

# Self-Esteem Development From Age 14 to 30 Years: A Longitudinal Study

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We examined the development of self-esteem in adolescence and young adulthood. Data came from the Young Adults section of the National Longitudinal Survey of Youth, which includes 8 assessments across a 14-year period of a national probability sample of 7,100 individuals age 14 to 30 years. Latent growth curve analyses indicated that self-esteem increases during adolescence and continues to increase more slowly in young adulthood. Women and men did not differ in their self-esteem trajectories. In adolescence, Hispanics had lower self-esteem than Blacks and Whites, but the self-esteem of Hispanics subsequently increased more strongly, so that at age 30 Blacks and Hispanics had higher self-esteem than Whites. At each age, emotionally stable, extraverted, and conscientious individuals experienced higher self-esteem than emotionally unstable, introverted, and less conscientious individuals. Moreover, at each age, high sense of mastery, low risk taking, and better health predicted higher self-esteem. Finally, the results suggest that normative increase in sense of mastery accounts for a large proportion of the normative increase in self-esteem.

**Keywords:** self-esteem, adolescence, young adulthood, development, Big Five personality traits

Low self-esteem in adolescence and young adulthood is a risk factor for negative outcomes in important life domains. For example, Trzesniewski et al. (2006) found that low self-esteem during adolescence predicts poorer mental and physical health, worse economic well-being, and higher levels of criminal activity in young adulthood. Similarly, other studies found that low self-esteem prospectively predicts antisocial behavior, eating disturbances, depression, and suicidal ideation (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005; McGee & Williams, 2000; Orth, Robins, & Roberts, 2008). Research findings thus suggest that the development of self-esteem—which is defined as “a person’s appraisal of his or her value” (Leary & Baumeister, 2000, p. 2)—may have significant consequences for life outcomes. However, the normative pattern of self-esteem development and the factors that affect it are still unclear. In the present study, we therefore aimed to clarify the trajectory of self-esteem during adolescence and young adulthood and to identify moderating factors of the level and shape of the trajectory.

## Self-Esteem Development in Adolescence and Young Adulthood

With regard to adolescence, previous research on self-esteem development has yielded inconsistent results. Several studies reported an increase in self-esteem (Cairns, McWhirter, Duffy, & Barry, 1990; Huang, 2010; Labouvie, Pandina, White, & Johnson,

1990; McCarthy & Hoge, 1982; Mullis, Mullis, & Normandin, 1992; O’Malley & Bachman, 1983; Prawat, Jones, & Hampton, 1979; Pullmann, Allik, & Realo, 2009; Roeser & Eccles, 1998; Twenge & Campbell, 2001), whereas other studies reported that self-esteem does not change (Chubb, Fertman, & Ross, 1997; Young & Mroczek, 2003) or even decreases (Keltikangas-Järvinen, 1990; McMullin & Cairney, 2004; Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002; Zimmerman, Copeland, Shope, & Dielman, 1997).

With regard to young adulthood, the few available longitudinal studies suggest that self-esteem increases during young adulthood (Galambos, Barker, & Krahn, 2006; Huang, 2010; Orth, Trzesniewski, & Robins, 2010; but see Donnellan, Trzesniewski, Conger, & Conger, 2007). Additional evidence is provided by cross-sectional data, likewise suggesting that self-esteem gradually increases during young adulthood (Gove, Ortega, & Style, 1989; Pullmann et al., 2009; Robins et al., 2002; Twenge & Campbell, 2001; with the exception of McMullin and Cairney, 2004, who reported a gradual decrease).

## Moderators of Self-Esteem Development

In addition to tracking the average self-esteem trajectory, this research examined factors that may explain individual differences in self-esteem development in adolescence and young adulthood (cf. Harter, 2006; Robins & Trzesniewski, 2005). We tested for the effects of demographic variables (gender and ethnicity), the Big Five personality traits, sense of mastery, risk taking, health, and income.

### Gender

Previous research on gender differences in self-esteem suggests that male adolescents have higher self-esteem than female adolescents do (Chubb et al., 1997; Eccles et al., 1989; Labouvie et al.,

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1990; McMullin & Cairney, 2004; Moksnes, Moljord, Espnes, & Byrne, 2010; Robins et al., 2002; Roeser & Eccles, 1998; Twenge & Campbell, 2001; Young & Mroczek, 2003); however, in some studies the gender difference was small (Kling, Hyde, Showers, & Buswell, 1999; Quatman, Sampson, Robinson, & Watson, 2001) or nonsignificant (Keltikangas-Järvinen, 1990). Likewise, several studies reported higher self-esteem for men in young adulthood (McMullin & Cairney, 2004; Robins et al., 2002; Twenge & Campbell, 2001), although in some studies the gender difference was small (Orth et al., 2010; Robins, Hendin, & Trzesniewski, 2001) or nonsignificant (Donnellan et al., 2007; Galambos et al., 2006).

### Ethnicity

With regard to ethnicity, the available evidence suggests that Blacks have higher self-esteem than Whites do during adolescence and young adulthood (Bachman, O'Malley, Freedman-Doan, Trzesniewski, & Donnellan, 2010; Gray-Little & Hafdahl, 2000; Robins et al., 2002; Twenge & Crocker, 2002). However, there are conflicting findings regarding the self-esteem of Hispanics. Some studies reported that Whites have higher self-esteem than Hispanics do in adolescence and young adulthood (Bachman et al., 2010; Carlson, Uppal, & Prosser, 2000; Twenge & Crocker, 2002), whereas Birndorf, Ryan, Auinger, and Aten (2005) found that, among female adolescents, Hispanics reported higher self-esteem than Whites did (for male adolescents, the difference was nonsignificant).

### Big Five Personality Traits

Although prior research examined correlations between self-esteem and the Big Five personality traits, no previous study tested for the effects of the Big Five on self-esteem development. Cross-sectional research suggests that self-esteem is correlated with each of the Big Five personality traits: Individuals with high self-esteem tend to be emotionally stable, extraverted, conscientious, agreeable, and open to experience (Robins, Hendin, & Trzesniewski, 2001; Robins, Tracy, Trzesniewski, Potter, & Gosling, 2001; Watson, Sulz, & Haig, 2002). Therefore, it is possible that the Big Five factors also explain individual differences in the development of self-esteem.

### Sense of Mastery

Sense of mastery is defined as the extent to which people see themselves as having control over the forces that affect their lives (Pearlin, Menaghan, Lieberman, & Mullan, 1981) and is related to the construct of self-efficacy (Bandura, 1977; Gecas, 1989). There has been a long debate on the relation between self-esteem and self-efficacy (e.g., Chen, Gully, & Eden, 2004; Judge, Erez, Bono, & Thoresen, 2002). Lightsey, Burke, Ervin, Henderson, and Yee (2006) found support for the hypothesis that self-efficacy prospectively predicts self-esteem but not, vice versa, that self-esteem prospectively predicts self-efficacy. Given the conceptual overlap between self-efficacy and sense of mastery, we expected that sense of mastery would predict self-esteem development.

### Risk Taking

Another possible moderator of self-esteem development is risk taking. The available evidence suggests that risk taking increases

during adolescence and then decreases during young adulthood (Boyer, 2006; Leather, 2009; Michael & Ben-Zur, 2007). Wild, Flisher, Bhana, and Lombard (2004) examined the relation between self-esteem and risk behaviors related to substance use, bullying, suicidality, and sexuality and found a complex pattern of results. Self-esteem in the family and school domain was negatively linked to risk behaviors, whereas self-esteem in the peer domain was positively linked to risk behaviors in both male and female adolescents. Moreover, low body image was associated with risk behaviors in female but not male adolescents.

### Health

Previous research suggests that self-esteem is associated with better physical health (Benyamini, Leventhal, & Leventhal, 2004; Mäkikangas, Kinnunen, & Feldt, 2004). As yet, only one longitudinal study has examined whether health predicts self-esteem; Reitzes and Mutran (2006) found support for a reciprocal prospective relation between health and self-esteem. It is possible that individuals with high self-esteem experience more social inclusion, receive more social support, and experience less stress, thereby enhancing their health. However, it is also plausible that healthy individuals have more control over their lives and are more successful in education, work, and relationships, which in turn would strengthen their self-esteem.

### Income

Income might influence self-esteem development because it may shape the individual's perception of his or her relational value and thereby influence self-esteem (Leary & Baumeister, 2000). At present, few studies have systematically examined relations between income and self-esteem. Using cross-sectional data from a large sample, McMullin and Cairney (2004) found that income had significant effects in midlife and old age but not in adolescence and young adulthood. Additional evidence accrues from studies on the relation between self-esteem and socioeconomic status (SES), for which income is one of the key indicators. A meta-analysis found that SES accounts for small but significant differences in self-esteem in young adulthood (Twenge & Campbell, 2002). A similar pattern emerged in the study by Robins et al. (2002), who found a small SES effect on self-esteem.

### The Present Research

Our first goal was to examine the normative self-esteem trajectory in adolescence and young adulthood and to test which of several growth curve models (i.e., linear, quadratic, and cubic) yields the best fit to the data. We expected, based on the findings of previous studies, that self-esteem would continuously increase during adolescence and young adulthood, but we had no specific hypothesis with regard to the shape of the trajectory (i.e., whether it is linear or curvilinear). Our second goal was to test for moderators of the self-esteem trajectory: gender, ethnicity, the Big Five personality traits, sense of mastery, risk taking, health, and income. On the basis of previous research as reviewed above, we expected that, in particular, emotional stability, extraversion, conscientiousness, sense of mastery, and health would predict a more positive self-esteem trajectory.

This research extends previous studies in several ways. First, we used data from a large national probability sample, which enabled us to draw more accurate and generalizable conclusions. Second, the data set includes eight repeated assessments over a 14-year period. Compared with previous longitudinal studies, which were based on a small number of repeated assessments, this approach provides for more precise estimates of the average self-esteem trajectory and allows testing more complex models (e.g., a cubic model) of the self-esteem trajectory. Third, no previous study has tested for the predictive effects of Big Five personality traits, sense of mastery, and risk taking on the self-esteem trajectory.

## Method

The data come from the Young Adults section of the National Longitudinal Survey of Youth (NLSY79), a national probability survey that was started in 1979 and that included an oversampling of Blacks and Hispanics (for further information about this study, see Center for Human Resource Research, 2009). The Young Adults section includes data from the children of study participants, who were first assessed in 1994 if they had reached the age of 15 years. These adolescents and young adults were assessed biennially from 1994 to 2008, resulting in eight waves of assessment. Because at every wave additional children reached the age of 15 years and thus became eligible for assessment, the sample size increased with every assessment ( $N$ s ranged from 979 in 1994 to 6,309 in 2008). Across Waves 1 to 8, the participants' ages ranged from 14 to 37 years.<sup>1</sup> We restructured the data so that they were organized by the individuals' age. Because few participants provided data above age 30, we restricted our analyses to assessments between age 14 and age 30.

## Participants

The sample consisted of 7,100 individuals (49% female). The participants' year of birth ranged from 1970 to 1993. Of the participants, 37% were White, 32% were Black, 20% were Hispanic, and 11% were from other ethnicities (i.e., 2% American Indian, 0.4% Asian American, and the remaining participants were of other or unspecified ethnicity). To investigate the potential impact of attrition, we compared the participants who did and did not participate in the most recent wave of data collection (i.e., Wave 8). The two groups did not significantly differ on any of the study variables.

## Measures

**Self-esteem.** Self-esteem was assessed with the 10-item Rosenberg Self-Esteem Scale (Rosenberg, 1965), a commonly used and well-validated measure of self-esteem (cf. Blascovich & Tomaka, 1991; Robins, Hendin, & Trzesniewski, 2001). Responses were measured with a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*), with a mean of 3.25 ( $SD = 0.42$ ) averaged across the assessments. The alpha reliability ranged from .85 to .88 across assessments. Self-esteem was assessed at all eight waves.

**Big Five personality traits.** The Big Five personality traits were assessed with the Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003), a brief measure that has

satisfactory convergent and predictive validity (Ehrhart et al., 2009; Furnham, 2008). Extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience are each assessed with two items. Responses were measured with a 7-point scale ranging from 1 (*disagree strongly*) to 7 (*agree strongly*). Coefficient alpha is not an appropriate indicator of reliability because the TIPI was not constructed with the goal of internal consistency but rather with the goal of broad coverage and optimized content validity (Gosling et al., 2003). Therefore, each of the subscales includes two items that capture distinct aspects of the Big Five dimension, necessarily resulting in lower internal consistency. In the present data, the mean alpha reliability was .25 across subscales and assessments, corresponding to relatively low alpha values reported by Gosling et al. (2003) and Ehrhart et al. (2009). However, the test-retest reliability of the TIPI has been found to be satisfactory (with a mean of .72 across a 6-week interval; see Gosling et al., 2003). The TIPI was included in the NLSY79 at two waves only (2006 and 2008). Because no participant provided data at more than one assessment (by reason of study design; i.e., the TIPI was given to distinct subsamples), it was not possible to use the Big Five variables as time-varying covariates (TVCs). Therefore, we used the Big Five as time-invariant covariates in the analyses.

**Sense of mastery.** Sense of mastery was assessed with the seven-item Pearlin-Schooler Mastery Scale (Pearlin & Schooler, 1978), a well-established scale that measures the extent to which individuals perceive having control over their lives (Pearlin et al., 1981). Item examples are "I can do just about anything I really set my mind to" and "I have little control over the things that happen to me" (reverse scored). Responses were measured with a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*), with a mean of 3.15 ( $SD = 0.44$ ) averaged across the assessments. The alpha reliability ranged from .70 to .77 across assessments. Sense of mastery was assessed at all eight waves.

**Risk taking.** The NLSY79 includes a six-item measure that assesses proneness to engage in risky behavior. Item examples are "I think that planning takes the fun out of things" and "I enjoy taking risks." Responses were measured with a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*), with a mean of 2.44 ( $SD = 0.45$ ). The alpha reliability ranged from .60 to .64 across assessments. Risk taking was assessed at all eight waves.

**Health.** Present health was assessed with one item: "How would you describe your present health?" Responses were measured on a 5-point scale (1 = *poor*, 2 = *fair*, 3 = *good*, 4 = *very good*, 5 = *excellent*), with a mean of 3.79 ( $SD = 0.96$ ) across assessments. Health was assessed at all eight waves.

**Income.** We examined the participants' total income from wages and salary using 11 categories ranging from 0 (no income) to 10 (\$80,000 or more), with a mean of 2.03 ( $SD = 2.24$ ). Income was assessed at all eight waves.

<sup>1</sup> Children became eligible for assessment if they reached age 15 at the end of the survey year. Therefore, many participants were still at age 14 at the time of assessment.

Table 1  
Fit of Basic Growth Curve Models of Self-Esteem

| Model                     | $\chi^2$ | df  | TLI | CFI | RMSEA [90% CI]    |
|---------------------------|----------|-----|-----|-----|-------------------|
| Linear change             | 262.4*   | 146 | .97 | .96 | .011 [.009, .013] |
| Quadratic change          | 189.7*   | 142 | .99 | .99 | .007 [.004, .009] |
| Cubic change <sup>a</sup> | 170.8*   | 137 | .99 | .99 | .006 [.002, .009] |

Note. df = degrees of freedom; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval.

<sup>a</sup> Model selected.

\*  $p < .05$ .

## Procedure for the Statistical Analyses

The analyses were conducted with the Mplus 6.1 program (Muthén & Muthén, 2010). To deal with missing values, we employed full-information maximum likelihood estimation to fit models directly to the raw data. This produces less biased and more reliable results than do conventional methods of dealing with missing data, such as listwise or pairwise deletion (Allison, 2003; Schafer & Graham, 2002). Model fit was assessed with the Tucker–Lewis index (TLI), the comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA), based on the recommendations of Hu and Bentler (1999) and MacCallum and Austin (2000). Hu and Bentler (1999) suggest that good fit is indicated by values greater than or equal to .95 for the TLI and CFI and less than or equal to .06 for RMSEA.

## Results

### Trajectory of Self-Esteem From Age 14 to 30 Years

Our first goal was to estimate the trajectory of self-esteem through adolescence and young adulthood. We examined growth curve models that capture the development of self-esteem across the entire observed age range represented in the sample (Bollen & Curran, 2006; Preacher, Wichman, MacCallum, & Briggs, 2008).

We estimated a linear, a quadratic, and a cubic model of self-esteem. Although the linear and quadratic models had a good fit, the cubic model had the best fit to the data (see Table 1). The fit of the quadratic model was worse than that of the cubic model, as indicated by the chi-square difference test,  $\Delta\chi^2(5) = 18.9, p < .05$ . Also, the fit of the linear model was worse than that of the cubic model,  $\Delta\chi^2(9) = 91.6, p < .05$ . We therefore estimated a cubic self-esteem trajectory in the remainder of the analyses. The overall fit of the cubic model was good. All coefficients were significant, including the means and variances of the intercept, linear slope, quadratic slope, and cubic slope. Given that there were individual differences in the growth factors (as indicated by significant variances), we tested for moderators of the self-esteem trajectory, as reported below. Figure 1 shows the average predicted trajectory for the full sample. Overall, self-esteem increased moderately during adolescence and continued to increase more slowly during young adulthood. The overall increase from age 14 to 30 years corresponded to  $d = 0.32$ .

Then, we tested for cohort effects on the trajectory of self-esteem. We estimated a conditional growth curve model in which the growth factors were regressed on participant year of birth. The results indicated that year of birth did not significantly predict any of the growth factors (the standardized coefficients were .02 for the intercept, .08 for the linear factor,  $-.02$  for the quadratic factor,

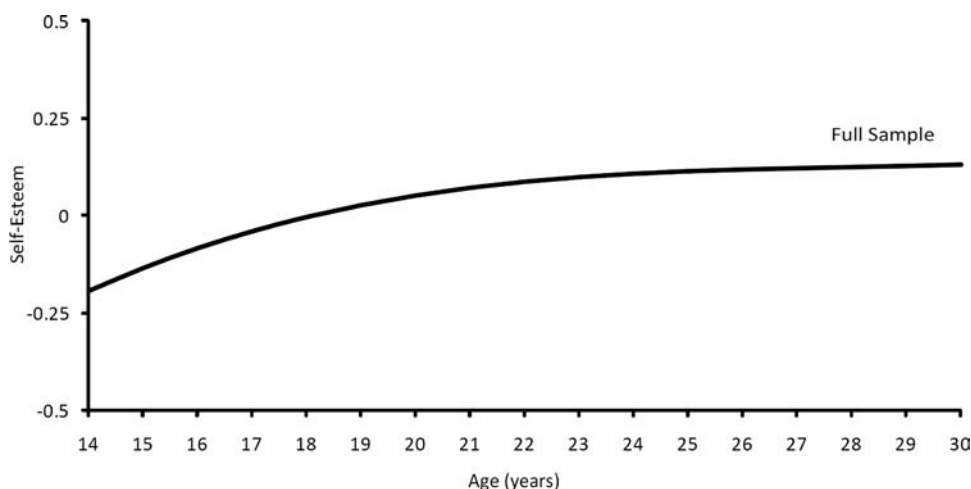


Figure 1. Average predicted trajectory of self-esteem for the full sample. The self-esteem measure was converted to z scores for the analysis.

Table 2  
Fit of Multiple-Group Growth Curve Models of Self-Esteem

| Model                                   | $\chi^2$ | df  | TLI | CFI | RMSEA [90% CI]    |
|-----------------------------------------|----------|-----|-----|-----|-------------------|
| Gender (male vs. female)                |          |     |     |     |                   |
| Cross-group constraints <sup>a</sup>    | 327.8    | 299 | .99 | .99 | .005 [.000, .009] |
| No cross-group constraints              | 304.2    | 274 | .99 | .99 | .006 [.000, .009] |
| Ethnicity (3 groups)                    |          |     |     |     |                   |
| Cross-group constraints                 | 615.1*   | 458 | .96 | .95 | .013 [.010, .015] |
| No cross-group constraints <sup>a</sup> | 487.3*   | 408 | .98 | .98 | .010 [.006, .013] |

Note. df = degrees of freedom; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval.

<sup>a</sup> Model selected.

\*  $p < .05$ .

and  $-.07$  for the cubic factor; all coefficients were nonsignificant). We concluded that the self-esteem trajectory was not confounded by cohort effects.

### Effects of Time-Invariant Covariates on the Self-Esteem Trajectory

Our second goal was to test for moderators of the self-esteem trajectory. Different models are required for analyzing time-invariant versus time-varying covariates, so we report the results separately for these two sets of variables.

To investigate the effects of gender and ethnicity, we estimated multiple-group growth curve models and tested whether model fit was altered when coefficients were allowed to vary across groups (see Table 2). The chi-square difference test indicated that gender did not significantly moderate the self-esteem trajectory,  $\Delta\chi^2(25) = 23.6$ ,  $p = .54$ . In contrast, allowing for different trajectories of White, Black, and Hispanic participants significantly improved model fit,  $\Delta\chi^2(50) = 127.8$ ,  $p < .05$ .

Figure 2 shows the predicted trajectories. As can be seen, self-esteem of Blacks and Whites differed only a little at age 14 ( $d = 0.03$ ), but self-esteem of Hispanics was lower than self-esteem of Blacks ( $d = 0.21$ ) and Whites ( $d = 0.18$ ). Self-esteem

increased gradually for all ethnicities (except for a slight decline among Whites from age 26 to age 30). However, the self-esteem of Hispanic and Black participants increased more sharply than that of White participants; thus, by age 30, the self-esteem of Whites was lower than the self-esteem of Blacks ( $d = -0.24$ ) and Hispanics ( $d = -0.09$ ).

To investigate the effects of Big Five personality traits, we estimated a conditional growth curve model, in which the growth factors were simultaneously regressed on the five personality traits (see Table 3). The results indicated that extraversion, conscientiousness, emotional stability, and openness to experience had independent effects on the intercept factor (with small to medium effect sizes). Emotional stability and extraversion had the strongest effects (.24 and .21), indicating that emotionally stable and extraverted individuals constantly experienced higher self-esteem than emotionally unstable and introverted individuals did from age 14 to 30 years. The Big Five personality traits did not predict the linear, quadratic, and cubic growth factors, with the exception of the effect of agreeableness on the cubic slope; given that only one out of 15 effects on the slopes was significant, we concluded that the slopes were largely unaffected by the Big Five personality traits.

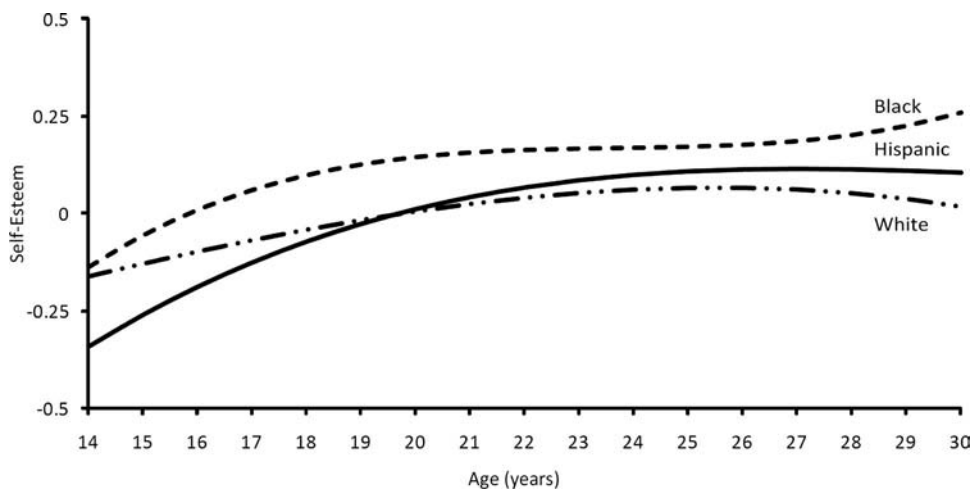


Figure 2. Average predicted trajectory of self-esteem for Hispanic, Black, and White participants. The self-esteem measure was converted to z scores for the analysis.

Table 3  
Standardized Multiple Regression Coefficients of Big Five Personality Traits Predicting Growth Factors of Self-Esteem

| Variable               | Growth factors |              |                 |             |
|------------------------|----------------|--------------|-----------------|-------------|
|                        | Intercept      | Linear slope | Quadratic slope | Cubic slope |
| Extraversion           | .21*           | .04          | -.04            | -.02        |
| Agreeableness          | -.02           | .03          | -.04            | -.10*       |
| Conscientiousness      | .16*           | .03          | -.09            | -.01        |
| Emotional stability    | .24*           | .06          | .05             | .03         |
| Openness to experience | .08*           | .06          | .09             | -.01        |

Note. The effects of Big Five personality traits were analyzed simultaneously in one conditional growth curve model. Model fit was  $\chi^2(202) = 257.5^*$ , TLI = .99, CFI = .99, and RMSEA [90% CI] = .006 [.004, .008]. TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval.

\*  $p < .05$ .

### Effects of TVCs on the Self-Esteem Trajectory

For the analysis of TVCs, we first modeled the growth in the TVCs themselves and then assessed the effects of TVCs on growth in self-esteem.<sup>2</sup> For each TVC, we estimated a linear, a quadratic, and a cubic model (see Table 4).<sup>3</sup> For three of the four TVCs tested, the cubic model had the best fit, as indicated by chi-square difference tests comparing the fit of the cubic versus the quadratic and linear models ( $ps < .05$ ). For the other TVC (i.e., risk taking), the quadratic model had the best fit (as indicated by chi-square difference tests). Overall, the fit of the models selected was good.

Figure 3 shows the individual growth curves for each TVC from age 14 to 30 years. Sense of mastery increased by about a half standard deviation ( $d = 0.48$ ), with a trajectory similar to self-esteem (i.e., moderately increasing from age 14 to 21 years and increasing more slowly from age 21 to 30 years). Risk taking decreased by about a half standard deviation ( $d = 0.48$ ). Health declined across the observed age range by about a half standard deviation ( $d = 0.45$ ), and income strongly increased by more than two standard deviations ( $d = 2.32$ ).

Figure 4 shows the generic model that was used for the analyses of TVC effects on self-esteem. In this model, self-esteem on specific measurement occasions is explained simultaneously by self-esteem growth curve factors and a repeatedly measured TVC. The model allows assessment of two different types of effects of the TVC (Bollen & Curran, 2006; Preacher et al., 2008). First, the model tests whether the TVC predicts deviations from the expected self-esteem trajectory, as indicated by the regression coefficient of the TVC predicting concurrent self-esteem. Second, the model estimates the self-esteem trajectory that results when the TVC is held constant, as indicated by the means and variances of the self-esteem growth factors. In the analyses, all TVCs were centered. For all TVCs, model fit was good (see Table 5).<sup>4</sup>

The results for the regression coefficients indicated that sense of mastery, risk taking, and health explained significant deviations from the expected self-esteem trajectory (see Table 5). Sense of mastery had a large positive effect: When sense of mastery is high, individuals experience positive deviations from the expected self-esteem trajectory; when sense of mastery is low, individuals experience negative deviations from the expected self-esteem trajectory. Risk taking had a small negative effect on self-esteem: When

risk taking is high, individuals experience negative deviations from the expected self-esteem trajectory and vice versa. Health had a small, but significant, positive effect on concurrent self-esteem.

We then examined the self-esteem trajectory resulting from the TVC models. To test whether controlling for a TVC affected the self-esteem trajectory, we compared the fit of the TVC model with that of a model in which the growth curve parameters were fixed to the values from the basic model (i.e., the unconditional model shown in Figure 1). Thus, the comparison model assumes that the trajectory is unaltered by controlling for the TVC. Only one of the TVCs (i.e. sense of mastery) significantly altered the expected self-esteem trajectory, as indicated by the chi-square difference test,  $\Delta\chi^2(4) = 129.5$ ,  $p < .05$ . To examine the effects in more detail, we plotted the predicted self-esteem trajectory controlling for sense of mastery, relative to the basic model (see Figure 5). The graphs show that if individuals were to maintain a constant level of sense of mastery from age 14 to 30 years, their self-esteem trajectory would be much flatter (with an overall increase corresponding to  $d = 0.12$  instead of  $d = 0.32$ , as in the basic model).

<sup>2</sup> A simpler approach would be to include the TVCs in the self-esteem growth model without modeling growth in TVCs, as described, for example, by Bollen and Curran (2006) and Preacher et al. (2008). However, this approach was not feasible in the present research, probably because the restructuring of the data (i.e., restructuring eight waves into 17 age scores) increased the proportion of missing values. A problem of the simpler TVC model is that it carries a large number of parameters because there is no restricted structure on the covariances between the repeatedly measured TVC indicators (Grimm, 2007). The simpler TVC model required estimating 136 covariances between 17 TVC indicators, which resulted in non-convergence of all models tested. In contrast, the approach used in the present research required only a small number of parameters for modeling the relations between the TVC indicators, specifically, the means and variances of the growth factors and the covariances between growth factors.

<sup>3</sup> When estimating the cubic models for sense of mastery and risk taking, we set the variance of the cubic factor to 0 to allow for convergence of the models.

<sup>4</sup> When estimating the fixed and free models with sense of mastery as a TVC, we set the variance of the cubic factor of self-esteem to 0 to allow for convergence of the models.

Table 4  
Fit of Basic Growth Curve Models of Time-Varying Covariates

| Model                  | $\chi^2$ | df  | TLI | CFI | RMSEA [90% CI]    |
|------------------------|----------|-----|-----|-----|-------------------|
| Sense of mastery       |          |     |     |     |                   |
| Linear                 | 316.8*   | 146 | .94 | .93 | .013 [.011, .015] |
| Quadratic              | 208.9*   | 142 | .98 | .97 | .008 [.006, .010] |
| Cubic <sup>a</sup>     | 191.1*   | 141 | .98 | .98 | .007 [.004, .010] |
| Risk taking            |          |     |     |     |                   |
| Linear                 | 278.0*   | 146 | .96 | .96 | .011 [.009, .013] |
| Quadratic <sup>a</sup> | 220.3*   | 142 | .98 | .97 | .009 [.006, .011] |
| Cubic                  | 220.3*   | 141 | .97 | .97 | .009 [.007, .011] |
| Health                 |          |     |     |     |                   |
| Linear                 | 282.4*   | 146 | .98 | .97 | .011 [.009, .013] |
| Quadratic              | 210.8*   | 142 | .99 | .99 | .008 [.006, .011] |
| Cubic <sup>a</sup>     | 170.5*   | 137 | .99 | .99 | .006 [.002, .009] |
| Income                 |          |     |     |     |                   |
| Linear                 | 2659.5*  | 146 | .47 | .42 | .050 [.048, .052] |
| Quadratic              | 1827.3*  | 142 | .63 | .61 | .041 [.040, .043] |
| Cubic <sup>a</sup>     | 525.9*   | 137 | .91 | .91 | .020 [.018, .022] |

Note. df = degrees of freedom; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval.

<sup>a</sup> Model selected.

\*  $p < .05$ .

Thus, normative change in sense of mastery explains a large proportion of the normative change in self-esteem from age 14 to 30 years. In contrast, controlling for the other TVCs did not alter the expected self-esteem trajectory.

Finally, we tested whether sense of mastery provides for an explanation of the ethnic differences or the gender similarity in self-esteem trajectories. We estimated multiple-group growth curve models with sense of mastery as a TVC and tested whether model fit was improved when coefficients were allowed to vary across groups.<sup>5</sup> The chi-square difference test indicated that gender did not significantly moderate the self-esteem trajectory,  $\Delta\chi^2(48) = 52.5$ ,  $p = .30$ , but that allowing for different trajectories of White, Black, and Hispanic participants significantly improved model fit,  $\Delta\chi^2(96) = 293.8$ ,  $p < .05$ . Thus, even when controlling for sense of mastery, the gender difference remained nonsignificant and the ethnic differences remained significant, consistent with the results of the uncontrolled multiple-group analyses reported above. Moreover, when controlling for sense of mastery, the pattern of ethnic differences in the self-esteem trajectory was identical to the pattern in the uncontrolled trajectory, as shown in Figure 2.

## Discussion

We examined the development of self-esteem from age 14 to 30 years using longitudinal data from a large national probability sample from the United States. Latent growth curve analyses indicated a curvilinear trajectory: Self-esteem increased moderately during adolescence and continued to increase more slowly during young adulthood. Given that we found significant individual differences in the self-esteem trajectory (as indicated by significant variances of the latent growth factors), we examined moderators of the trajectory. Women and men did not differ in their self-esteem trajectories. In adolescence, Hispanics had lower self-esteem than Blacks and Whites did, but the self-esteem of Hispanics increased more strongly so that at age 30 years Blacks

and Hispanics had higher self-esteem than Whites did. At each age, emotionally stable, extraverted, and conscientious individuals experienced higher self-esteem than emotionally unstable, introverted, and less conscientious individuals did. Moreover, at each age, high sense of mastery, low risk taking, and better health predicted higher self-esteem. Finally, sense of mastery moderated the shape of the self-esteem trajectory: The analyses suggested that normative increase in sense of mastery accounts for a large proportion of the normative increase in self-esteem.

As discussed in the introduction, previous research on self-esteem development in adolescence and young adulthood has yielded inconsistent findings; for example, in some studies self-esteem increased in these developmental periods (Huang, 2010; Pullmann et al., 2009), whereas in other studies self-esteem did not change (Chubb et al., 1997; Young & Mroczek, 2003) or even decreased (McMullin & Cairney, 2004; Zimmerman et al., 1997). The present research advances the field by analyzing longitudinal data from a large national probability sample and by testing relatively complex models (e.g., a cubic model) of the self-esteem trajectory. The results suggest that self-esteem changes more strongly in adolescence than in young adulthood. This finding might be related to the fact that, likewise, the rank-order stability in self-esteem is lower in adolescence than in young adulthood (Trzesniewski, Donnellan, & Robins, 2003). The combined pattern of results for mean-level and rank-order change suggests that adolescence is a critical period in self-esteem development and, therefore, might be of particular importance for interventions aimed at improving self-esteem.

The present research provides further evidence on the gender difference—or, rather, similarity—in self-esteem. Whereas previous research typically found a small gender difference in adoles-

<sup>5</sup> The variance of the quadratic and cubic factor of self-esteem and the variance of the cubic factor of sense of mastery were set to 0 to allow for convergence of the models.

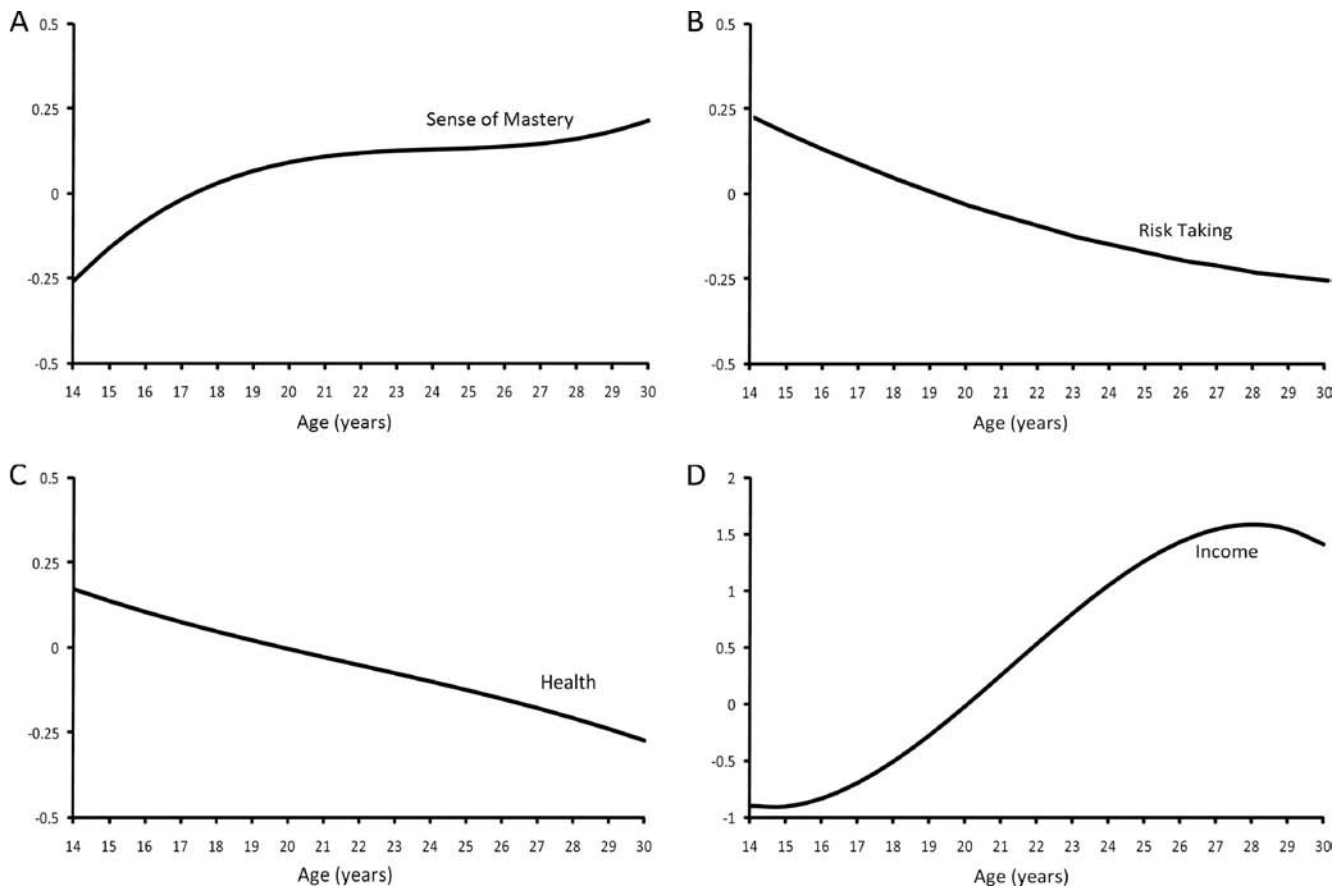


Figure 3. Average predicted trajectories of time-varying covariates (sense of mastery, risk taking, health, and income). The measures were converted to z scores for the analysis.

cence (Kling et al., 1999; Quatman et al., 2001) and young adulthood (Orth et al., 2010; Robins, Hendin, & Trzesniewski, 2001), in this study, which used a national probability sample, the gender effect was nonsignificant, despite the large sample size and consequent considerable statistical power. Moreover, the gender difference remained nonsignificant even when we controlled for differences in sense of mastery. In combination, the available evidence strongly suggests that the difference between men's and women's self-esteem during adolescence and young adulthood is at most small or even nonsignificant. The converging evidence on gender similarity in self-esteem is important because false beliefs in gender differences in self-esteem may carry substantial costs. For example, parents, teachers, and counselors may overlook self-esteem problems in male adolescents and young men because of the widespread belief that men have higher self-esteem than women do (Hyde, 2005).

Consistent with previous research (Bachman et al., 2010; Gray-Little & Hafdahl, 2000; Robins et al., 2002; Twenge & Crocker, 2002), the present study found that Blacks have higher self-esteem than Whites do in adolescence and young adulthood. Comparisons between Hispanics and other ethnicities were more complex: In adolescence Whites had higher self-esteem than Hispanics did, whereas in young adulthood the order changed, with Hispanics reporting higher self-esteem than Whites did. This finding may

explain why previous studies found inconsistent results with regard to whether Whites have higher or lower self-esteem than Hispanics do (e.g., Bachman et al., 2010; Birndorf et al., 2005; Carlson et al., 2000; Twenge & Crocker, 2002). It is important that ethnic differences remained significant (and the pattern of results held) even when we controlled for sense of mastery. Thus, differences in sense of mastery cannot account for ethnic differences in self-esteem development. Overall, however, the observed differences among Whites, Blacks, and Hispanics were small.

In this research, which included participants born between the early 1970s and the early 1990s, we did not find any evidence for cohort effects on the trajectory of self-esteem. This strengthens the generalizability of the results. Likewise, no cohort differences were found in the study by Orth et al. (2010), who examined the self-esteem trajectory of individuals born between the 1890s and 1960s. Thus, although the claim that there has been a generational increase in self-esteem levels has intuitive appeal (Twenge & Campbell, 2001, 2008), the available evidence suggests that the average self-esteem trajectory has not changed across the generations born in the 20th century (see also Trzesniewski & Donnellan, 2010; Trzesniewski, Donnellan, & Robins, 2008).

The results of the present study suggest that sense of mastery (i.e., the perceived control over one's life; cf. Pearlin et al., 1981) is an important moderator of the self-esteem trajectory. First, at

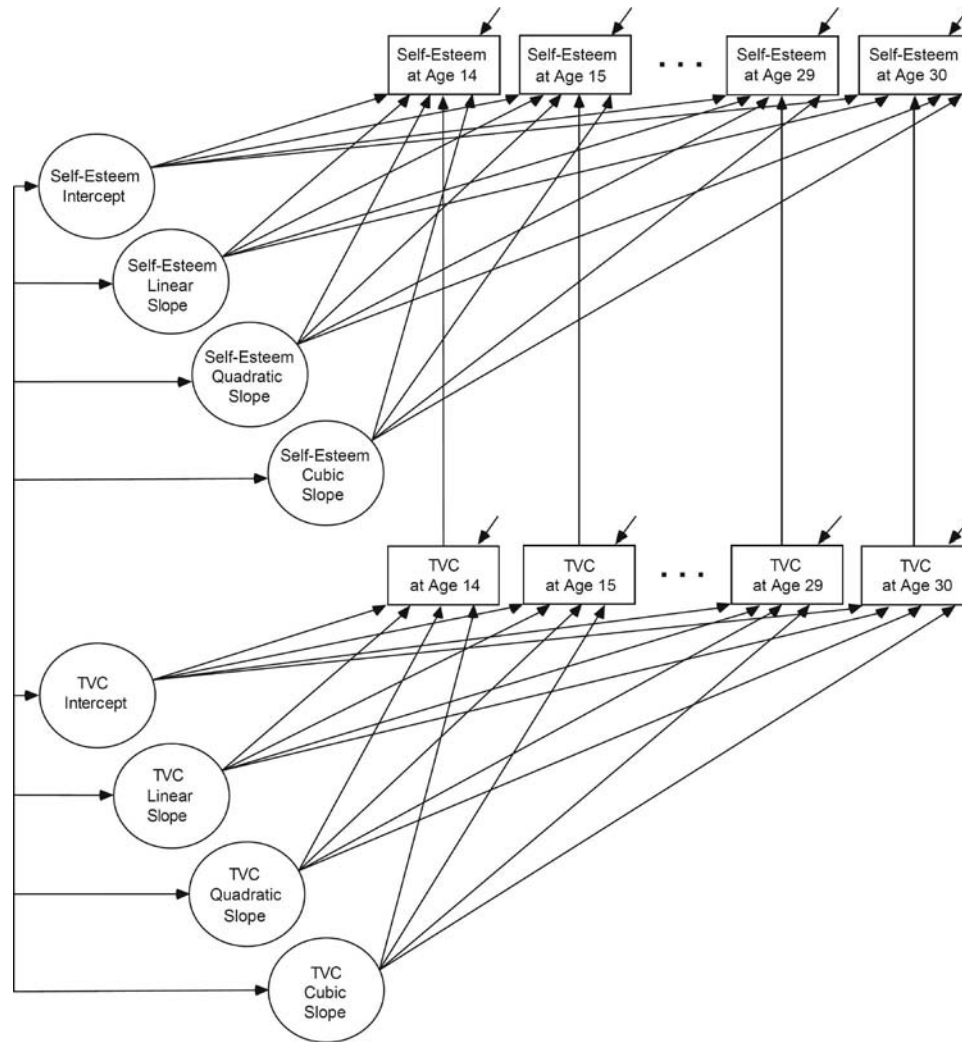


Figure 4. Generic model used for the analysis of time-varying covariate (TVC) effects on self-esteem, shown for cubic growth in the TVC (the model for quadratic growth was specified accordingly). In this model, self-esteem on specific measurement occasions is explained simultaneously by self-esteem growth curve factors and a repeatedly measured TVC. The model includes covariances between growth factors of self-esteem and the TVC.

each age, sense of mastery had a strong positive effect on the participants' level of self-esteem. Second, sense of mastery also moderated the shape of the self-esteem trajectory: When we statistically controlled for sense of mastery, the slope of the self-esteem growth curve was significantly flattened. Given that the average trajectory of sense of mastery was similar to the self-esteem trajectory (i.e., relatively strong increases in adolescence and smaller increases in young adulthood), the findings suggest that the normative development of sense of mastery may be an important factor in the normative development of self-esteem (cf. Conger, Williams, Little, Masyn, & Shebloski, 2009). Sociometer theory (Leary & Baumeister, 2000; Leary, Tambor, Terdal, & Downs, 1995) may provide for an explanation for the strong effect of sense of mastery on self-esteem. According to this theory, self-esteem reflects a person's subjective assessment of his or her own relational value (i.e., how much he or she is a desirable person

for inclusion in groups and close relationships). Being a competent person and having control over one's life are central aspirations for many people, and competence and control may therefore be perceived as important indicators of relational value (although people likely differ on which attributes indicate relational value and, consequently, influence their self-esteem; see Crocker & Wolfe, 2001). Future research should test whether sense of mastery mediates the effects of achievements and success in education, work, and relationships on self-esteem.

In contrast, the results of the present research suggest that income does not influence the level or shape of the self-esteem trajectory in adolescence and young adulthood. Correspondingly, previous research found that income predicted the self-esteem trajectory in middle adulthood and old age but not in adolescence and young adulthood (McMullin & Cairney, 2004). Also, in a meta-analysis on the relation between SES and self-esteem

Table 5

*Fit of Growth Curve Models of Self-Esteem With Time-Varying Covariates (TVCs) and Standardized Regression Coefficients of TVCs*

| TVC              | Fit information |           |     |     |                   | $\beta$ |
|------------------|-----------------|-----------|-----|-----|-------------------|---------|
|                  | $\chi^2$        | <i>df</i> | TLI | CFI | RMSEA [90% CI]    |         |
| Sense of mastery | 650.2*          | 550       | .99 | .99 | .005 [.003, .007] | .51*    |
| Risk taking      | 660.0*          | 551       | .98 | .98 | .005 [.004, .007] | -.13*   |
| Health           | 672.1*          | 542       | .99 | .99 | .006 [.004, .007] | .10*    |
| Income           | 971.9*          | 553       | .94 | .95 | .011 [.009, .012] | .02     |

Note. *df* = degrees of freedom; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval.

\*  $p < .05$ .

(Twenge & Campbell, 2002), which found a significant but small correlation, the effect size was smaller in adolescence and young adulthood than in middle adulthood. Moreover, the effect size was smaller when income was used as an indicator of SES than when other indicators of SES (i.e., occupational status and education) were used. Thus, the available evidence suggests that self-esteem of adolescents and young adults is, at most, only slightly influenced by their income.

The self-esteem trajectory found in the present research fits well into what is known about the life span development of self-esteem. The available evidence suggests that self-esteem follows a quadratic trajectory from adolescence to old age, increasing during young and middle adulthood, reaching a peak at about age 60, and declining in old age (Orth et al., 2010; Robins et al., 2002; Shaw, Liang, & Krause, 2010). The present research suggests that, in particular, emotional stability, extraversion, conscientiousness, and sense of mastery are important predictors of the self-esteem trajectory in adolescence and young adulthood. Future research should therefore test for the effects of these variables on the life span development in self-esteem. For example, it is possible that—similar to the finding of the present study—normative decline in sense of mastery partially accounts for the normative decline in self-esteem in old age. In fact, there is some evidence that the development of sense of mastery and related constructs, such as

self-efficacy, follow a life span trajectory similar to that for self-esteem (Berry & West, 1993).

The findings reported here are also largely consistent with the literature on personality development. Self-esteem is most closely associated with the personality traits of emotional stability, extraversion, and conscientiousness (Robins, Hendin, & Trzesniewski, 2001; Robins, Tracy, et al., 2001; Watson et al., 2002). On average, emotional stability and conscientiousness increase in adolescence and young adulthood and extraversion shows minimal change (Allemand, Zimprich, & Hendriks, 2008; Lucas & Donnellan, 2009; Roberts, Walton, & Viechtbauer, 2006; Srivastava, John, Gosling, & Potter, 2003). The results of the present study suggest that self-esteem follows a trajectory similar to that for emotional stability and conscientiousness. Moreover, emotional stability and extraversion had the strongest effects on the level of the self-esteem trajectory.

However, a limitation of the present research is that, for each participant, the Big Five personality traits were assessed only once and therefore could not be analyzed as time-varying covariates. Therefore, future research would benefit from repeated assessments of the Big Five, so that the possible dynamic interplay between development of self-esteem and Big Five personality traits can be examined. At present, we can only speculate as to whether, for example, people increase in self-esteem during ado-

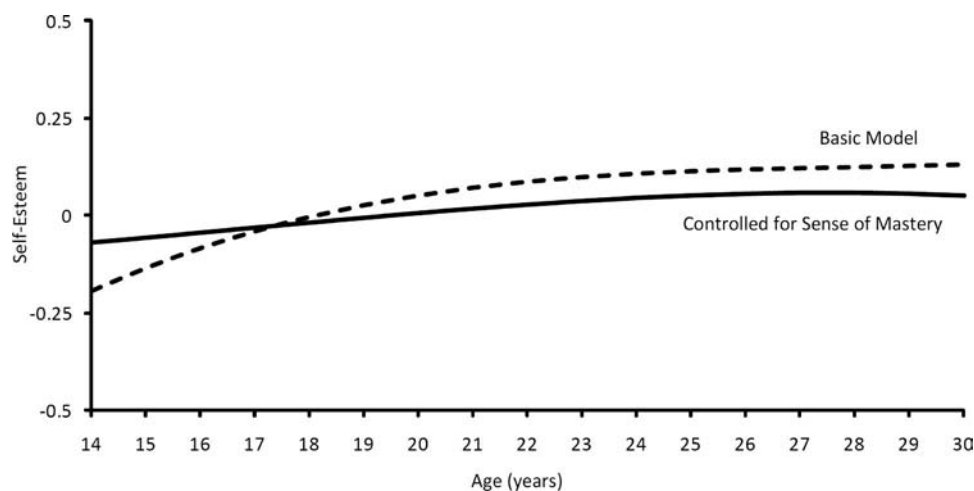


Figure 5. Average predicted trajectory of self-esteem controlling for sense of mastery. The measures were converted to z scores for the analysis.

lescence and young adulthood because they increase in conscientiousness, whether they increase in conscientiousness because they increase in self-esteem, or whether the conscientiousness and self-esteem trajectories are independent of each other.

Another limitation of this study is that it does not allow for causal conclusions regarding the effects of moderators on self-esteem development. As in all passive observational designs, effects between variables may be caused by third variables that were not assessed (Finkel, 1995). Although the time-varying and time-invariant covariates moderated the self-esteem trajectories, it is possible that the effects were caused by other psychological or demographic variables that were not included in the model. For example, researchers should examine the direction and causality of the relation between sense of mastery and self-esteem. Although it is plausible that sense of mastery influences self-esteem, it is also possible that self-esteem influences sense of mastery, that sense of mastery and self-esteem reciprocally influence each other, or that third variables account for the relation between the constructs.

The present study included participants from a national probability sample from the United States. Future research should examine self-esteem development in countries from diverse cultural contexts, such as Asian and African cultures (cf. Arnett, 2008). For example, individuals from Asian and Western cultures show different self-construal styles and different tendencies toward self-enhancement (Heine, Lehman, Markus, & Kitayama, 1999; Markus & Kitayama, 1991), which may have consequences for the average self-esteem trajectory and for the relations between self-esteem and moderating factors. Therefore, whether studies with samples from other cultural contexts would yield the same results as the present study is unknown.

In summary, the present research contributes to the understanding of self-esteem development in adolescence and young adulthood by providing evidence on the normative trajectory based on longitudinal data from a large national probability sample and by identifying several moderators of the trajectory. Sense of mastery, emotional stability, extraversion, conscientiousness, low risk taking, and health were factors that were of particular importance in explaining individual differences in the self-esteem trajectory. If future research provides evidence that these factors causally influence self-esteem, this knowledge might provide the basis for effective interventions aimed at improving self-esteem.

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