is not limited to a few social groups), and (c) is relatively easily to follow (Hennecke, Bleidorn, Denissen, & Wood, 2014; Wood & Wortman, 2012). By contrast, the large individual differences in change in conscientiousness, extraversion, and emotional stability suggests that adolescents do not adhere to general norms regarding these traits. Alternatively, they might differ in their capacity to keep up with these norms, or they tend to adhere to different, socially stratified norms.

Dyadic Personality Trait Similarity and Codevelopment

The idea that personality change may be clustered among dyad or peer group members was addressed in our analyses of codevelopment. Our results indicated that dyadic personality trait similarity among friends and among siblings did not systematically change over time and that adolescents' linear personality trait trajectories could not be predicted by their best friend's or sibling's initial trait level or linear trajectory in the same period. Thus, we found no evidence for our hypothesis that personality trajectories among best friends and among siblings are systematically interrelated. This finding is consistent with previous studies that found no personality trait codevelopment among college students (Anderson, Keltner, & John, 2003; Selfhout, Denissen, Branje, & Meeus, 2009) and among interacting dyads that were sampled in public spaces (Bahns, Crandall, Gillath, & Preacher, 2016).

However, we did find evidence for a small degree of dyadic personality trait similarity. We found evidence for similarity with respect to openness and emotional stability among siblings, and with respect to conscientiousness, extraversion, and agreeableness among friends. Among siblings, the observed similarity may have partly resulted from genetical resemblance (Bleidorn et al., 2014; Bouchard & Loehlin, 2001). Previous studies suggested that personality trait similarity among friends reflects selection effects (Selfhout et al., 2010; Selfhout, Branje, & Meeus, 2007; M. Van Zalk & Denissen, 2015) and that similarity is most important in the early stages of a relationship (Bahns et al., 2016). Alternatively, personality similarity may have been produced by unmeasured previous socialization effects or by a confounding factor. Overall, this pattern seems to imply that personality similarity may only be a criterion in the phase of friendship formation, and that friendship retention likely depends on other processes (e.g., mutual support and self-disclosure). Adolescent friends appeared to change independently from each other in their personality traits during this friendship retention phase, regardless of friendship quality and gender. It is important to note that this conclusion only applies to change in Big Five personality traits. It may very well be that other personality characteristics, such as self-esteem or motives, are more prone to dyadic social influence processes.

The lack of evidence for dyadic codevelopment leads us to conclude that shared experiences between friends or siblings (e.g., shared exposure to a peer group norm or parenting style) have either no significant effect on personality trait change in adolescence, or they exert idiosyncratic influences that are unique to each person in a dyad. This inference is inconsistent with Harris' (1995) group socialization theory of personality development, which proposed that peer group identification plays an important role in adolescents' personality development. To the extent that friends or siblings tend to belong to the same peer group, this identification process would have resulted in positively correlated change.

Strengths and Limitations

The design of the present study is unique because it encompasses the period of early to late adolescence (ages 12–22), contains up to seven longitudinal personality measurements per individual, and tracks year-to-year changes in personality traits. Other important strengths of this study are its large sample size (containing over 1,500 respondents in middle adolescence), the inclusion of adolescents' friends and siblings (allowing us to investigate codevelopment), and the use of advanced statistical techniques. However, we also notice some limitations.

First, the sample did not include the period of childhood and the earliest years of adolescence (i.e., ages 10 and 11). This omission prevented a replication of the often-found mean-level decreases in personality traits during early adolescence (Denissen, Van Aken, Penke, et al., 2013; Durbin et al., 2016; Soto, 2016; Soto et al., 2011). Future studies may include the transition from childhood to adolescence.

Second, we used a relatively short Big Five Questionnaire that contained only six items per trait, which prohibited a finer-grained analysis of codevelopment at the level of lower-order facets. Based on previous research, one may predict that dyad members show codevelopment on facets related to deviant behaviors (Dishion & Tipsord, 2011), negative emotionality (Hogue & Steinberg, 1995; N. van Zalk, Van Zalk, Kerr, & Stattin, 2011), and motivational constructs (Ojanen et al., 2013; Ryan, 2000).

Third, we did not find evidence for partner effects or correlated change, though our findings indicate that dyad members tended to maintain their similarity over time. Caspi, Herbener, and Ozer (1992) argued that the mere maintenance of dyadic similarity over time requires codevelopment. Because of the imperfect rank-order stability of personality traits, initial dyadic similarity should slowly deteriorate over time in the absence of partner effects or correlated change. Our statistical power might have been insufficient to detect the small degree of codevelopment that might has maintained dyadic similarity over time.

Fourth, our dyadic growth curve model was restricted to estimate codevelopment in a linear fashion and across multiple years. However, codevelopment might occur in a more complex fashion or in a shorter time frame. In addition, opposing processes such as convergence within some dyads and divergence within others might have cancelled each other out in the aggregate, masking differential codevelopment that occurred among subgroups of dyads. Future research might use a different methodological or statistical approach, such as the modeling of codevelopment across shorter periods (e.g., months or weeks).

Finally, although we tested the role of several potential moderators of codevelopment (i.e., relative age, relationship quality, and gender constellations), our scope of moderating variables as well as the statistical tools we used to test them were limited. For example, we compared codevelopment parameters between two relationship quality groups based on a median split, thus ignoring potentially important temporal and dyad member-specific variance in relationship quality. Future research may investigate the moderating role of additional individual difference variables such as self-esteem (M. van Zalk & Van Zalk, 2015), popularity, and self-control (Dishion & Tipsord, 2011). In addition, future research might measure participants' subjective trait desirability and test whether individuals' degree of social influence is moderated by the extent to which they possess traits that are desired by the other member of their dyad.

Conclusions

Four conclusions stand out. First, the 1-year rank-order stability of personality traits was already substantial at age 12, increased strongly from early through middle adolescence, and remained rather stable during late adolescence and early adulthood. Second, the linear mean-level increases in girls' conscientiousness and both genders' agreeableness were consistent with the maturity principle, whereas the U-shaped mean-level changes in girls' emotional stability and boys' conscientiousness were consistent with the disruption hypothesis. Furthermore, we found U-shaped change in girls' extraversion, a linear increase in boys' openness, an increase followed by a decrease in girls' openness, and no evidence for mean-level change in boys' emotional stability and boys' extraversion. Third, for most Big Five traits, we found large individual differences in personality change trajectories, which implies that mean-level change estimates are not always accurate representations of individual development. Fourth, we did not find evidence for dyadic personality trait codevelopment in adolescent friendship and sibling dyads, suggesting that adolescents change independently from their best friend and sibling. The lack of association between dyad members' personality trajectories also suggests that shared experiences do not have uniform effects on personality trait change in adolescence. The major challenge for future research is to test alternative mechanisms for increasing rank-order stability and personality maturation in adolescence, including idiosyncratic mechanisms that drive individual differences in personality trait development.

References

Anderson, C., Keltner, D., & John, O. P. (2003). Emotional convergence between people over time. *Journal of Personality and Social Psychology, 84,* 1054–1068. http://dx.doi.org/10.1037/0022-3514.84.5.1054

Back, M. D., Baumert, A., Denissen, J. J. A., Hartung, F. M., Penke, L., Schmukle, S. C., . . . Wrzus, C. (2011). PERSOC: A unified framework for understanding the dynamic interplay of personality and social relationships. *European Journal of Personality, 25,* 90–107. http://dx.doi.org/10.1002/per.811

Bahns, A. J., Crandall, C. S., Gillath, O., & Preacher, K. J. (2016). Similarity in relationships as niche construction: Choice, stability, and influence within dyads in a free choice environment. *Journal of Personality and Social Psychology, 112,* 329–355. http://dx.doi.org/10.1037/pspp0000088

Bandura, A. (1971). Vicarious and self-reinforcement processes. In R. Glaser (Ed.), *The nature of reinforcement* (pp. 228–278). New York, NY: Academic.

Bazana, P. G., & Stelmack, R. M. (2004). Stability of personality across the life span: A meta-analysis. In R. Stelmack (Ed.), *On the psychobiology of personality* (pp. 113–144). New York, NY: Elsevier. http://doi.org/10.1016/B978-008044209-9/50009-9

Berndt, T. J. (1979). Developmental changes in conformity to peers and parents. *Developmental Psychology, 15,* 608–616. http://dx.doi.org/10.1037/0012-1649.15.6.608

Berndt, T. J. (1999). Friends' influence on students' adjustment to school. *Educational Psychologist, 34,* 15–28. http://dx.doi.org/10.1207/s15326985ep3401_2

Biddle, B. J., Bank, B. J., & Marlin, M. M. (1980). Parental and peer influence on adolescents. *Social Forces, 58,* 1057–1079. http://dx.doi.org/10.1093/sf/58.4.1057

Blakemore, S.-J. (2008). The social brain in adolescence. *Nature Reviews Neuroscience, 9,* 267–277. http://dx.doi.org/10.1038/nrn2353

Bleidorn, W. (2012). Hitting the road to adulthood: Short-term personality development during a major life transition. *Personality and Social Psychology Bulletin, 38,* 1594–1608. http://dx.doi.org/10.1177/0146167212456707

Bleidorn, W. (2015). What accounts for personality maturation in early adulthood? *Current Directions in Psychological Science, 24,* 245–252. http://dx.doi.org/10.1177/0963721414568662

Bleidorn, W., Kandler, C., & Caspi, A. (2014). The behavioural genetics of personality development in adulthood — Classic, contemporary, and future trends. *European Journal of Personality, 28,* 244–255. http://dx.doi.org/10.1002/per.1957

Bouchard, T. J., Jr., & Loehlin, J. C. (2001). Genes, evolution, and personality. *Behavior Genetics, 31,* 243–273. http://dx.doi.org/10.1023/A:1012294324713

Branje, S. J. T., Van Lieshout, C. F. M., & Gerris, J. R. M. (2007). Big Five personality development in adolescence and adulthood. *European Journal of Personality, 21,* 45–62. http://dx.doi.org/10.1002/per.596

Branje, S. J. T., van Lieshout, C. F. M., & van Aken, M. A. G. (2004). Relations between Big Five personality characteristics and perceived support in adolescents' families. *Journal of Personality and Social Psychology, 86,* 615–628. http://dx.doi.org/10.1037/0022-3514.86.4.615

Briley, D. A., & Tucker-Drob, E. M. (2014). Genetic and environmental continuity in personality development: A meta-analysis. *Psychological Bulletin, 140,* 1303–1331. http://dx.doi.org/10.1037/a0037091

Brody, G. H., Stoneman, Z., MacKinnon, C. E., & MacKinnon, R. (1985). Role relationships and behavior between preschool-aged and school-aged sibling pairs. *Developmental Psychology, 21,* 124–129. http://dx.doi.org/10.1037/0012-1649.21.1.124

Byrne, D. (1971). *The attraction paradigm*. New York, NY: Academic Press.

Casey, B. J., Jones, R. M., & Hare, T. A. (2008). The adolescent brain. *Annals of the New York Academy of Sciences, 1124,* 111–126. http://dx.doi.org/10.1196/annals.1440.010

Caspi, A., Herbener, E. S. S., & Ozer, D. J. J. (1992). Shared experiences and the similarity of personalities: A longitudinal study of married couples. *Journal of Personality and Social Psychology, 62,* 281–291. http://dx.doi.org/10.1037/0022-3514.62.2.281

Caspi, A., & Roberts, B. W. (2001). Personality development across the life course: The argument for change and continuity. *Psychological Inquiry, 12,* 49–66. http://dx.doi.org/10.1207/S15327965PLI1202_01

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9,* 233–255. http://dx.doi.org/10.1207/S15328007SEM0902_5

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16,* 297–334. http://dx.doi.org/10.1007/BF02310555

Denissen, J. J. A., Van Aken, M. A. G., Penke, L., & Wood, D. (2013). Self-regulation underlies temperament and personality: An integrative developmental framework. *Child Development Perspectives, 7,* 255–260. http://dx.doi.org/10.1111/cdep.12050

Denissen, J. J. A., Van Aken, M. A. G., & Roberts, B. W. (2013). Personality Development across the Life Span. In T. Chamorro-Premuzic, S. von Stumm, & A. Furnham (Eds.), *The Wiley-Blackwell handbook of individual differences* (pp. 75–100). Oxford, UK: Wiley-Blackwell. http://dx.doi.org/10.1002/9781444343120.ch3

Dishion, T. J., & Tipsord, J. M. (2011). Peer contagion in child and adolescent social and emotional development. *Annual Review of Psychology, 62,* 189–214. http://dx.doi.org/10.1146/annurev.psych.093008.100412

Duncan, T. E., Duncan, S. C., Strycker, L. A., Li, F., & Alpert, A. (1999). *An introduction to latent variable growth curve modeling*. Mahwah, NJ: Erlbaum.

Durbin, C. E., Hicks, B. M., Blonigen, D. M., Johnson, W., Iacono, W. G., & McGue, M. (2016). Personality trait change across late childhood to young adulthood: Evidence for nonlinearity and sex differences in change. *European Journal of Personality, 30,* 31–44. http://dx.doi.org/10.1002/per.2013

Furman, W., & Buhrmester, D. (1985). Children's perceptions of the personal relationships in their social networks. *Developmental Psychology, 21,* 1016–1024. http://dx.doi.org/10.1037/0012-1649.21.6.1016

Gardner, M., & Steinberg, L. (2005). Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: An experimental study. *Developmental Psychology, 41,* 625–635. http://dx.doi.org/10.1037/0012-1649.41.4.625

Hardy, C. L., Bukowski, W. M., & Sippola, L. K. (2002). Stability and change in peer relationships during the transition to middle-level school. *The Journal of Early Adolescence, 22,* 117–142. http://dx.doi.org/10.1177/0272431602022002001

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review, 102,* 458–489. http://dx.doi.org/10.1037/0033-295X.102.3.458

Hartup, W. W. (1996). The company they keep: Friendships and their developmental significance. *Child Development, 67,* 1–13. http://dx.doi.org/10.2307/1131681

Hawley, P. H. (2006). Evolution and personality: A new look at Machiavellianism. In D. K. Mroczek & T. D. Little (Eds.), *Handbook of personality development* (pp. 147–161). Mahwah, NJ: Erlbaum.

Hennecke, M., Bleidorn, W., Denissen, J. J. A., & Wood, D. (2014). A three-part framework for self-regulated personality development across adulthood. *European Journal of Personality, 28,* 289–299. http://dx.doi.org/10.1002/per.1945

Hertzog, C., Lindenberger, U., Ghisletta, P., & von Oertzen, T. (2006). On the power of multivariate latent growth curve models to detect correlated change. *Psychological Methods, 11,* 244–252. http://dx.doi.org/10.1037/1082-989X.11.3.244

Hogan, R., & Roberts, B. W. (2004). A socioanalytic model of maturity. *Journal of Career Assessment, 12,* 207–217. http://dx.doi.org/10.1177/1069072703255882

Hogue, A., & Steinberg, L. (1995). Homophily of internalized distress in adolescent peer groups. *Developmental Psychology, 31,* 897–906. http://dx.doi.org/10.1037/0012-1649.31.6.897

Jensen-Campbell, L. A., Rosselli, M., Workman, K. A., Santisi, M., Rios, J. D., & Bojan, D. (2002). Agreeableness, conscientiousness, and effortful control processes. *Journal of Research in Personality, 36,* 476–489. http://dx.doi.org/10.1016/S0092-6566(02)00004-1

Kawamoto, T., & Endo, T. (2015). Personality change in adolescence: Results from a Japanese sample. *Journal of Research in Personality, 57,* 32–42. http://dx.doi.org/10.1016/j.jrp.2015.03.002

Keijsers, L., Branje, S., Hawk, S. T., Schwartz, S. J., Frijns, T., Koot, H. M., . . . Meeus, W. (2012). Forbidden friends as forbidden fruit: Parental supervision of friendships, contact with deviant peers, and adolescent delinquency. *Child Development, 83,* 651–666.

Klimstra, T. A., Hale, W. W., III, Raaijmakers, Q. A. W., Branje, S. J. T., & Meeus, W. H. J. (2010). Identity formation in adolescence: Change or stability? *Journal of Youth and Adolescence, 39,* 150–162. http://dx.doi.org/10.1007/s10964-009-9401-4

Klimstra, T. A., Hale, W. W., Raaijmakers, Q. A. W., Branje, S. J. T., & Meeus, W. H. J. (2009). Maturation of personality in adolescence. *Journal of Personality and Social Psychology, 96,* 898–912. http://dx.doi.org/10.1037/a0014746

Koepke, S., & Denissen, J. J. A. (2012). Dynamics of identity development and separation-individuation in parent-child relationships during adolescence and emerging adulthood - A conceptual integration. *Developmental Review, 32,* 67–88. http://dx.doi.org/10.1016/j.dr.2012.01.001

Kraemer, H. C., Yesavage, J. A., Taylor, J. L., & Kupfer, D. (2000). How can we learn about developmental processes from cross-sectional studies, or can we? *The American Journal of Psychiatry, 157,* 163–171. http://dx.doi.org/10.1176/appi.ajp.157.2.163

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9,* 151–173. http://dx.doi.org/10.1207/S15328007SEM0902_1

Luhmann, M., Orth, U., Specht, J., Kandler, C., & Lucas, R. E. (2014). Studying changes in life circumstances and personality: It's about time. *European Journal of Personality, 28,* 256–266. http://dx.doi.org/10.1002/per.1951

McArdle, J. J. (2009). Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology, 60,* 577–605. http://dx.doi.org/10.1146/annurev.psych.60.110707.163612

McCaffery, J. M., Franz, C. E., Jacobson, K., Leahey, T. M., Xian, H., Wing, R. R., . . . Kremen, W. S. (2011). Effects of social contact and zygosity on 21-y weight change in male twins. *The American Journal of Clinical Nutrition, 94,* 404–409. http://dx.doi.org/10.3945/ajcn.111.012195

McHale, S. M., Updegraff, K. A., & Whiteman, S. D. (2012). Sibling relationships and influences in childhood and adolescence. *Journal of Marriage and Family, 74,* 913–930. http://dx.doi.org/10.1111/j.1741-3737.2012.01011.x

Mills, K. L., Lalonde, F., Clasen, L. S., Giedd, J. N., & Blakemore, S.-J. (2014). Developmental changes in the structure of the social brain in late childhood and adolescence. *Social Cognitive and Affective Neuroscience, 9,* 123–131. http://dx.doi.org/10.1093/scan/nss113

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100,* 674–701. http://dx.doi.org/10.1037/0033-295X.100.4.674

Mund, M., & Neyer, F. J. (2014). Treating personality-relationship transactions with respect: Narrow facets, advanced models, and extended time frames. *Journal of Personality and Social Psychology, 107,* 352–368. http://dx.doi.org/10.1037/a0036719

Oberski, D. (2014). lavaan.survey: An R package for complex survey analysis of structural equation models. *Journal of Statistical Software, 57,* 1–27. http://dx.doi.org/10.18637/jss.v057.i01

Ojanen, T., Sijtsema, J. J., & Rambaran, A. J. (2013). Social goals and adolescent friendships: Social selection, deselection, and influence. *Journal of Research on Adolescence, 23,* 550–562. http://dx.doi.org/10.1111/jora.12043

Pornprasertmanit, S., Miller, P., Schoemann, A., & Rosseel, Y. (2015). semTools: Useful tools for structural equation modeling. R package version 0.4–6.

Reitz, A. K., Zimmermann, J., Hutteman, R., Specht, J., & Neyer, F. J. (2014). How peers make a difference: The role of peer groups and peer relationships in personality development. *European Journal of Personality, 28,* 279–288. http://dx.doi.org/10.1002/per.1965

Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin, 126,* 3–25. http://dx.doi.org/10.1037/0033-2909.126.1.3

Roberts, B. W., & Mroczek, D. (2008). Personality trait change in adulthood. *Current Directions in Psychological Science, 17,* 31–35. http://dx.doi.org/10.1111/j.1467-8721.2008.00543.x

Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin, 132,* 1–25. http://dx.doi.org/10.1037/0033-2909.132.1.1

Roberts, B. W., Wood, D., & Caspi, A. (2008). Development of personality traits in adulthood. *Handbook of Personality: Theory and Research,* 375–398.

Rose, R. J., Kaprio, J., Williams, C. J., Viken, R., & Obremski, K. (1990). Social contact and sibling similarity: Facts, issues, and red herrings. *Behavior Genetics, 20,* 763–778. http://dx.doi.org/10.1007/BF01065919

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48,* 1–36. http://dx.doi.org/10.18637/jss.v048.i02

Rowe, D. C., & Gulley, B. L. (1992). Sibling effects on substance use and delinquency. *Criminology, 30,* 217–234. http://dx.doi.org/10.1111/j.1745-9125.1992.tb01103.x

Ryan, A. M. (2000). Peer groups as a context for the socialization of adolescents' motivation, engagement, and achievement in school. *Educational Psychologist, 35,* 101–111. http://dx.doi.org/10.1207/S15326985EP3502_4

Selfhout, M., Branje, S. J. T., & Meeus, W. H. J. (2007). Similarity in adolescent best friendships: The role of gender. *Netherlands Journal of Psychology, 63,* 42–48. http://dx.doi.org/10.1007/BF03061061

Selfhout, M., Burk, W., Branje, S., Denissen, J., van Aken, M., & Meeus, W. (2010). Emerging late adolescent friendship networks and Big Five personality traits: A social network approach. *Journal of Personality, 78,* 509–538. http://dx.doi.org/10.1111/j.1467-6494.2010.00625.x

Selfhout, M., Denissen, J., Branje, S., & Meeus, W. (2009). In the eye of the beholder: Perceived, actual, and peer-rated similarity in personality, communication, and friendship intensity during the acquaintanceship process. *Journal of Personality and Social Psychology, 96,* 1152–1165. http://dx.doi.org/10.1037/a0014468

Shiner, R. L. (2015). The development of temperament and personality traits in childhood and adolescence. In M. Mikulincer, P. R. Shaver, M. L. Cooper, & R. J. Larsen (Eds.), *APA handbook of personality and social psychology: Vol. 4. Personality processes and individual differences* (pp. 85–105). Washington, DC: American Psychological Association. http://dx.doi.org/10.1037/14343-004

Slomkowski, C., Rende, R., Novak, S., Lloyd-Richardson, E., & Niaura, R. (2005). Sibling effects on smoking in adolescence: Evidence for social influence from a genetically informative design. *Addiction, 100,* 430–438. http://dx.doi.org/10.1111/j.1360-0443.2004.00965.x

Smith, A. R., Steinberg, L., Strang, N., & Chein, J. (2015). Age differences in the impact of peers on adolescents' and adults' neural response to reward. *Developmental Cognitive Neuroscience, 11,* 75–82. http://dx.doi.org/10.1016/j.dcn.2014.08.010

Soto, C. J. (2016). The Little Six Personality Dimensions from early childhood to early adulthood: Mean-level age and gender differences in parents' reports. *Journal of Personality, 84,* 409–422. http://dx.doi.org/10.1111/jopy.12168

Soto, C. J., John, O. P., Gosling, S. D., & Potter, J. (2011). Age differences in personality traits from 10 to 65: Big Five domains and facets in a large cross-sectional sample. *Journal of Personality and Social Psychology, 100,* 330–348. http://dx.doi.org/10.1037/a0021717

Soto, C. J., & Tackett, J. L. (2015). Personality traits in childhood and adolescence: Structure, development, and outcomes. *Current Directions in Psychological Science, 24,* 358–362. http://dx.doi.org/10.1177/0963721415589345

Spiel, C. (1998). Four methodological approaches to the study of stability and change in development. *Methods of Psychological Research, 3,* 7–22.

Sullivan, H. S. (1953). *The interpersonal theory of psychiatry*. New York, NY: Norton.

Trim, R. S., Leuthe, E., & Chassin, L. (2006). Sibling influence on alcohol use in a young adult, high-risk sample. *Journal of Studies on Alcohol, 67,* 391–398. http://dx.doi.org/10.15288/jsa.2006.67.391

Van den Akker, A. L., Deković, M., Asscher, J., & Prinzie, P. (2014). Mean-level personality development across childhood and adolescence: A temporary defiance of the maturity principle and bidirectional associations with parenting. *Journal of Personality and Social Psychology, 107,* 736–750. http://dx.doi.org/10.1037/a0037248

Van Lier, P. A. C., Frijns, T., Neumann, A., Den Exter Blokland, E., Koot, H. M., & Meeus, W. H. J. (2011). *The RADAR young study: Design, description of sample, and validation of cohort assignment*.

van Zalk, M., & Denissen, J. (2015). Idiosyncratic versus social consensus approaches to personality: Self-view, perceived, and peer-view similarity. *Journal of Personality and Social Psychology, 109,* 121–141. http://dx.doi.org/10.1037/pspp0000035

Van Zalk, M. H., & Van Zalk, N. (2015). Violent peer influence: The roles of self-esteem and psychopathic traits. *Development and Psychopathology, 27,* 1077–1088. http://dx.doi.org/10.1017/S0954579415000693

Van Zalk, N., Van Zalk, M., Kerr, M., & Stattin, H. (2011). Social anxiety as a basis for friendship selection and socialization in adolescents' social networks. *Journal of Personality, 79,* 499–526. http://dx.doi.org/10.1111/j.1467-6494.2011.00682.x

Vermulst, A. A., & Gerris, J. R. M. (2005). *QBF: Quick Big Five persoonlijkheidstest handleiding* [Quick Big Five personality test manual]. Leeuwarden, the Netherlands: LDC Publications.

Wallace, L. N. (2015). Sibling popularity: A moderator of sibling influence for adolescent substance use. *Addiction Research & Theory, 23,* 481–489. http://dx.doi.org/10.3109/16066359.2015.1036046

Weisfeld, G. E. (1999). *Evolutionary principles of human adolescence*. New York, NY: Basic books.

Whiteman, S. D., Bernard, J. M., & Jensen, A. C. (2011). Sibling influence in human development. In *Sibling development: Implications for mental health practitioners* (pp. 1–15). New York, NY: Springer.

Wood, D., & Wortman, J. (2012). Trait means and desirabilities as artifactual and real sources of differential stability of personality traits. *Journal of Personality, 80,* 665–701. http://dx.doi.org/10.1111/j.1467-6494.2011.00740.x

Wrzus, C., & Roberts, B. W. (2016). Processes of personality development in adulthood: The TESSERA framework. *Personality and Social Psychology Review*. Advance online publication. http://dx.doi.org/10.1177/1088868316652279

Wrzus, C., Zimmermann, J., Mund, M., & Neyer, F. J. (2015). Friendships in young and middle adulthood: Normative patterns and personality differences. In M. Hojjat & A. Moyer (Eds.), *Psychology of friendship*. New York, NY: Oxford University Press.

Zukow, P. G. (1989). Siblings as effective socializing agents: Evidence from Central Mexico. In P. G. Zukow (Ed.), *Sibling interaction across cultures: Theoretical and methodological issues* (pp. 79–105). New York, NY: Springer. http://dx.doi.org/10.1007/978-1-4612-3536-1_5

Received March 18, 2016
Revision received December 23, 2016
Accepted January 12, 2017 ■

Addendum to Zwebner et al. (2017)

In the article, "We Look Like Our Names: The Manifestation of Name Stereotypes in Facial Appearance" by Yonat Zwebner, Anne-Laure Sellier, Nir Rosenfeld, Jacob Goldenberg, and Ruth Mayo (*Journal of Personality and Social Psychology*, 2017, Vol. 112, No. 4, pp. 527–554. http://dx.doi.org/10.1037/pspa0000076), there was a minor coding error in the reported results of Study 5. The mean accuracy of Israeli participants matching French faces and names is actually 22.73% (and not 22.48%), and for French participants matching Israeli faces and names, the mean accuracy is actually 26.45% (and not 26.68%). Note that these corrected results do not affect the conclusions, indicating that names are *not* accurately matched between cultures (French participants and Israeli stimuli, and vice versa). Notably, the interaction remains significant; in both cultures, the probability of accurately matching faces/names from the same culture remains significantly higher than matching faces/names from a different culture, and the accuracies of matching face/names within each culture remain significantly above chance level, while between culture is below or similar to chance. Readers interested in the full-corrected description of the results of Study 5 may contact the first author for details.

http://dx.doi.org/10.1037/pspa0000096