

PERSONALITY DEVELOPMENT DURING THE SCHOOL-AGED YEARS: IMPLICATIONS FOR THEORY, RESEARCH, AND PRACTICE

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**Personality Development during the School-aged Years:
Implications for Theory, Research and Practice**

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Abstract

In this chapter, we review the current state of research on personality development across the lifespan with an emphasis on childhood and adolescence. We first provide a framework for discussing personality development across the life course by highlighting the fundamental personality traits observed across childhood and adolescence and into adulthood. We then discuss the various methods of assessing continuity and change of these traits, including rank-order stability, mean-level change, individual-level change, and ipsative continuity. In the context of each method, we offer a review of the findings to date concerning personality development. We next provide a brief overview of some possible explanations for the observed patterns of development then conclude with a discussion of the implications of these findings for educational research, theory, and practice.

A Developmental Trait Taxonomy

Historically, childhood temperament was studied in isolation from adult personality. Temperament has been generally defined as biologically-determined traits, which are present in infancy and show temporal and situational consistency. Temperamental traits were most often studied by child or developmental psychologists. Personality has been defined as “the dynamic organization within the individual of those psychophysical systems that determine his characteristic behavior and thought” (Allport, 1961, p. 28), and personality psychologists typically study traits in adulthood. More recent advances have led to the synthesis of child temperament and adult personality research. A key finding relevant for this particular chapter concerns the hierarchical nature of childhood temperament traits and how this hierarchy maps onto adult personality traits. The similarity in structure across the lifespan can facilitate our discussion of the development of personality.

Within the past few decades, the field has reached consensus concerning the structure of adult personality traits. Multiple personality trait taxonomies have been put forth with the number of key personality traits ranging from as few as one (Musek, 2007) or two (J. H. Block & J. Block, 1980; Digman, 1997), to as many as twenty (Gough, 1987). These seemingly distinct taxonomies can be reconciled with the understanding that personality is structured hierarchically, much like intelligence. There is thought to be a general factor of intelligence (*g*; Spearman, 1904), which subsumes more narrow and specific factors. For example, Carroll (1993) posits a three strata model of cognitive ability; 69 narrow abilities make up stratum I, eight broad abilities make up stratum II, and *g* lies in stratum III. For example, fluid reasoning is one of the eight broad abilities, and it comprises the three narrow abilities of induction, general sequential reasoning, and quantitative reasoning. Personality is similarly structured. At the most general

level of the hierarchy is a general personality factor, referred to as the Big One (Musek, 2007). Beneath the Big One lie two factors often referred to as alpha and beta (Digman, 1997). Alpha and beta are thought to be associated with socialization processes and personal growth, respectively. At the next level of the hierarchy, the more narrow traits of agreeableness, conscientiousness, and emotional stability load on the alpha factor, while the more narrow traits of extraversion and openness to experience load on beta. Some models of personality focus on a much greater number of specific traits, such as Cattell's 16 factor taxonomy (Cattell, 1979).

While broad traits have the advantage of summarizing large amounts of information, narrow traits allow for more nuanced description. This tradeoff has long been recognized as the bandwidth-fidelity dilemma (Cronbach & Gleser, 1965). At a specific level of the hierarchy, traits reach an optimal balance of high bandwidth and high fidelity. This level has been termed the foundational level of personality structure (Soto & John, 2013). In the adult literature, the Big Five personality traits – extraversion, agreeableness, conscientiousness, emotional stability (with its opposite pole, neuroticism most often referenced in the literature), and openness to experience – have been recognized as achieving this optimal balance, and consequently, this five-factor taxonomy is the most widely used in personality research. In addition to maximizing the bandwidth-fidelity balance, the Big Five have garnered tremendous empirical support in the past few decades, as the same five-factor structure is generalizable to both men and women and across numerous populations and settings (Marsh, Nagengast, & Morin, 2013; McCrae & Costa, 2003; McCrae, Terracciano, & 78 members of the Personality Profiles of Cultures Project, 2005).

While this five-factor model is well-established in the adult literature and has facilitated studies of adult personality development, efforts to discern the foundational level of child and

adolescent personality structure are more recent. Findings suggest that, like adult personality, childhood personality is hierarchical (Soto & John, 2013; Tackett, Krueger, Iacono, & McGue, 2008; Tackett et al., 2012). In studies of childhood temperament and personality, five factors emerge that are markedly similar to the Big Five personality traits identified in the adult literature. Adult extraversion stems from infant/childhood positive emotionality and surgency, which subsume the more specific facets of sociability and activity level. Adult agreeableness stems from childhood benevolence and need for affiliation, and adult conscientiousness develops from childhood tendencies to demonstrate constraint and effortful control. Infant and childhood negative emotionality, like adult neuroticism, incorporates feelings of fearfulness, anxiety, and sadness. Finally, childhood creativity and imagination pave the way for adult openness to experience (Caspi, Roberts, & Shiner, 2005; Caspi & Shiner, 2006; De Pauw & Mervielde, 2010).

Our goal in this chapter is to provide an overview of findings concerning the development of personality across the life course. Given the overlap from childhood to adulthood, the Big Five provide a feasible framework for this discussion. In the following sections, we consider literature pertaining to the continuity and change of extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience (and related constructs) across the lifespan. It is worthwhile to note that in all ensuing discussion and review of the literature, we refer to emotional stability and reverse any interpretations that pertain to neuroticism.

Personality Continuity and Change

There is an array of methods to evaluate personality continuity and change, and it is critical to consider multiple methods to gain a full appreciation of the nature of personality

development. To illustrate the need for considering different types of continuity and change, consider the trait of conscientiousness. Conscientiousness is defined as “socially prescribed impulse control that facilitates task- and goal-directed behavior, such as thinking before acting, delaying gratification, following norms and rules, and planning, organizing, and prioritizing tasks” (John & Srivastava, 1999, p. 121). It would not be a stretch to imagine that, as children age, they will show a greater tendency to follow rules, delay gratification, and consider the consequences of an action before carrying it out. That is, it is likely that one would observe an absolute increase in conscientiousness during the school-aged years. However, assume that across this time period, a child we will call Ben maintains his position of being lowest among his peers in terms of conscientiousness as he is consistently the most impulsive, disorganized, etc. That is, relative to his peers, he maintains a low level of conscientiousness. Therefore, in addition to the absolute change, it is possible to simultaneously observe relative stability. This distinction is necessary. Only considering absolute change would lead to the conclusion that conscientiousness is dynamic, changing across time. In contrast, only considering Ben’s relative standing among his peers would lead to the conclusion that conscientiousness is static, unchanging across time. In the ensuing sections, we review findings from both perspectives and consider two additional methods of personality development assessment.

Rank-order stability

The above example of Ben maintaining his position of being lowest among his peers in conscientiousness illustrates rank-order stability. Rank-order stability reflects the degree to which the relative order of individuals on a given trait is maintained across time. Correlation coefficients are typically used as an index of personality continuity with high test-retest correlations indicating high rank-order stability or personality consistency across time.

Hampson and Goldberg (2006) gathered teachers' assessments of personality in first and second grade children, and over a four-year period, stability coefficients ranged from .36 for extraversion to .55 for openness. In a separate three-year longitudinal study of continuity and change in children, teacher ratings of the Hierarchical Personality Inventory for Children (HiPIC; Mervielde, & De Fruyt, 1999) were collected on children who were aged 6-9 years during the first wave of assessment (Prinzle & Deković, 2008). Three-year test-retest correlations ranged from .38 for emotional stability to .59 for imagination, a trait that maps onto openness (De Fruyt et al., 2006; Prinzle & Deković, 2008). These stability coefficients and those reported in the studies reviewed below are presented in Table 1.

In an older, adolescent sample of Estonian students, Pullmann, Raudsepp, and Allik (2006) studied the personality development of three groups (12-, 14-, and 16-year-olds) across a two-year span. For the combined male and female sample, the average test-retest correlations of scores on the Estonian NEO-Five Factor Inventory (NEO-FFI; Allik, Laidra, Realo, & Pullmann, 2004; Costa & McCrae, 1992) ranged from .48 (conscientiousness, from age 12 to 14) to .73 (extraversion, from age 16 to 18). In a second study carried out over a five-year span during roughly the same adolescent time period, two cohorts were observed five times from early (12.4 years, on average) to middle adolescence, and from middle (16.7 years, on average) to late adolescence (Klimstra, Hale III, Raaijmakers, Branje, & Meeus, 2009). Test-retest correlations of scores on the Dutch version of Goldberg's Big Five questionnaire (Gerris et al., 1998; Goldberg, 1992) for girls in the younger cohort ranged from .41 (Time 1-2, agreeableness) to .75 (Time 4-5, extraversion), and they ranged from .52 (Times 1-2 and 3-4, agreeableness) to .86 (Time 4-5, conscientiousness) for the older cohort. For boys, test-retest correlations in the younger cohort ranged from .31 (Time 1-2, agreeableness) to .69 (Time 3-4, conscientiousness),

and they ranged from .27 (Time 1-2, agreeableness) to .75 (Time 3-4, conscientiousness, and Time 4-5, extraversion) for the older cohort. Similar estimates were derived in a sample of children with an average age of 12 years who were re-assessed four years later with the NEO-FFI (McCrae et al., 2002); for girls, estimates ranged from .30 for emotional stability to .63 for conscientiousness, and for boys, estimates ranged from .31 for agreeableness to .49 for conscientiousness.

Wortman, Lucas, and Donnellan (2012) employed a sample with a much wider age range and assessed personality traits twice over a four-year span with a variant of Saucier's (1994) adjective-based Big Five measure. Individuals ranged from age 15 to 84 years and were divided into 14 groups. The 15-19 year-old group exhibited a great deal of stability. Their average test-retest correlations reached .58 for conscientiousness and emotional stability, .61 for agreeableness, and .70 for extraversion and openness. Consistency estimates increased for the subsequent age groups, though these age-related changes in personality stability ultimately showed clear curvilinear trends for all of the Big Five traits. Stability estimates increased after the 15-19 year-old group, became larger during midlife, and then declined for the oldest cohort (80-84 year-olds). Peak stability generally emerged around the sixth decade of life when estimates reached .90 for extraversion, .85 for conscientiousness, .82 for openness, and .75 for both agreeableness and emotional stability.

To summarize the findings from multiple studies of personality consistency across time, an extensive meta-analysis was carried out in which the authors compiled more than 3,000 test-retest correlations from 152 longitudinal studies (Roberts & DelVecchio, 2000). The average test-retest correlation (after controlling for length of interval) was .31 for the 0-2.9 year age range, .49 for the 3-5.9 year age range, and .43 for the 6-11.9 and 12-17.9 year age ranges.

Thereafter, stability estimates increased until the sixth decade when they peaked at .74 and then showed a slight decline. Across the age groups, extraversion showed the greatest stability with an average test-retest correlation of .55, and emotional stability showed the lowest with an average of .46. Consistency estimates were negatively related to interval length, but there were no moderating effects for attrition, gender, or method of assessment.

This meta-analysis and collection of empirical studies illustrates several key features regarding the rank-order stability of personality. First, we see that personality is fairly stable over time. Even in children as young as six-years-old, we observe stability estimates in the range of .38 to .59 (Prinzle & Deković, 2008). Second, for the most part, we see that personality attributes increase in stability with age, supporting what has been referred to as the cumulative continuity principle (Caspi et al., 2005). In studies of school-aged children, stability estimates for older cohorts are greater than those for younger cohorts (Klimstra et al., 2009; Pullmann, et al., 2006). For example, Pullmann and colleagues (2006) reported that, across traits, the average test-retest correlation increased from .51 from age 12 to 14, to .56 from age 14 to 16, and reached .67 from age 16 to 18 years. While this age-related increase in stability is well-documented, studies that extend beyond adolescence into middle and late adulthood suggest that this increase is non-linear. Wortman and colleagues (2012) documented a decline in stability coefficients during the later stages of life, and Roberts' and DelVecchio's (2000) meta-analysis revealed a slight drop after the 50-59 decade. It should be noted, though, that not all studies offer support for the cumulative continuity principle. For example, with their study of personality continuity in childhood and adolescence, De Fruyt and colleagues (2006) provided evidence for age-related linear decreases in continuity or more complex cubic age-stability relationships.

In addition, it is worth highlighting findings concerning gender differences in patterns of rank-order stability. Roberts and DelVecchio (2000) reported that there were no gender differences in personality stability. However, in some individual studies focusing on school-aged children and adolescents, some gender differences have been observed. Several studies show that girls tend to be more stable than boys during this period of development (Klimstra et al., 2009; Pullmann et al., 2006). One study suggests the gender effect is trait-specific with girls exhibiting greater stability on some traits (extraversion, agreeableness, and conscientiousness) and boys exhibiting greater stability on others (emotional stability and openness; McCrae et al., 2002). Moreover, there is some evidence that age-related increases in rank-order stability seem to be stronger in girls than in boys (Klimstra et al., 2009; Pullmann et al., 2006). Greater stability for females during the school-aged years may be due to females' advantage with physical and neural development; that is, females' bodies and brains mature earlier than males'. Some psychological mechanisms might be at play as well. Klimstra and colleagues (2009) cited evidence (Burwell & Shirk, 2007) that adolescent girls have a greater tendency for self-reflection and suggested that repeated reflection on oneself could possibly lead to greater personality consistency.

Finally, in the empirical studies of school-aged children and adolescents reviewed here, there is no overwhelmingly clear pattern concerning which traits show the greatest amount of consistency. Roberts and DelVecchio (2000) concluded that extraversion and agreeableness are the most consistent but that the remaining Big Five are also quite consistent with comparable stability estimates.

Mean-level change

In the preceding section, we established that there is a considerable amount of rank-order stability across time. As previously noted, this does not preclude the possibility of significant

mean-level change. Differences in the average value of a group across time can still be observed. Mean-level change is commonly assessed with *t*-tests and/or indexed with a standardized effect size, such as Cohen's *d*. Cohen's *d* indicates how many standard deviations two values differ from one another. In a study of mean-level change, a *d* of -.50 would indicate a decrease of one-half a standard deviation from Time 1 to Time 2. Often these are derived from longitudinal studies in which the same group of individuals is tracked over time, though cross-sectional differences between age groups at a single time point may also be considered. All studies reviewed here are longitudinal unless otherwise stated.

Prinzle and Deković (2008) gave an account of the mean-level change for their sample of elementary school-aged children (6-9 years) who were assessed with teachers' HiPIC ratings twice in a three-year period. They reported no significant change on conscientiousness or emotional stability but significant decreases on extraversion ($d = -.17$) and imagination (akin to openness; $d = -.15$) and a small yet significant increase on benevolence (akin to agreeableness; $d = .09$). These effect sizes and those reported in one other paper reviewed are presented in Table 2 (many of the other studies we review here did not report effect sizes).

There are multiple studies describing mean-level change during the adolescent years. Conscientiousness seems to show no change (De Fruyt et al., 2006; Klimstra et al., 2009; Pullmann et al., 2006) or a slight decrease (De Fruyt et al., 2006; McCrae et al., 2002) while extraversion seems to show no change (De Fruyt et al., 2006; McCrae et al., 2002) or a slight increase (Klimstra et al., 2009; Pullmann et al., 2006). Emotional stability findings mimic those of extraversion with evidence of stability (De Fruyt et al., 2006; McCrae et al., 2002; Pullmann et al., 2006) or an increase (De Fruyt et al., 2006; Klimstra et al., 2009; Pullmann et al., 2006). Likewise, openness generally remains unchanged (De Fruyt et al., 2006) or increases with age

(Klimstra et al., 2009; McCrae et al., 2002; Pullmann et al., 2006). The findings for agreeableness are more mixed. Pullmann and colleagues (2006) reported a decrease over the two-year period for their youngest cohort (the 12-year-olds) but no change for the two older cohorts (the 14- and 16-year-olds). De Fruyt and colleagues (2006) and McCrae and colleagues (2002) found no evidence of change in agreeableness, but Klimstra and colleagues (2009) wrote that their sample became much more agreeable from early to mid adolescence and from mid to late adolescence.

Utilizing a different methodology for evaluating mean-level change, Branje, Lieshout, and Gerris (2007) fit growth curve models to self- and other-reports of a Dutch adaptation of Goldberg's (1992) Big Five questionnaire from age 11 to 17 years using an accelerated longitudinal design. Emotional stability showed no change, and agreeableness showed a linear increase in female self-reports only. A linear increase in conscientiousness was also found for both female self- and observer-reports. While self-reported openness increased linearly for girls, observer-reported openness decreased linearly for boys. Boys' self- and observer-reports of extraversion revealed a linear decrease while girls' observer-reports revealed a linear increase. Girls' self-reports of extraversion indicated a curvilinear trend with an initial increase followed by a decrease.

Thus far, we have detailed personality change in childhood and adolescence. Two cross-sectional studies covering a wide range of ages and extending into old age allow us to garner an understanding of how personality continues to change beyond the adolescent years. As cited above, Wortman and colleagues (2012) assessed personality traits of individuals aged 15 to 84 years, who were divided into 14 age groups, twice over a four-year span. In addition to looking at mean-level changes within each group over the four-year period, they examined cross-

sectional trends across the entire sample, spanning 69 years. The older participants were less extraverted and open than younger participants. Emotional stability increased linearly with age, and conscientiousness generally increased across the life course. Agreeableness showed a positive trend across early and middle adulthood, but there was a plateau after age 50, followed by a slight decrease after age 70. In a second cross-sectional study, Soto and colleagues (2011) gathered Big Five Inventory (BFI; John, Donahue, & Kentle, 1991) self-reports from a large (the sample size exceeded one million) internet sample who ranged in age from 10 to 65 years. Extraversion showed a modest negative trend from late childhood into adolescence. Thereafter, little-no change was observed through early adulthood and into middle age. Despite conscientiousness's negative trend from late childhood into adolescence, there was a pronounced positive trend from adolescence and through adulthood. Agreeableness and openness showed patterns highly similar to that of conscientiousness yet with less pronounced changes. The pattern of change for emotional stability differed across males and females. Males became slightly more emotionally stable from childhood through adulthood. Females also became more emotionally stable through adulthood, but this was preceded by a decrease during childhood.

We see that there are some mixed findings concerning the nature of personality change across the life course (e.g., there is evidence that agreeableness increases, decreases, and remains unchanged during adolescence). In an effort to clarify this, Roberts, Walton, and Viechtbauer (2006) carried out a meta-analysis of 92 longitudinal studies documenting mean-level personality change. Two distinct facets of extraversion were considered because of suspected (and subsequently confirmed) differences in maturation. Social vitality showed a slight increase during the college years (ages 18 to 21.9 years; $d = .06$) and decreases during the age 22-30 ($d = -.16$) and 60-70 ($d = -.16$) periods. Social dominance, in contrast, showed steady increases during

adolescence ($d = .20$), the college years ($d = .41$), the 20s ($d = .28$), and the 30s ($d = .18$).

Increases across much of the life course were also observed for conscientiousness and emotional stability. Effect sizes for conscientiousness reached .22, .26, .10, and .22 for the 20s, 30s, 40s, and 60s, respectively. For emotional stability they reached .16, .12, .23, .26, and .06 for the adolescent years, college years, 20s, 30s, and 50s, respectively. Openness did not show a distinct pattern of development; there was a strong increase during the college years ($d = .37$) and a moderate decrease during the period of 60-70 ($d = -.19$). Agreeableness showed the least amount of systematic change with the only significant change occurring during the 50-60 period ($d = .30$). Finally, we should note that there was no evidence that men and women change in distinct ways; there was no relationship between gender and mean-level change. There also was no moderating effect of attrition, yet there were some effects for interval length and cohort standing.

The overview of these studies leads us to draw at least two conclusions. First, personality continues to change in adulthood, even into late adulthood in some cases (Roberts et al., 2006). Although we see significant changes during childhood and adolescence (Branje et al., 2007; De Fruyt et al., 2006; Klimstra et al., 2009; McCrae et al., 2002; Prinzie & Deković 2008; Pullmann et al., 2006), young adulthood is the period for the most significant changes, countering the idea that personality development is a phenomenon restricted to childhood and adolescence (Roberts et al., 2006). The second noteworthy conclusion we can draw is that, much like a fine wine, people get better with age. People exhibit increased conscientiousness, emotional stability, and social dominance across much of the life course. Meta-analytic findings point to a positive (though not statistically significant) trend for agreeableness as well (Roberts et al., 2006). These findings support the maturity principle, which states that people demonstrate an increased capability of being a productive and involved member of society, an increased tendency to be

planful and decisive, and a greater propensity for being considerate and charitable (Caspi et al., 2005).

Individual-level change

While rank-order stability and mean-level change entail the entire population or study sample, individual-level change focuses on the increase or decrease in a particular trait demonstrated by a particular individual. Individual- and mean-level change are independent of one another, and it is possible to observe one without the other. For a simplistic example, if all females in the population were to increase on a trait in a given time period yet all males were to exhibit a decrease of equal magnitude, these individual changes would cancel one another out, and there would be no significant mean-level change. Individual-level change is commonly estimated with a difference score (ideally corrected for measurement error). A common index is the Reliable Change Index (RCI; Jacobson & Truax, 1991). The index is calculated by dividing the difference between Time 1 and Time 2 scores by the standard error of the difference between the two scores. RCI scores are normally distributed under the expectation that there is no change. Therefore, scores within ± 1.96 are unlikely to occur without true change, and scores exceeding ± 1.96 (i.e., the extreme 5% of the distribution) are thought to represent true change. Although we believe the level of individual change is continuous and do not intend to imply some natural trichotomy of increasers, decreasers, and those who remain the same, we refer to individuals with scores in the extreme 5% of the distribution as “increasers” or “decreasers” for the sake of simplicity.

Prinzie and Deković (2008) found high individual-level continuity among children ages 6-9 years old in their three-year longitudinal study. The majority of children, approximately 78%, showed no change at the domain level. No child in the sample changed on all of the traits,

17% of the children changed on one trait, and only 5% changed on two traits. More children exhibited reliable change on benevolence (7.2%) than on any other trait. Benevolence had both more increasers (4.2%) and decreasers (3.0%) than expected by chance. Emotional stability had more increasers than expected by chance (4.4%). Conscientiousness (3.8%) and imagination (4.0%) had more decreasers than expected by chance. Extraversion did as well with 3.2% exhibiting a reliable decrease. Extraversion was the trait on which the fewest number of children exhibited reliable change with a total of 4.4%. These percentages and those explicitly presented in the studies reviewed below are presented in Table 3.

Results from De Fruyt and colleagues' (2006) study of personality development (assessed with parent HiPIC ratings) in childhood and adolescence (aged 6-13 years and split into four age groups), also suggest high levels of individual-level continuity. The majority of participants were stable across all traits. Only a single individual showed change on four of the five traits, and none of the participants exhibited reliable change on all traits. Approximately 20% exhibited change on one trait while 5-10% (varying across the different age groups) reliability changed on two traits. Similar findings of high individual-level continuity were reported by Pullmann and colleagues (2006) in their two-year study of 12-, 14-, and 16-year-olds. On average, across the three groups and across the Big Five, more than 82% of the adolescents showed no reliable change. However, there were more increasers and decreasers than expected by chance for all three groups on all traits. Averaged across the three groups, openness showed the most amount of change with 6.1% decreasing and 13.0% increasing. Agreeableness had the fewest amount of individual-level change with 83.7% remaining the same across the two-year period.

McCrae and colleagues (2002) reported much higher amounts of individual-level change in their longitudinal study tracking adolescents from age 12 to 16 years. Of the five traits,

extraversion showed the least amount of change with 66% of the sample remaining stable. For most traits there were fairly equivalent (within 3.5%) numbers of increases and decreases, but there were considerably more decreases (22.6%) than increases (14.8%) for conscientiousness, and far more increases (43.5%) than decreases (5.2%) for openness.

Collectively, the four sets of individual-level change results reviewed here suggest that the majority of children and adolescents exhibit no reliable change across these two- to four-year periods. McCrae and colleagues (2002) reported more change than the other authors, which could be the result of their longer test-retest interval (four years vs. the two-year interval in the Pullmann et al., 2006 study, for example). Although in all studies the majority remained the same, there were still significantly more children and adolescents exhibiting reliable change than one would expect by chance. Worth noting is that not all children show normative changes. For example, a meta-analysis of mean-level personality change (Roberts et al., 2006) documented a .20 standard deviation increase in social dominance during the adolescent years, yet McCrae and colleagues (2002) reported that 18.3% of their sample showed evidence of a reliable decrease in extraversion. In addition, while there is a normative .16 standard deviation increase in emotional stability during the adolescent years (Roberts et al., 2006), 23.5% of McCrae and colleagues' (2002) sample increased in neuroticism during this period. So while most people remain stable, and those who do change show change in the normative direction, there are individuals who develop in a non-normative manner. This again illustrates the importance of considering multiple indices of personality change and continuity; these individual-level changes can be masked when focusing solely on group-level changes.

Ipsative continuity

The prior three methods of investigating personality continuity or change concentrate on a single trait at a time (e.g., one would calculate separate test-retest correlations for conscientiousness, extraversion, etc.). Ipsative change refers to alterations in the configuration of variables within an individual across time and relies on some type of profile analysis. *Q* correlations are commonly used as an indicator of profile similarity. A ranked set of traits at Time 1 are correlated with a ranked set of traits at Time 2. For example, using the California Q-sort (Block, 1978; Block & Block, 1980), raters consider 100 cards listing descriptive personality statements and arrange the cards in groups ranging from statements that are least descriptive of the target individual to most descriptive. If this is carried out at two time points, the groups of statements at Times 1 and 2 can be correlated with one another. Higher correlations indicate a greater degree of stability of trait configuration across time.

California Child (Block & Block, 1980) and Adult (Block, 1978) Q-sort profile scores have been obtained in several studies, and the stability of those profiles over time have been investigated. In one study, from age 3-4 to age 7 years, median *q* correlations reached .52 for boys and girls (Ozer & Gjerde, 1989), slightly higher than the median correlation observed in another study in which age 4 and 6 year profiles were correlated with one another (median correlation = .43; Asendorpf & van Aken, 1991). These correlations tend to increase with age. Asendorpf and van Aken (1991) reported median correlations of .47 and .61 (depending on the rater) between age 10 and age 12 year profiles. Ozer and Gjerde (1989) noted that between ages 14 and 18 years, profile similarity increased to .71 for girls and .68 for boys, and Block (1971) reported that average *q* correlations between early and late adolescence exceed .70. While on average there is moderate-high profile similarity during childhood and adolescence, it should be

noted that there is considerable variation across individuals in these q correlations, and negative correlations are often observed (Asendorpf & van Aken, 1991; Ozer & Gjerde, 1989).

In addition to Q sets, ipsative continuity of the Big Five has been studied. As well as investigating rank-order stability and mean- and individual-level change, Prinzie and Deković (2008) reported on the ipsative continuity of teacher ratings across three years for their sample of children aged 6-9 years at Time 1. The average level of profile consistency across the 18 facet scales of the HiPIC ranged from $-.61$ to $.97$, with a median of $.56$. More than 45% of the children had high correlations falling between $.50$ and $.80$, while 21% of the sample showed profile correlations below $.30$, and 7% of the sample showed negative profile correlations from Time 1 to Time 2.

Like Prinzie and Deković (2008), De Fruyt and colleagues (2006) reported on ipsative continuity in addition to rank-order stability and mean- and individual-level change. Q correlations for the 18 HiPIC facets indicated a high level of ipsative continuity. The median correlations ranged from $.81$ to $.85$. In addition to q correlations, Cronbach and Gleser's (1953) three indices of profile variation were employed. These indices quantify variation in profiles' elevation (average level of scores), scatter (variability of scores), and shape (patterning of scores). D^2 is sensitive to all three and is a measure of the squared differences between traits at Time 1 and Time 2. D'^2 is sensitive to scatter and shape differences only and is a measure of the squared differences between Time 1 and Time 2 profiles after each has been centered around its mean. D''^2 is sensitive to shape differences only and quantifies the squared differences between profiles after each profile has been standardized. De Fruyt and colleagues' results indicated that a large percentage of individuals had stable trait profiles. For the most part, there was an increase in the number of significantly changed profiles moving from the youngest (age 6-7 years) to the

oldest (age 12-13 years) group. The percentage of children with D^2 indices exceeding the cut-off value indicating a significant profile change was 9.1% for the 6-7 year-old group, 14.8% for the 8-9 year-old group, 14.9% for the 10-11 year-old group, and 16.7% for the 12-13 year-old group. The percentage of children exceeding the cut-off values for D'^2 and D''^2 was lower. Across all age groups, less than 10% exhibited change in the shape of the profile; any changes were primarily changes in elevation and scatter.

Klimstra and colleagues (2009) reported on the five-year profile similarity of their sample, and three findings are worth noting. Profile similarity increased with age, and these increases were more pronounced in the early-mid adolescence period than during the mid-late adolescence period. Furthermore, girls tended to exhibit greater across-time profile similarity than boys. For the younger group of boys (12.4 years old at Time 1), q correlations ranged from .42 (Time 1-2) to .63 (Time 4-5), and they ranged from .63 (Time 1-2) to .76 (Time 4-5) for the older group of boys (16.7 years old at Time 1). For the younger girls, q correlations ranged from .55 (Time 1-2) to .74 (Time 4-5), and for the older girls, they ranged from .73 (Time 1-2) to .82 (Time 4-5). Ozer and Gjerde (1989) also documented increased profile similarity with age and a greater increase in earlier ages (e.g., the median q correlation for girls increased from .52 from age 3-4 to age 7 years to .63 from age 7 to age 11 years, but the median correlation between age 14 and 18 was only .02 higher than that between age 11 and 14, increasing from .69 to .71). Ozer and Gjerde did not report noticeably higher profile similarities for girls than boys.

Explanations for Developmental Patterns

In summary, we have reviewed literature showing that there is a moderate level of rank-order stability in childhood and stability estimates increase through adolescence and adulthood. For the most part, individuals maintain a stable profile of traits across time, and like rank-order

stability, profile stability increases with age. Despite the relative consistency individuals maintain among their peers, and the ipsative continuity observed, there is significant individual- and mean-level change across the life course, even into late adulthood. What mechanisms or processes can account for these developmental patterns? To conclude, we will offer a brief overview of potential explanations of continuity and change.

Rank-order stability has been attributed to both biological and environmental causes. The Five Factor Theory (McCrae & Costa, 1999), for example, argues that traits are solely affected by biological factors. In part, this argument is based on behavior genetic findings confirming that genetic factors have a significant influence on personality trait differences (Bouchard & Loehlin, 2001). Heritability estimates for the Big Five are typically in the range of .50, and these estimates exceed those for shared environmental factors. While an innate, biological basis of traits may contribute to their across-time continuity, this does not rule out the impact of environmental processes that may also contribute to continuity. One such process is described by the corresposive principle (Caspi et al., 2005), which states that life experiences tend to enhance pre-existing traits that lead individuals to those experiences in the first place. Caspi and colleagues offered the dominance-leadership relationship as an example. Dominant individuals are more likely to take on leadership roles. Then, as a result of being in these leadership positions, they become even more dominant. Life experiences do not occur at random, creating extensive personality transformations. Instead, traits that are already prominent become even more ingrained due to the experiences they elicit. This is analogous to Bandura's (1978) social-cognitive theory of reciprocal determinism where behaviors, the environment, and cognitions and other internal events all reciprocally influence one another.

As we have seen, this level of continuity does not preclude significant change across the life course, and there are both biological and environmental explanations for this change. As discussed above, the Five Factor Theory (McCrae & Costa, 1999) suggests that there is a biological basis for personality traits. In addition, this theory suggests that observed change is due to genetic predispositions to change in particular ways. That is, personality traits have intrinsic paths of development impervious to environmental effects (McCrae et al., 2000). In contrast, it has been argued that environmental demands influence change. At similar ages people generally encounter specific life experiences which are accompanied by a set of demands at similar ages. For example, for most people, with early adulthood come one's first job, marriage, and parenthood. In the face of these experiences, one is forced to "grow up", become more socially invested, and become more conscientiousness and emotionally stable (Roberts et al., 2006; Roberts & Wood, 2006). The increased levels of conscientiousness, emotional stability, and social dominance during early adulthood support this assertion (Roberts et al., 2006). Childhood and adolescence bring their own set of demands, and Klimstra and colleagues (2009) speculated about the age-related demands and the resulting normative personality changes (or lack thereof). For instance, they reported no mean-level change in conscientiousness. For most adolescents, conscientiousness is most relevant for school work. The importance of academic achievement is constant across the entire adolescent period, which could explain why they and others found conscientiousness to be stable during this period. In contrast to some other researchers, Klimstra and colleagues (2009) found an increase in agreeableness during this period, and they argued that this is intuitive. During adolescence, peer relations become ever more salient and intimate, and agreeableness is key to establishing and maintaining positive,

intimate relationships. The relationships and experiences of childhood and adolescence can at least partially dictate the nature of personality development.

Implications for the Academic Domain

The findings reviewed above have implications for many important outcomes, including academic achievement. Personality is known to be related to academic success and educational attainment. Poropat (2009) provided a meta-analysis of the relationship between the Big Five and academic performance. He concluded that academic performance is associated with agreeableness and openness but even more strongly with conscientiousness. Richardson, Abraham, and Bond (2012) carried out a second meta-analysis and concluded that conscientiousness is the only Big Five trait with significant correlations with university students' GPA. Both meta-analyses documented that the association between conscientiousness and academic performance is nearly as strong as that between intelligence and academic performance. Conscientiousness has also been shown to positively predict educational attainment (Lodi-Smith et al., 2010; Tross, Harper, Osher, & Kneidinger, 2000). The strength of association between conscientiousness and academic success remains fairly constant across academic levels while associations between the other Big Five and academic performance tend to decrease from primary to secondary and tertiary school (Poropat, 2009).

Conscientiousness, the Big Five trait showing the strongest link with educational achievement and attainment, seems to show little to no change during the school-aged years (De Fruyt et al., 2006; Klimstra et al., 2009; Prinzie & Deković, 2008; Pullmann et al., 2006; Roberts et al., 2006). Roberts and colleagues (2006) reported population estimates of mean-level change in conscientiousness of .03 for the 10-18 year age range and .04 for the 18-22 year age range. Steady increases in conscientiousness are observed in the subsequent decades, though by this

point, most individuals have completed their schooling. Therefore, in an effort to enhance students' scholastic performance, educators, school administrators, and school psychologists might consider personality-targeted interventions. Attempts to expedite the maturation of conscientiousness, for example, may lead to greater academic success. A review of the literature has led us to the conclusion that personality traits are not set in stone but instead continue to change even into late adulthood. Not only do personality traits mature on their own, through no active interventions or programs designed to induce change, but research has shown that we can actively manipulate change in personality traits. Indeed, studies have shown that experimental (Jackson, Hill, Payne, Roberts, & Stine-Morrow, 2012), pharmacological (Tang et al., 2009), and therapeutic interventions (De Fruyt, Van Leeuwen, Bagby, Rolland, & Rouillon, 2006) are effective in altering personality traits.

Conclusion

Using the five-factor trait taxonomy to guide our discussion, we have presented a depiction of personality development across the life course, highlighting the school-aged developmental period. During this period, personality traits show moderate-high levels of rank-order and profile stability. Reliable individual-level and significant mean-level change are also observed. Further demonstrating the independence of continuity and change, results signify that there is a greater degree of both stability and change in adulthood than in childhood and adolescence. This underscores the importance of employing multiple methods of investigating personality development. While personality evolves across the life course, its role in determining important life outcomes remains constant. To some degree, its evolution can be manipulated to enhance life outcomes, such as educational success.

References

- Allik, J., Laidra, K., Realo, A., & Pullmann, H. (2004). Personality development from 12 to 18 years of age: Changes in mean levels and structure of traits. *European Journal of Personality, 18*, 445-462.
- Allport, G. W. (1961). *Pattern and growth in personality*. Oxford, England: Hold, Reinhart, and Winston.
- Asendorpf, J. B., & van Aken, M. A. G. (1991). Correlates of the temporal consistency of personality patterns in childhood. *Journal of Personality, 59*, 689-703.
- Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist, 33*, 344-358.
- Block, J. (1971). *Lives through time*. Berkeley, CA: Bancroft Books.
- Block, J. (1978) *The Q-sort method in personality assessment and psychiatric research*. Palo Alto, CA: Consulting Psychologists Press.
- Block, J., & Block, J. H. (1980) *The California Child Q-set*. Palo Alto, CA: Consulting Psychologists Press.
- Block, J. H., & Block, J. (1980). *The role of ego-control and ego resiliency in the organization of behavior*. In W. A. Collins (Ed.), *Minnesota symposia on child psychology* (pp. 39-101). Hillsdale, NJ: Erlbaum.
- Bouchard, T. J., Jr., Loehlin, J. C. (2001). Genes, evolution, and personality. *Behavior Genetics, 31*, 243-273.
- Branje, S. J., Van Lieshout, C. F., & Gerris, J. R. (2007). Big Five personality development in adolescence and adulthood. *European Journal of Personality, 21*, 45-62.

- Burwell, R. A., & Shirk, S. R. (2007). Subtypes of rumination in adolescence: Associations between brooding, reflection, depressive symptoms, and coping. *Journal of Clinical Child and Adolescent Psychology, 36*, 56-65.
- Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytical studies*. New York: Cambridge University Press.
- Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: Stability and change. *Annual Review of Psychology, 56*, 453-484.
- Caspi, A., & Shiner, R. L. (2006). Personality development. In W. Damon, R. Lerner, & N. Eisenberg (Eds.), *Handbook of child psychology: Vol. 3 social, emotional, and personality development, 6th ed.*, (pp. 300-364). New York: Wiley.
- Cattell, R. B. (1979). *Cattell 16 Personality Factor Questionnaire*. Champaign, IL: Institute for Personality and Ability Testing.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.
- Cronbach, L. J., & Gleser, G. C. (1953). Assessing similarity between profiles. *Psychological Bulletin, 50*, 456-473.
- Cronbach, L. J., & Gleser, G. C. (1965). *Psychological tests and personnel decisions, 2nd ed.* Urbana, IL: University of Illinois Press.
- De Fruyt, F., Bartels, M., Van Leeuwen, K. G., De Clercq, B., Decuyper, M., & Mervielde, I. (2006). Five types of personality continuity in childhood and adolescence. *Journal of Personality and Social Psychology, 91*, 538.

- De Fruyt, F., Van Leeuwen, K., Bagby, R. M., Rolland, J.-P., & Rouillon, R. (2006). Assessing and interpreting personality change and continuity in patients treated for major depression. *Psychological Assessment, 18*, 71-80.
- De Pauw, S. S. W., & Mervielde, I. (2010). Temperament, personality and developmental psychopathology: A review based on the conceptual dimensions underlying childhood traits. *Child Psychiatry and Human Development, 41*, 313-329.
- Digman, J. M (1997). Higher-order factors of the big five. *Journal of Personality and Social Psychology, 73*, 1246-1256.
- Gerris, J. R. M., Houtmans, M. J. M., Kwaaitaal-Roosen, E. M. G., Schipper, J. C., Vermulst, A. A., & Janssens, J. M. A. M. (1998). *Parents, adolescents and young adults in Dutch families: A longitudinal study*. Nijmegen, The Netherlands: University of Nijmegen, Institute of Family Studies.
- Goldberg, L. R. (1992). The development of markers for the Big Five factor structure. *Psychological Assessment, 4*, 26-42.
- Gough, H.G. (1987). *California Psychological Inventory administrator's guide*. Palo Alto, CA: Consulting Psychologists Press, Inc.
- Hampson, S. E., & Goldberg, L. R. (2006). A first large cohort study of personality trait stability over the 40 years between elementary school and midlife. *Journal of personality and social psychology, 91*, 763.
- Jackson, J. J., Hill, P. L., Payne, B. R., Roberts, B. W., & Stine-Morrow, E. A. L. (2012). Can and old dog learn (and want to experience) new tricks? Cognitive training increases openness to experience in older adults. *Psychology and Aging, 27*, 286-292.

- Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology, 59*, 12-19.
- John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory—Versions 4a and 54*. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.
- John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research, Vol. 2*, (pp. 102–138). New York: Guilford Press.
- Klimstra, T. A., Hale III, W. W., Raaijmakers, Q. A., Branje, S. J., & Meeus, W. H. (2009). Maturation of personality in adolescence. *Journal of Personality and Social Psychology, 96*, 898.
- Lodi-Smith, J., Jackson, J., Bogg, T., Walton, K. E., Wood, D., Harms, P., & Roberts, B. W. (2010). Mechanisms of health: Education and health-related behaviors partially mediate the relationship between conscientiousness and self-reported physical health. *Psychology and Health, 25*, 305-319.
- Marsh, H. W., Nagengast, B., & Morin, A. J. S. (2013). Measurement invariance of big-five factors over the life span: ESEM tests of gender, age, plasticity, maturity, and la dolce vita effects. *Developmental Psychology, 49*, 1194-1218.
- McCrae, R. R., & Costa, P. T., Jr. (1999). A five-factor theory of personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality theory and research* (Vol. 2, pp. 139–153). New York: Guilford Press.
- McCrae, R. R., & Costa, P. T., Jr. (2003). *Personality in adulthood: A five-factor theory*

- perspective, 2nd ed.* New York: Guilford Press.
- McCrae, R. R., Costa, P. T., Jr., Ostendorf, F., Angleitner, A., Hrebickova, M., Avia, M. D., et al. (2000). Nature over nurture: Temperament, personality, and life span development. *Journal of Personality and Social Psychology, 78*, 173-186.
- McCrae, R. R., Costa, P. T., Jr., Terracciano, A., Parker, W. D., Mills, C. J., De Fruyt, F., & Mervielde, I. (2002). Personality trait development from age 12 to age 18: Longitudinal, cross-sectional and cross-cultural analyses. *Journal of personality and social psychology, 83*, 1456.
- McCrae, R. R., Terracciano, A., & 78 Members of the Personality Profiles of Cultures Project. (2005). Universal features of personality traits from the observer's perspective: Data from 50 cultures. *Journal of Personality and Social Psychology, 88*, 547-561.
- Mervielde, I., & De Fruyt, F. (1999). Construction of the Hierarchical Personality Inventory for Children (HiPIC). In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality psychology in Europe. Proceedings of the Eight European Conference on personality psychology* (pp. 107–127). Tilburg, the Netherlands: Tilburg University Press.
- Musek, J. (2007). A general factor of personality: Evidence for the Big One in the five-factor model. *Journal of Research in Personality, 41*, 1213-1233.
- Ozer, D. J., & Gjerde, P. F. (1989). Patterns of personality consistency and change from childhood through adolescence. *Journal of Personality, 57*, 483-507.
- Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin, 135*, 322-338.
- Prinzie, P., & Deković, M. (2008). Continuity and change of childhood personality

- characteristics through the lens of teachers. *Personality and Individual Differences*, *45*, 82-88.
- Pullmann, H., Raudsepp, L., & Allik, J. (2006). Stability and change in adolescents' personality: A longitudinal study. *European Journal of Personality*, *20*, 447-459.
- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, *138*, 353-387.
- 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.
- 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.
- Roberts, B. W., & Wood, D. (2006). Personality development in the context of the neo-socioanalytic model of personality. In D. K. Mroczek & T. D. Little (Eds.), *Handbook of personality development* (pp. 11-39). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Saucier, G. (1994). Mini-markers: A brief version of Goldberg's unipolar Big-Five markers. *Journal of Personality Assessment*, *63*, 506-516.
- 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.

- Spearman, C. (1904). "General intelligence" objectively determined and measured. *American Journal of Psychology*, *15*, 201-293.
- Tackett, J. L., Krueger, R. F., Iacono, W. G., & McGue, M. (2008). Personality in middle childhood: A hierarchical structure and longitudinal connections with personality in late adolescence. *Journal of Research in Personality*, *42*, 1456-1462.
- Tackett, J. L., Slobodskaya, H. R., Mar, R. A., Deal, J., Halverson Jr., C. F., Baker, S. R., Pavlopoulos, V., & Besevegis, E. (2012). The hierarchical structure of childhood personality in five countries: Continuity from early childhood to early adolescence. *Journal of Personality*, *80*, 847-879.
- Tang, T. Z., DeRubeis, R. J., Hollon, S. D., Amsterdam, J., Shelton, R., & Schalet, B. (2009). Personality change during depression treatment: A placebo-controlled trial. *Archives of General Psychiatry*, *66*, 1322-1330.
- Tross, S. A., Harper, J. P., Osher, L. W., & Kneidinger, L. M. (2000). Not just the usual case of characteristics: Using personality to predict college performance and retention. *Journal of College Student Development*, *41*, 323-334.
- Wortman, J., Lucas, R. E., & Donnellan, M. B. (2012). Stability and change in the Big Five personality domains: Evidence from a longitudinal study of Australians. *Psychology and aging*, *27*, 867.

Table 1

Rank-order stability estimates given as test-retest correlations

<u>Reference</u>	<u>Mean Age</u>	<u>Interval Length</u>	<u>Sex</u>	<u>E</u>	<u>A</u>	<u>C</u>	<u>ES</u>	<u>Q</u>
Hampson & Goldberg (2006)	6.5 ^a	1	M&F	.52	.51	.53	.28	.49
	6.5 ^a	4	M&F	.36	.45	.41	.38	.55
	7.0 ^a	3	M&F	.38	.43	.31	.22	.33
Prinzie & Deković (2008)	7.0	3	M&F	.49	.42	.54	.38	.59
McCrae et al. (2002)	12.0	4	M	.39	.31	.49	.36	.45
	12.0	4	F	.45	.34	.63	.30	.34
Pullmann et al. (2006)	12.4	2	M&F ^b	.49	.51	.48	.50	.57
	14.4	2	M&F ^b	.62	.49	.59	.64	.48
	16.1	2	M&F ^b	.73	.62	.69	.65	.68
Klimstra et al. (2009)	12.4	1	M	.35	.31	.45	.32	.36
	13.4 ^c	1	M	.48	.48	.59	.39	.51
	14.4 ^c	1	M	.62	.53	.69	.50	.61
	15.4 ^c	1	M	.60	.47	.64	.51	.61
	12.4	1	F	.55	.41	.55	.48	.52
	13.4 ^c	1	F	.67	.46	.60	.59	.54
	14.4 ^c	1	F	.68	.51	.67	.56	.60
15.4 ^c	1	F	.75	.53	.72	.66	.69	
Wortman et al. (2012) ^d	15-19 ^e	4	M&F	.70	.61	.58	.58	.70

Note. Mean age is at Time 1 and is given in years. Interval length is given in years. M = males, F = females, E = extraversion, A = agreeableness, C = conscientiousness, ES = emotional stability, O = openness. ^a Mean age not explicitly stated but inferred from year in school. ^b Males' and females' coefficients also presented separately in original paper. ^c Mean age not explicitly stated but inferred from interval length. ^d Older cohorts also presented in original paper. ^e Only age range presented in original paper.

Table 2

Mean-level change estimates given as Cohen's d effect sizes

<u>Reference</u>	<u>Mean Age</u>	<u>Interval Length</u>	<u>Sex</u>	<u>E</u>	<u>A</u>	<u>C</u>	<u>ES</u>	<u>O</u>
Prinzie & Deković (2008)	7.0	3	M&F	-.17	.09	-.08	.07	-.15
Pullmann et al. (2006) ^a	12.4	2	M&F	.24	-.15	.06	.15	.10
	14.4	2	M&F	.14	.03	-.03	.13	.25
	16.1	2	M&F	-.02	.04	.08	.04	.27

Note. Mean age is at Time 1 and is given in years. Interval length is given in years. M = males, F = females, E = extraversion, A = agreeableness, C = conscientiousness, ES = emotional stability, O = openness. ^a Cohen's *d* reported for neuroticism so the signs were reversed to reflect change in emotional stability.

Table 3

Individual-level change estimates given as percentage of participants with Reliable Change Index scores exceeding -1.96 (decrease), exceeding +1.96 (increase), or falling within those bounds (stable)

<u>Reference</u>	<u>Mean Age</u>	<u>Interval Length</u>	<u>Sex</u>	<u>E</u>			<u>A</u>		
				<u>% decrease</u>	<u>% stable</u>	<u>% increase</u>	<u>% decrease</u>	<u>% stable</u>	<u>% increase</u>
Prinzie & Deković (2008)	7.0	3	M&F	3.2	95.6	1.2	3.0	92.8	4.2
McCrae et al. (2002) ^a	12.0	4	M&F	18.3	66.0	15.7	20.4	62.2	17.4
Pullmann et al. (2006) ^a	12.4	2	M&F	6.1	79.7	14.2	11.16	82.6	5.8
	14.4	2	M&F	6.8	80.6	12.6	8.3	81.0	10.7
	16.1	2	M&F	9.7	82.8	7.5	6.6	87.5	5.9

Table 3 continued

Individual-level change estimates given as percentage of participants with Reliable Change Index scores exceeding -1.96 (decrease), exceeding +1.96 (increase), or falling within those bounds (stable)

<u>Reference</u>	<u>C</u>			<u>ES</u>			<u>O</u>		
	<u>% decrease</u>	<u>% stable</u>	<u>% increase</u>	<u>% decrease</u>	<u>% stable</u>	<u>% increase</u>	<u>% decrease</u>	<u>% stable</u>	<u>% increase</u>
Prinzle & Deković (2008)	3.8	94.9	1.3	1.7	93.9	4.4	4.0	94.3	1.7
McCrae et al. (2002)	22.6	62.6	14.8	23.5 ^a	56.5	20.0	5.2	51.7	43.5
Pullmann et al. (2006)	8.4	82.4	9.2	8.9 ^a	78.8	12.4	6.6	85.2	8.2
	8.4	81.4	10.2	5.8 ^a	80.1	14.1	8.3	74.7	17.0
	5.5	86.2	8.3	4.8 ^a	85.9	9.3	3.4	82.8	13.8

Note. Mean age is at Time 1 and is given in years. Interval length is given in years. M = males, F = females, E = extraversion, A = agreeableness, C = conscientiousness, ES = emotional stability, O = openness. ^a Scored in direction of neuroticism so % increase and decrease were reversed.