

A Longitudinal Study of Personality Change in Young Adulthood

Richard W. Robins

University of California, Davis

R. Chris Fraley

University of Illinois, Chicago

Brent W. Roberts

University of Illinois, Urbana-Champaign

Kali H. Trzesniewski

University of California, Davis

ABSTRACT The present research examined personality continuity and change in a sample of young men and women assessed at the beginning and end of college. Two-hundred seventy students completed measures of the Big Five personality traits when they first entered college and then 4 years later. Analyses indicate small- to medium-sized normative (i.e., mean-level) changes, large rank-order stability correlations, high levels of stability in personality structure, and moderate levels of ipsative (i.e. profile) stability. Overall, the findings are consistent with the perspective that personality traits exhibit considerable continuity over time, yet can change in systematic ways.

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Young adulthood is a period of considerable opportunity and challenge. Many young adults move away from home for the first time, begin college and full-time jobs, or marry and have children. Personality theorists and developmental psychologists have highlighted the importance of this period, describing the complex challenges that young adults face and the patterns of adaptation that follow from their resolution (Arnett, 2000; Erikson, 1963; Helson, 1983; White, 1966). Given the transitional nature of these years, young adulthood may be a time during which personality is especially susceptible to change.

The present study examined personality continuity and change in young adulthood, using longitudinal data on a large sample of young adults followed through their college years. Participants completed a measure of the Big Five personality dimensions during the 1st week of college and then 4 years later. These data provide a unique opportunity to learn more about personality change during an important developmental transition.

Previous Research on Personality Stability and Change in Young Adulthood

There is ongoing debate concerning when in the life course personality traits stop changing (e.g., Block, 1993; Costa & McCrae, 1994a; Heatherton & Weinberger, 1994; Helson & Stewart, 1994; Roberts & DelVecchio, 2000). Costa and McCrae (1994a) have argued that personality is “set like plaster” by age 30. Although this assertion has been debated, it nonetheless raises the question: What happens before age 30? Most theorists agree that personality continues to develop during young adulthood, and several longitudinal studies have found meaningful changes in personality during this stage of life (e.g., Block, 1971, 1993; Bloom, 1964; Haan, Millsap, & Hartka, 1986; Helson & Moane, 1987; Jessor, 1983; McGue, Bacon, & Lykken, 1993; Mortimer, Finch, & Kumka, 1982; Watson & Walker, 1996). According to Costa and McCrae (1989), “Such findings constitute a mandate for studying personality development during the decade of the 20s” (p. 53). Similarly, Watson and Walker (1996) called for further research on personality development in the period leading up to age 30: “Our results demonstrate the need for studies that examine both stability and change during this critical, transitional period of life” (p. 575).

Most of the existing longitudinal studies of young adulthood first assessed the participants in college and then followed them up 5 to 10 years later. Although informative, such research does not directly address how personality develops *during* the transition from adolescence to early adulthood. That is, these studies do not provide a way to pinpoint “precisely when personality reaches maturity” (p. 142, Costa & McCrae, 1994b). Moreover, none of the previous longitudinal studies of early adulthood used personality measures specifically designed to assess the “Big Five” dimensions: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience (Goldberg, 1993; John & Srivastava, 1999). Many personality researchers believe that the Five Factor Model provides a useful descriptive taxonomy for the full range of personality traits. By studying personality development within the common framework provided by the Five Factor Model, findings on continuity and change in young adulthood can be compared to research on the development of the Big Five during childhood (e.g., Halverson, Kohnstamm, & Martin, 1994), adolescence (Graziano & Ward, 1992; John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994), and adulthood (e.g., Costa & McCrae, 1997).

In this article, we focus on four types of personality stability and change: (a) normative (i.e., mean-level) change, (b) rank-order stability, (c) structural stability, and (d) ipsative stability (e.g., Block & Robins, 1993; Caspi & Roberts, 1999; Mortimer et al., 1982). *Normative change* refers to changes in the average trait level of a population. Normative changes are thought to result from maturational or historical processes shared by a population (e.g., Helson & Moane, 1987; Roberts & Helson, 1997). Normative change is typically assessed by mean-level differences in specific traits over time, which indicate whether the sample as a whole is increasing or decreasing on a trait.

Rank-order stability reflects the degree to which the relative ordering of individuals on a given trait is maintained over time. Rank-order stability is theoretically and statistically distinct from normative stability. For example, the rank ordering of individuals could change substantially over time but without any aggregate increases or decreases (e.g., if the number of people who decreased offset the number of people who increased). Similarly, a population could increase substantially on a trait, but the rank ordering of individuals would be maintained if everyone increased by the same amount. Changes in rank ordering result from maturational or experiential factors that differentially affect people, as

well as from measurement error. Rank-order stability is commonly assessed by the correlation between personality scores across two time points.

Structural stability refers to the degree of continuity in the intercorrelations among traits over time. Structural equation modeling can be used to assess the degree to which the intercorrelations among personality dimensions are invariant over time (Mortimer et al., 1982; see Panter, Tanaka, & Hoyle, 1994, for a general discussion of methodological approaches to comparing personality structure across time, measures, and data source).

Ipsative stability refers to the degree to which the relative ordering of traits within an individual stays the same over time. Of the four types of stability, only ipsative stability characterizes changes that occur at the level of the individual. Ipsative stability can be assessed by several different indices of profile similarity, which quantify the degree to which two profiles differ in their elevation, scatter, and shape (Cronbach & Gleser, 1953).

Normative Change

Although no studies have used a direct measure of the Big Five to chart normative, or mean-level, changes in personality during the college years, a number of studies have tracked changes on other personality dimensions from adolescence through young adulthood. Many of these studies focused on dimensions broadly related to Openness to Experience. For example, Plant (1965) reported decreases in authoritarianism, ethnocentrism, and dogmatism over the first 2 years of college. Stewart (1964), in a 4-year longitudinal study of Berkeley students, found decreases in authoritarianism coupled with increases in complexity of outlook and originality. Sanford (1956) reported that Vassar College students became less conservative and more tolerant of individual differences. Likewise, Mortimer et al. (1982) found increases in unconventionality during college, and both Nichols (1967) and Baltes and Nesselroade (1972) reported significant increases on the 16PF scale of intelligence in longitudinal studies of college students. Helson and Moane (1987) reported increases in psychological mindedness in a sample of women from ages 21 to 27, and McGue et al. (1993) reported increases in absorption in a sample of twins from ages 20 to 30. Haan et al. (1986) found significant increases in cognitive commitment for women from

ages 17 to 30. Thus, many traits associated with Openness to Experience appear to increase during young adulthood.

A second domain that shows evidence for mean-level increases in young adulthood corresponds to the Big Five dimension of Conscientiousness. In a longitudinal study of adolescents, Stein, Newcomb, and Bentler (1986) reported increases in measures of orderliness, law abidance, and diligence. Haan et al. (1986) found increases in both men and women in dependability from age 17 to 30. Helson and Moane (1987) reported increases in self-control from ages 21 to 27 (see also, Roberts, Helson, & Klohnen, in press). Holmlund (1991) found increases in the need for order from ages 15 to 25. In addition, McGue et al. (1993) found increases in one's sense of control from age 20 to age 30. However, the evidence is not uniform for traits related to Conscientiousness. For example, Sanford (1956) reported that students became more inclined to express their impulses during college, and Nichols (1964) reported decreases in measures of deferred gratification and "superego." In general, though, the preponderance of evidence points to increasing Conscientiousness in young adulthood.

In the domain of Extraversion, the longitudinal findings in adolescence and young adulthood are quite mixed. Several studies have found increases in traits related to Extraversion. For example, Stewart (1964) reported increases in dominance and decreases in introversion in a longitudinal study of college students. Holmlund (1991) found increases in dominance and decreases in succorance in a longitudinal study of females from age 15 to age 25. Similarly, Carmichael and McGue (1994) found increases in Extraversion in a study of twins from ages 16 to 35. In contrast, Viken, Rose, Kaprio, and Koskenvuo (1994) found decreases in Extraversion in young adulthood for both male and female twins. In addition, Nichols (1967) reported decreases in dominance during college. By far the most common finding is no change in positive emotion in young adulthood. For example, Nichols (1967) found no systematic change in sociability and surgency. Haan et al. (1986) reported no systematic increases or decreases in assertiveness in young adulthood. Helson and Moane (1987) reported no changes in dominance and social poise in the Mills Longitudinal study of women from ages 21 to 27. Watson and Walker (1996) found no change in positive affect in their 7-year follow-up of college students. Finally, in a longitudinal study of twins that used the MPQ, McGue et al. (1993) found no increases or decreases on measures of social potency and social closeness. Taken as

a whole, the longitudinal research to date indicates that Extraversion does not show normative change in young adulthood.

With regard to Neuroticism, the results of previous studies point to either no change or a decrease. In college student populations, Nichols (1967) failed to find normative change on scales measuring anxiety and tension, and Crook (1943), in a 6-year follow-up of college freshman, failed to find changes on the Thurstone Personality Schedule, a measure tapping aspects of neuroticism. Several studies have also failed to find changes in young adulthood for measures of dispositional well-being (Roberts & Chapman, 2000), positive affect (Watson & Walker, 1996), and self-confidence (Haan et al., 1986). In contrast, McGue et al. (1993) found decreases in stress reaction and alienation in young adulthood. Viken et al. (1994) found decreases in Neuroticism in young adulthood. Likewise, Holmlund (1991) reported decreases in guilt from ages 15 to 25. Other studies have shown that the transition from adolescence to young adulthood is characterized by increasing self-acceptance (Stein et al., 1986) and decreasing negative emotionality (Carmichael & McGue, 1994; Watson & Walker, 1996). Although mixed, the preponderance of evidence supports the hypothesis that Neuroticism decreases during the college years.

Only a few studies have examined longitudinal changes in traits related to Agreeableness. Haan et al. (1986) reported different patterns of change for men and women in young adulthood: Men tended to decrease in warmth, whereas women tended to increase. Holmlund (1991) found no changes in affiliation, but decreases in aggression in young adulthood. Likewise, McGue et al. (1993) reported decreases in aggression from ages 20 to 30. Finally, Helson and Moane (1987) reported increases in the CPI scale of tolerance in young adulthood, which has modest correlations with measures of Agreeableness (Gough & Bradley, 1996). Thus, the bulk of the longitudinal evidence suggests an increase in Agreeableness in young adulthood. Consistent with this, cross-sectional research shows that college students tend to be lower in Agreeableness than older adults (e.g., Costa & McCrae, 1994b).

Taken together, previous research on personality change during young adulthood supports the hypothesis that Openness to Experience, Conscientiousness, and Agreeableness will increase, Neuroticism will decrease, and Extraversion will not show any normative change.

Rank-Order Stability

Several longitudinal studies have examined the rank-order stability of personality during the college years, although none using a measure of the Big Five. Roberts and DelVecchio's (2000) meta-analysis of longitudinal personality research confirmed two major conclusions: The rank-order stability of personality tends to increase as the age of the sample increases and to decrease as the time interval between observations increases (Conley, 1984). The results showed that estimates of personality stability (unadjusted for measurement error) increased from .31 in childhood to .54 during the college age period, to .64 at age 30, and then reached a plateau around .74 between ages 50 and 70. Roberts and DelVecchio (2000) also estimated expected levels of rank-order stability for various time periods for a hypothetical sample of 20-year-olds. They estimated that rank-order stability should average around .52 over a 5-year period. Combining the age and time estimates provided by Roberts and DelVecchio, we would expect to find test-retest estimates in the .50s over the 4-year period examined in the present study.

Structural and Ipsative Change

Only a handful of studies have examined structural (Costa & McCrae, 1997; Mortimer et al., 1982) or ipsative personality change (Asendorpf & Van Aken, 1991; Block, 1971; Ozer & Gjerde, 1989), and the findings generally show relatively high levels of stability. However, none of these studies examined personality change during young adulthood using a measure of the Big Five. Thus, there is no basis for forming hypotheses about the expected levels of structural or ipsative change in the present study.

METHOD

Sample and Procedure

This research uses data from the Longitudinal Study of Personality and Self-Esteem Development, an ongoing study of a cohort of individuals who entered the University of California at Berkeley in 1992. During their 1st week of school, participants were contacted in class and offered partial course credit for completing a set of questionnaires. In the 4th year of college, participants were contacted by mail and asked to complete an extensive questionnaire in exchange

for \$20. Four hundred eighty-nine individuals completed a measure of the Big Five in the first assessment, and 303 individuals completed the Big Five measure in the Year 4 assessment. Our analyses focused on a subsample of participants who completed the relevant measures at both time periods and who were aged 18 or 19 at the time of the first assessment ($N = 270$).¹

The sample of participants included in the present study is diverse in terms of ethnicity (41% Asian, 37% Caucasian, 13% Chicano/Latino, 4% African American, 5% Missing/Other/Multiracial), gender (59% female), socioeconomic status (20% came from families with 1992 household incomes below \$25,000 and 16% from families with household incomes above \$100,000), and academic ability (combined SAT scores ranged from 650 to 1540, $M = 1198$, $SD = 171$).

Measuring Personality

The Big Five were assessed using the 60-item NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). Items were rated on a 5-point scale ranging from 1 (*not very true of me*) to 5 (*very true of me*).² The NEO-FFI was administered during the 1st week of college and at the end of the 4th year. Coefficient alpha reliabilities were .83 and .82 for Extraversion, .76 and .77 for Agreeableness, .81 and .83 for Conscientiousness, .84 and .85 for Neuroticism, and .77 and .75 for Openness to Experience, respectively for the two assessments. As a second measure of reliability, we collected short-term, test-retest data on the NEO-FFI. Specifically, we administered the NEO-FFI to a separate

1. All of the findings to be reported held when participants older than 19 were included in the analyses. There were no significant differences between individuals who did and did not complete the personality measures at both time points, except that participants scored higher on Conscientious ($M = 3.52$, $SD = .56$) than non-participants ($M = 3.28$, $SD = .59$), $t = 4.45$, $p < .05$. Participants were marginally more likely to be women than nonparticipants (59% vs. 52%, $p = .08$); participants had marginally higher SAT scores than nonparticipants ($M = 1198$ vs. 1166, $p = .05$); participants and nonparticipants did not differ in socioeconomic status, $t < 1$. Participants and nonparticipants did not differ in variance on any of the personality or demographic dimensions, except that the variance for SAT scores was slightly lower among participants than nonparticipants ($SD = 171$ vs. 188, $p = .05$), based on the Levene's test for the equality of variances. In light of these differences, the participants in the study may not represent a completely random, unbiased sample of the original study participants. Nonetheless, on most variables of interest, there were no differences between participants and nonparticipants, and our subsequent analyses are unlikely to be seriously biased by nonrandom attrition.

2. These response scale anchors are different from those typically used for the NEO-FFI (*Strongly disagree*, *Strongly agree*). This difference should be taken into consideration when making comparisons to norms from other samples.

sample of 107 undergraduate students at one point in time and then 2 weeks later. The Big Five scales differed only minimally in their test-retest reliabilities: .86 (Extraversion), .86 (Agreeableness), .90 (Conscientiousness), .89 (Neuroticism), and .88 (Openness).

Measuring Personality Change

Mean-level change was assessed by comparing mean personality scores at Time 1 (Week 1) with mean scores at Time 2 (Year 4) using dependent samples *t* tests. To determine the degree to which the mean-level changes held for each participant in our study, we also assessed individual-level personality change. We classified people as having decreased, increased, or stayed the same on each dimension, based on the Reliable Change index (RC; Christensen & Mendoza, 1986). The RC index quantifies the probability of observing a difference score equal to or greater than the one observed, assuming that no change has occurred. The RC index explicitly accounts for the unreliability of measurement, thereby providing a useful method for separating true personality change from change due to measurement error (Jacobson & Truax, 1991).³ We classified an individual as having increased or decreased on each dimension if the probability associated with his or her RC score was less than 5% (i.e., we used a 95% confidence interval).

Rank-order stability was assessed by the correlation between Week 1 and Year 4 personality scores.

To test the *structural stability* of the Big Five, we used structural equation modeling to compare the fit of two models, one in which the intercorrelations among the Big Five were freely estimated at each time point and the other in which the intercorrelations among the Big Five were constrained to be equivalent across the two assessments. A significant difference in fit between these two models would indicate that there was significant change in the structural relations among the Big Five.

To assess *ipsative stability* over time, we computed three indices of profile similarity. Cronbach and Gleser (1953) observed that individual profiles can vary in three ways: elevation (the average level of scores), scatter (the variability of scores), and shape (the patterning of scores, or relative salience of the Big Five within a profile). Cronbach and Gleser outlined three methods for quantifying these sources of variability. The first index, D^2 , quantifies the

3. The RC index is based on classical test theory and thus makes a number of assumptions that may or may not be valid (e.g., error variance is constant across participants and over time). To the extent that these assumptions do not hold in the present data, our estimates of how many individuals increased, decreased, and stayed the same may be biased.

squared differences between trait levels at two time points, summed across all five traits. D^2 is sensitive to differences in elevation, scatter, and shape. The second index, D'^2 , quantifies the squared differences between profiles after each profile has been centered around its mean. D'^2 is insensitive to differences in mean levels between profiles and only reflects differences in scatter and shape. The third index, D''^2 , quantifies the squared differences between profiles after each profile has been standardized. D''^2 is sensitive only to differences in shape. (D''^2 is perfectly inversely related to the within-person or ipsatized correlation coefficient.) D^2 correlated .95 with D'^2 and .56 with D''^2 ; D'^2 correlated .57 with D''^2 .

To parallel the RC index, we classified people as having changed on each of these indices if the probability associated with their score on the index was less than 5%, under the assumption that any changes observed were due to unreliability of measurement. We estimated these probabilities by simulating trait scores on a sample of 50,000 individuals in which there was no change in the latent, or true score, values (i.e., a person's personality profiles at the two time points had identical levels of elevation, scatter, and shape) and examining the corresponding distributions. Simulated trait scores were constructed to have the same means, variances, and covariances, and, importantly, coefficient alpha reliabilities as estimated from the real data.

RESULTS

Neither gender nor ethnicity (Asian vs. Caucasian) significantly moderated any of the findings (all $ps > .05$). All results are reported for the total sample.

Mean-Level Personality Change

Table 1 reports the means and standard deviations for each dimension at the beginning and end of college, as well as the standardized mean difference between Week 1 and Year 4. Neuroticism scores decreased over the 4-year period by almost half of a standard deviation. Scores on Agreeableness, Conscientiousness, and Openness exhibited small to medium sized (Cohen, 1988) increases over time, with Cohen's d ranging from .22 to .44 standard score units. There was virtually no mean-level change in Extraversion during college. None of the Big Five dimensions showed significant changes in variance (all $ps > .05$), based on a t test for the difference between dependent variances (Gonzalez & Griffin, 1999,

Table 1
Change in Personality Over 4 Years of College

| Dimension | Age 18 <i>M (SD)</i> | Age 22 <i>M (SD)</i> | Mean change ^a | Individual-level change | | | Rank-order stability ^c |
|-------------------|-------------------------|-------------------------|-----------------------------|-------------------------|---------------------------------|------------------------|--------------------------------------|
| | | | | Decreased ^b | Stayed the same ^b | Increased ^b | |
| Extraversion | 3.47 (.62) | 3.49 (.60) | + .03 | 8% | 83% | 9% | .63* (.76) |
| Agreeableness | 3.57 (.54) | 3.81 (.54) | + .44* | 2% | 84% | 14% | .60* (.78) |
| Conscientiousness | 3.53 (.56) | 3.69 (.61) | + .27* | 6% | 81% | 13% | .59* (.72) |
| Neuroticism | 2.99 (.68) | 2.66 (.68) | - .49* | 23% | 73% | 4% | .53* (.63) |
| Openness | 3.58 (.59) | 3.71 (.57) | + .22* | 2% | 91% | 7% | .70* (.92) |

Note. $N = 270$.

* $p < .05$.

^aMean-level change in standard score units (i.e., Cohen's d).

^bPercentage of individuals who decreased, stayed the same, or increased on each dimension, according to the Reliable Change index (see text). The expected frequencies are 2.5%, 95%, and 2.5%, respectively. The observed frequencies differ from the expected frequencies for each of the Big Five dimensions (χ^2 values ranged from 22.6 to 470.1, all $ps < .05$).

^cCorrelations between age 18 and age 22 scores. Values in parentheses are disattenuated for measurement error (based on coefficient alpha).

Appendix). Thus, the college experience did not serve to broaden or reduce the range of individual differences in personality.

We also examined change by categorizing people as having stayed the same if they were within the 95% confidence interval around the RC index, or as having increased or decreased if the probability associated with their RC score was less than 5%. These analyses suggested that there was little change in personality for the majority of participants (see Table 1). For example, 84% of the sample had similar levels of Agreeableness at each time point. However, Neuroticism showed less stability; roughly 35% of the sample scored outside the expected range. Overall, 64% of the sample changed on at least one of the five dimensions according to the RC index.

Rank-Order Stability of Personality

Rank-order stability coefficients for the Big Five dimensions were medium to large in size, ranging from .53 for Neuroticism to .70 for Openness. These values are comparable to the mean rank-order stability estimate of .54 found for personality traits during the college years (Roberts & DelVecchio, 2000). Disattenuated coefficients (corrected for coefficient alpha reliability estimates) ranged from .63 for Neuroticism to .92 for Openness.

Differences among the Big Five in their 4-year stabilities may reflect differences in the degree to which these dimensions exhibit short-term fluctuations over time. For example, it is possible that Neuroticism is less stable than Openness because Neuroticism shows greater week-by-week fluctuations than Openness. To explore this possibility, we used short-term test-retest reliability estimates to compute stability coefficients for each of the Big Five. The disattenuated 4-year stability correlations were .73 (Extraversion), .70 (Agreeableness), .66 (Conscientiousness), .60 (Neuroticism), and .80 (Openness). These stability estimates are consistent with (albeit a little lower than) the stabilities found when coefficient alpha was used to disattenuate the correlations (see Table 1).

Structural Stability of Personality

The intercorrelations among the Big Five scales at the beginning and end of college were highly similar both in terms of their absolute level and their patterning (see Table 2). The mean intercorrelation at Week 1 was

Table 2
Structural Stability of Personality: Intercorrelations Among the Big Five Dimensions at the Beginning (Age 18) and End (Age 22) of College

| | Extraversion | Agreeableness | Conscientiousness | Neuroticism | Openness |
|-------------------|--------------|---------------|-------------------|-------------|----------|
| Extraversion | — | .30* | .26* | -.37* | .12* |
| Agreeableness | .27* | — | .29* | -.35* | .18* |
| Conscientiousness | .16* | -.20* | — | -.38* | .05 |
| Neuroticism | -.37* | -.27* | -.30* | — | -.10 |
| Openness | .05 | .12* | .12 | -.11 | — |

Note. $N = 270$. Intercorrelations at age 18 are reported below the diagonal and intercorrelations at age 22 are reported above the diagonal.

* $p < .05$.

.20 and the mean intercorrelation at Year 4 was .24. These values are comparable to intercorrelations among the Big Five reported in other studies (John & Srivastava, 1999).

To formally test the structural stability of the Big Five, we used structural equation modeling to conduct an asymptotic test of the equivalence of the two correlation matrices. Specifically, we compared the fit of two models, one in which the intercorrelations among the Big Five were freely estimated at each time point and the other in which the intercorrelations among the Big Five were constrained to be equivalent across the two assessments. If the unconstrained model fit significantly better, this would indicate significant change in the structural relations among the Big Five. To conduct these analyses, we analyzed the matrix of covariances among the 10 scale scores. We specified a single-indicator latent variable model with one latent variable associated with each scale score. We identified the model by fixing the variances of the latent variables to 1 and the variances of the residuals to 0. We then estimated paths among all latent variables and between each latent variable and its indicator. In this analysis, the matrix of covariances among the latent variables is equivalent to the matrix of correlations. This leads to a fully saturated model (CFI = 1.00). We reestimated the model after placing 10 pairwise equality constraints between paths at Week 1 and Year 4. A chi-squared difference test indicated that constraining the model did not lead to a significant reduction in fit, $\chi^2\Delta (df = 10) = 8.5, ns$ CFI = .99. Thus, the intercorrelations among the Big Five were highly stable over time.

Ipsative Stability of Personality

To explore the patterning of traits at the individual level, we compared the stability of individual trait configurations over time using Cronbach and Gleser's D^2 , D'^2 , and D''^2 indices. The distribution of D^2 values ranged from .04 to 8.24, with a mean of 1.63 and a standard deviation of 1.24 (the 25th, 50th, and 75th quartile scores were .77, 1.31, and 2.21, respectively). Forty-three percent of the participants had D^2 values greater than what would be expected by measurement error alone (i.e., if their profiles had not changed at all and measurement error was the only factor producing change over time). The distribution of D'^2 values ranged from .04 to 5.91, with a mean of 1.36 and a standard deviation of 1.06 (the 25th, 50th, and 75th quartile scores were .60, 1.01, and 1.92, respectively). Forty-three percent of the sample had D'^2 values greater than chance. The distribution of D''^2 values ranged from .03 to 15.59, with a mean of 3.12 and a standard deviation of 3.14 (the 25th, 50th, and 75th quartile scores were .83, 1.95, and 4.65, respectively). Only 17% of the sample had D''^2 values greater than chance. Thus, most of the profile change reflected changes in elevation (i.e., mean level changes across all traits) and scatter (changes in the spread of the scores). Only a small proportion of the sample showed significant change in the shape of their profile.⁴

DISCUSSION

The present research examined personality continuity and change in a sample of young men and women followed longitudinally through college. The findings contribute to a growing literature on how personality changes throughout the life course and provide much needed data on the young adult period.

4. As noted previously, the D''^2 index is perfectly inversely related to the within-person correlation. The within-person correlations ranged from $-.95$ to $.97$, with a mean of $.61$ ($SD = .39$) and a median of $.76$. The within-person correlation does not have an expected value of 0 (Cronbach & Gleser, 1953; Ozer & Gjerde, 1989). Thus, to estimate the expected value of this correlation in the present sample, we repeatedly sampled Time 1 and Time 2 profiles from *different* participants and computed the profile correlations. The average value generated by this procedure was $.20$.

Personality Change in Young Adulthood

In this article, we approached the question of stability and change from a variety of perspectives and assessed multiple types of change. Overall, the findings are consistent with the perspective that personality exhibits moderate degrees of continuity over time, yet can change in systematic ways. One insight emerging from the results is that conclusions about personality change depend in part on how change is defined.

With respect to normative change, we found that all of the Big Five dimensions showed significant mean-level change, except for Extraversion. The students in our sample became more agreeable, conscientious, emotionally stable, and open to new experiences as they progressed through college. These findings, which are generally consistent with previous longitudinal studies, point toward increasing levels of adaptation and psychological functioning. However, in no case did we find evidence for dramatic normative shifts; the mean-level changes were small to medium in magnitude, ranging from one quarter to one half of a standard deviation.

The absence of large mean-level changes does not preclude the possibility that individual participants showed substantial personality changes over time (e.g., if some participants increase substantially while others decrease substantially, then mean-level change could be minimal). However, the individual level changes we found were generally consistent with the mean-level changes; relatively few participants showed reliable increases or decreases in their personality scale scores. On any given personality dimension, the vast majority of participants (73% to 90%) did not exhibit larger changes than would be expected by measurement error alone (see Table 1). Longitudinal studies rarely find dramatic changes in personality at any stage of the life course, and the present study is no exception.

Analyses of rank-order stability revealed strong correlations over time, with disattenuated correlations ranging from .63 to .92. The level of stability was comparable to that found in previous research on the Big Five (Costa & McCrae, 1997; Roberts & DelVecchio, 2000). Individual differences in Agreeableness and Neuroticism were the least consistent in rank ordering, whereas individual differences in Openness to Experience were the most consistent.

The interrelations among the Big Five personality dimensions remained highly stable over the 4-year period, reflecting a high level of

structural stability. Thus, although college is a time of considerable identity construction and reformation, it does not seem to entail a dramatic change in the structure of personality traits.

In terms of ipsative stability, the individual Big Five profiles showed moderate levels of stability. Almost half the sample showed change in their trait profile over the 4-year period, based on the D^2 and D'^2 indices. This is not surprising given that most people exhibited some degree of reliable change on at least one of the Big Five dimensions. However, analyses of the D''^2 index showed that much of the change was due to shifts in the overall level and spread of the profiles rather than in their shape. The literature on personality change is almost completely devoid of research on the stability of trait profiles, and the present study thus helps to fill a gap in the literature. However, the psychological meaning of individual differences in ipsative stability remains to be explored.

Limitations and Future Directions

The present study has a number of limitations that suggest the need for further research. Most notably, the design did not allow us to distinguish personality change due to maturational factors (ontogenic change) and change due to the college experience (sociogenic change). Thus, we do not know whether the findings generalize to all individuals transitioning from late adolescence to early adulthood or just those who attend college. Consider, for example, normative increases in Conscientiousness and Openness. In some sense, the college context provides an environmental press for increases in these two traits. Successful academic performance in college requires perseverance, punctuality, responsibility, and other traits related to Conscientiousness. Similarly, the college environment exposes individuals to a diverse set of ideas, people, and cultural traditions, as well as sparking their curiosity and stimulating them to consider a wider range of perspectives and values. At the same time, maturational changes occurring during late adolescence may promote independence from one's parents; exploration of new identities, roles, and relationships; and goal-oriented behaviors that facilitate successful adaptation to adult society (Arnett, 2000). Thus, increases in Conscientiousness and Openness could reflect experiential factors associated with college, intrinsic maturational factors, or both. Disentangling these accounts requires research using a non-college student control sample.

Longitudinal studies based on only two waves of data present several limitations in the study of stability and change (e.g., Bryk & Raudenbush, 1987; Jones & Meredith, 1996; Rogosa, 1995; Rogosa, Brandt, & Zimowski, 1982; Willett, Singer, & Martin, 1998). First, estimates of the amount of change from two-wave studies can be highly unreliable. The reliability of a change trajectory increases substantially up to six or seven waves of data and then gradually begins to asymptote (Willett, Singer, & Martin, 1998, Figure 4). Thus, studies in which personality change is modeled across multiple waves of data are greatly needed.

Second, the amount of change demonstrated by two-wave longitudinal studies can be misleading because decisions about when the Time 1 and Time 2 measurements occur are highly consequential, and observations over alternative time periods may yield quite different findings (Rogosa, 1995). For example, our findings regarding change in Neuroticism might have been different if our first personality assessment had been 1 month earlier (i.e., prior to entry into college). Specifically, it is possible that individuals experience a temporary elevation in their Neuroticism scores during the transition to college and that this artifactually produced an apparent decline in Neuroticism over the course of college, as participants returned to their baseline levels. This problem could be addressed by studies that assess personality prior to college or that include additional waves of data throughout the college period.

Third, although two-wave longitudinal studies can provide information about the amount of change across a given time period, they do not provide a way to chart the precise change trajectory. Most notably, with two assessment points, only linear (or straight-line) change can be measured. However, patterns of personality change (both at the individual and mean level) are likely to be non-linear and dynamic (e.g., Brown & Moskowitz, 1998; Nesselroade & Boker, 1994). For example, if a person's Neuroticism level increased sharply during the 1st year of college but then gradually returned to the initial level over the course of college, this person would show no change according to our measures. Thus, measures of linear change may underestimate the amount of change actually occurring during college, and more generally mischaracterize the precise trajectory of personality change. Future research should use methods to assess non-linear developmental trajectories, including growth curve modeling across multiple waves of data.

In addition to these concerns about two-wave designs, our longitudinal study does not allow us to disentangle age and period (i.e., year of

assessment) effects, and it does not allow us to examine cohort effects. It is possible that other cohorts of college students (and young adults) will not show the same personality changes observed in the present study. However, this concern is somewhat ameliorated by the fact that our findings are generally consistent with previous studies based on earlier cohorts. Nonetheless, the use of a cohort-sequential design (Nesselroade & Baltes, 1979) in which multiple cohorts are followed longitudinally would greatly benefit research on personality change.

Another limitation of our measure of personality change is that it is based on a self-report personality questionnaire. This poses two potential problems in the present context. First, social desirability and other response style tendencies may limit the validity of self-report personality scales (Paulhus, 1991; but see Piedmont, McCrae, Riemann, & Angleitner, 2000). Second, personality scale responses may be influenced by people's beliefs about how they have changed during young adulthood. For example, if the participants in our study believe that college is a time of increasing maturity and adjustment, then their personality self-reports may have shifted in the direction of appearing more mature, producing apparent declines in negative traits and increases in positive traits. Thus, the findings need to be replicated using non-self-report measures of personality such as peer or parent ratings.

Another issue worthy of future research concerns the stability of personality across different levels of analysis. In this article, we focused on basic personality traits. However, numerous levels exist in the study of personality (e.g., Emmons, 1995; McAdams, 1995), ranging from unconscious defenses to life stories. It is possible that each level exhibits distinct patterns of continuity and change over the life course (Conley, 1985; McAdams, 1994). In fact, it may be the case that when people are considering how their own personality has changed, they are more in tune with changes in their personal goals, relationships, and memorable life experiences, than changes in their basic personality traits (Thorne, 1989). Future research on continuity and change across different units of personality would contribute enormously to our understanding of personality development.

Finally, although the present findings help us understand the degree to which people change during the transition to young adulthood, they do not tell us why these changes occur. That is, we have not explored the psychological and contextual factors that produce personality change. One important avenue for future research is to examine the mechanisms

that underlie stability and change in personality during young adulthood. Caspi and others have outlined a number of possible mechanisms that might be involved in personality stability and change (Caspi, 1998; Caspi & Roberts, 1999; Roberts, 1997). We would like to highlight a few possibilities that we believe are particularly relevant to young adulthood. First, some theorists have hypothesized that personality stability is simply the result of living in a stable environment (e.g., Moss & Susman, 1980). In the present study, most of the participants remained in the same university environment throughout the period examined. This raises the possibility that we would have found less stability if we had examined participants during the transition into or out of college, or participants who were engaged in a more diverse range of life activities (e.g., entry into the workforce). Second, as we noted earlier, some of the changes we observed may reflect maturational changes that occur during adolescence and young adulthood. Specifically, some theorists hypothesize that neuro-developmental changes associated with adolescence (including changes in neural circuitry and hormonal changes associated with puberty) produce profound disturbances in psychological functioning (Hall, 1904; Simmons, Blyth, Van Cleave, & Bush, 1979). Thus, the decline in Neuroticism observed in the present study may have reflected a “recovery” from the generally elevated levels of anxiety and depression that may occur during adolescence. Third, according to Erikson and other lifespan developmental theorists, adolescence often entails a questioning of one’s identity and a subsequent transformation of self and identity. Identity consolidation, the continued investment in and evaluation of life choices made in adolescence has been shown to predict increases in ego resiliency in young adulthood (Pals, 1999). Thus, personality development might occur in tandem with identity development, and this possibility merits further research.

Finally, a number of personality theorists have suggested that personality stability and change is best conceptualized as a person-environment transaction (e.g., Buss, 1987; Caspi, 1998). In the present study, this transaction may play out in terms of individuals adapting to and finding niches within the college environment. For example, certain experiences within the academic context might promote higher levels of Conscientiousness and similarly certain experiences within the broader context of college might promote greater Openness to Experience. A related idea is the possibility that person-environment fit might serve as a mechanism for both stability and change. It is possible, for example, that individuals

select college majors that fit with their current personalities, thus promoting personality stability, or select majors that correspond with what kind of person they would like to be in the future, thus promoting personality change.

In summary, these various limitations point to the need for further research on personality change in young adulthood. In particular, the field would greatly benefit from studies that (a) assess change across multiple waves of data; (b) use a cohort-sequential longitudinal design; (c) use a multi-method approach to the assessment of personality, including both self-report questionnaires and external criteria such as peer and parent reports; (d) assess personality at different levels of analysis, including traits, motives, goals, and life stories; and (e) measure variables hypothesized to produce personality change.

CONCLUSION

The college experience involves a diverse range of experiences—increased independence from one's family, successes and failures in the academic domain, romantic beginnings and endings, shifting life goals, and the establishment of lifelong friendships. Amidst all these changing life circumstances, personality exhibits impressive levels of continuity. Nonetheless, the degree of continuity is far from perfect, and most individuals seem to show important change in at least some domains. Thus, further inquiry into the antecedents, concomitants, and consequences of different patterns of change is needed, both in terms of normative change and individual developmental trajectories.

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