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Is “Maturing out” of Problematic Alcohol Involvement Related to Personality Change?

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Abstract

Problematic alcohol involvement typically peaks in the early 20s and declines with age. This maturing out of alcohol involvement is usually attributed to individuals attaining adult statuses incompatible with heavy drinking. Nevertheless, little is known about how changes in problematic alcohol use during emerging/early adulthood relate to changes in etiologically relevant personality traits that also change during this period. This study examined the relation between changes in problematic alcohol involvement and personality (measures of impulsivity, neuroticism, and extraversion) from ages 18 to 35 in a cohort of college students ($N = 489$) at varying risk for alcohol use disorders. Latent growth models indicated that both normative and individual changes in alcohol involvement occur between ages 18 and 35 and that these changes are associated with changes in neuroticism and impulsivity. Moreover, marital and parental role statuses did not appear to be third-variable explanations of the associated changes in alcohol involvement and personality. Findings suggest that personality change may be an important mechanism in the maturing-out effect.

Keywords

personality change; personality; alcohol use disorders; maturing out; prospective study

Problematic alcohol involvement, including drinking that leads to unwanted consequences and/or alcohol use disorders (AUDs), tends to increase through late adolescence, peak in the early 20s, and decline as individuals age (Dawson, Grant, Stinson, & Chou, 2004; Fillmore, 1988; Johnston, O'Malley, & Bachman, 1998). This period of normative decline in problematic use has been referred to as *maturing out* (Christo, 1998; Donovan, Jessor, & Jessor, 1983; Winick, 1962) and is thought to be linked to individuals' assuming adult roles and responsibilities and adopting a more conventional lifestyle (Bachman et al., 2002; Fillmore, 1988; Jessor, Donovan, & Costa, 1991; Yamaguchi & Kandel, 1985) toward the end of “emerging adulthood” (roughly ages 18–25 years old; Arnett, 2000), the transitional period from adolescence to young adulthood.

In a recent article reviewing the tendency of individuals to mature out of problematic alcohol use, O'Malley (2004–2005) discussed common transitions experienced during emerging adulthood, such as marriage and parenthood, and how they relate to declines in problematic drinking. For example, marriage has been shown to reduce alcohol consumption, especially problematic alcohol use (Bachman et al., 2002; Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Leonard & Rothbard, 1999). Pregnant women appear to reduce their alcohol use for a number of reasons, including the belief that alcohol is harmful to the

developing fetus (Coles, 1994). Furthermore, becoming a parent appears to be the key event to prompt men to reduce their drinking (Bachman et al., 1997). Marriage and parenthood are thought to bring about reductions in social and recreational activities linked to drinking, such as attending parties and going out with friends to bars (O'Malley, 2004–2005).

The negative relation of social roles (e.g., marriage/parenthood) to specific patterns of behavior (e.g., problematic drinking) has been labeled *role incompatibility* (Yamaguchi & Kandel, 1985). The association between social roles and substance use is thought to be determined by two different processes: role selection and role socialization (Chassin, Presson, Sherman, & Edwards, 1992; Yamaguchi & Kandel, 1985). Role selection refers to the effects of substance use on later role involvement, whereas role socialization refers to the influence of adult roles on substance use behaviors. Similar to O'Malley's (2004–2005) conclusions after reviewing the relevant maturing-out literature, Gotham, Sher, and Wood (2003) concluded that the role selection effect of AUDs on later marriage is less plausible than the socialization effect of marriage on later AUDs and that role socialization is a major contributor to the maturing-out process of problematic alcohol involvement during early adulthood.

Additional Changes Occurring in Emerging and Young Adulthood

Besides systematic changes of alcohol involvement, a number of other developmental changes appear to occur during emerging and young adulthood. Though personality traits have traditionally been posited as intrinsic and unchanging internal dispositions (McCrae et al., 2000; but see also Costa & McCrae, 2006), more recent perspectives have begun to view personality traits as dynamic constructs that change systematically over the life course (e.g., Johnson, Hicks, McGue, & Iacono, 2007; Roberts, Caspi, & Moffitt, 2003). A burgeoning collection of cross-sectional and longitudinal studies have documented systematic patterns of mean-level changes in personality traits at various ages across the life span, including during emerging and young adulthood (Caspi, Roberts, & Shiner, 2005; McCrae et al., 1999; Roberts, Walton, & Viechtbauer, 2006). A recent meta-analysis (Roberts et al., 2006) found a clear pattern of normative change across the life course, with people becoming more socially dominant, conscientious, and emotionally stable with age. Consistent with other findings (e.g., Roberts, Caspi, & Moffitt, 2001), Roberts and colleagues (2006) found that personality traits changed more during emerging and young adulthood than during any other period of the life course, including adolescence.

Furthermore, several authors have noted a normative trend toward personality structures that reflect greater self-control, risk avoidance, agreeableness, and emotional stability as people reach adulthood (e.g., Johnson et al., 2007). Similar to the maturing-out effect discussed in the alcohol literature, these normative changes in personality are largely attributed to individuals' undergoing role transitions associated with adulthood, such as marriage and parenthood (Helson, Kwan, John, & Jones, 2002; Roberts et al., 2006; Roberts, Wood, & Smith, 2005). The tendency of individuals' personality structures to exhibit developmental adaptation to cope with the roles and tasks associated with adulthood has been labeled the *maturity principle* (Caspi et al., 2005). Several empirical studies support this perspective, as changes in femininity and dominance have been linked to marital and family status (Roberts, Helson, & Klohnen, 2002) and emotional stability has been found to correspond with experiencing satisfying relationships (Roberts & Chapman, 2000; Robins, Caspi, & Moffitt, 2002).

Problematic Alcohol Involvement and Personality

Several personality traits have been linked to problematic alcohol involvement. In a review of personality, alcohol use, and AUDs, Sher, Grekin, and Williams (2005) discussed the relationship between alcohol involvement and personality dimensions that broadly correspond to the Big Three models of personality proposed by H. J. Eysenck (1994) and Tellegen

(1994): impulsivity/disinhibition, neuroticism/negative emotionality, and extraversion/sociability.

Impulsivity/Disinhibition

Impulsivity/disinhibition have been linked to AUDS, such that individuals who meet AUD criteria tend to score higher on both self-report (Bennett, McCrady, Johnson, & Pandina, 1999; McGue, Slutske, Taylor, & Iacono, 1997; Trull, Waudby, & Sher, 2004) and laboratory (Kollins, 2003; Petry, 2001, 2002) measures of these traits. Furthermore, impulsivity/disinhibition has prospectively predicted AUDs in both high-risk (Sher, Bartholow, & Wood, 2000) and other samples (Caspi, Moffitt, Newman, & Silva, 1998; Schuckit, 1998).

Neuroticism/Negative Emotionality

High rates of depression and anxiety have been found in alcoholic samples (Gratzer et al., 2004; Hasin & Nunes, 1997; Weitzman, 2004), and self-report measures of neuroticism tend to be higher in individuals with AUDs (Jackson & Sher, 2003; McCormick, Dowd, Quirk, & Zegarra, 1998; Prescott, Neale, Corey, & Kendler, 1997). However, the relationship between neuroticism/negative emotionality and the later development of alcohol-related problems remains unclear, with some studies indicating that neuroticism/negative emotionality predicts subsequent onset and course of AUDs (Zimmerman et al., 2003) and other studies suggesting that neuroticism/negative emotionality is a consequence of extended problematic alcohol involvement (Sutherland, 1997).

Extraversion/Sociability

The relationship between extraversion/sociability and problematic alcohol involvement remains unclear. Though some studies have indicated a positive relation between extraversion/sociability and drinking onset (Hill, Shen, Lowers, & Locke, 2000; Hill & Yuan, 1999), alcohol consumption among nonalcoholics (Cook, Young, Taylor, & Bedford, 1998; Flory, Lynam, Milich, Leukefeld, & Clayton, 2002; Grau & Ortet, 1999; Martsh & Miller, 1997), and the later development of alcohol problems (Kilbey, Downey, & Breslau, 1998; Wennberg, 2002), many studies of extraversion and alcohol problems/consumption have yielded negative findings (e.g., LoCastro, Spiro, Monnelly, & Ciraulo, 2000; Stacy & Newcomb, 1998; see Sher et al., 2005, for a discussion).

Problematic Alcohol Involvement and Personality: The Importance of Correlated Change

As just noted, researchers have traditionally viewed personality as static traits that are modeled as etiological correlates of problematic alcohol involvement rather than dynamic constructs that exhibit both change and stability across time and may influence or be influenced by problematic alcohol involvement (Sher et al., 2005; Sher, Trull, Bartholow, & Vieth, 1999). It remains unclear how changes in problematic alcohol involvement relate to changes in personality, especially with regard to individual differences in change. Although common mean-level trends for decreased alcohol use and changes in personality linked to maturity during emerging adulthood exist, there is variability in the respective course of these variables. For example, some individuals continue to drink at elevated or increasing levels into middle adulthood and beyond (Fillmore, 1988). Furthermore, research indicates that a statistically significant percentage of individuals exhibit personality change in the opposite direction (i.e., nonnormative change) compared with the overall sample (Robins, Fraley, Roberts, & Trzesniewski, 2001).

Demonstrating a relation of change in problematic alcohol involvement to changes in personality has both theoretical and clinical implications. Theoretically, correlated change between problematic alcohol involvement and personality would call for a broader developmental framework in which changes in these constructs are viewed in the context of each other. Linking changes in personality to changes in alcohol involvement could also have substantial clinical relevance. If personality change leads to changes in alcohol involvement, then clinical assessments should address changes in personality along with changes in drinking behaviors. Additionally, concurrent changes in both problematic drinking behaviors and personality may indicate that the individual has undergone substantial underlying change, whereas changes in drinking behaviors but not personality may signal ongoing risk of relapse or recurrence. Furthermore, interventions could focus on strategies to modify personality traits related to drinking.

Current Study/Hypothesis

Normative change in both problematic alcohol involvement and personality has been largely attributed to individuals' undertaking roles associated with adulthood, such as marriage and parenthood. However, a formal investigation of how changes in problematic alcohol involvement correspond to changes in personality while accounting for adult role status (e.g., marital, parental) has yet to be conducted. This article is an investigation of the nature of the respective changes in problematic alcohol involvement and personality and how these changes are associated, accounting for the adult role statuses (i.e., marriage and parenthood) assumed during emerging and early adulthood.

The current article addresses two major questions: Are changes in problematic alcohol use and personality significantly related to one another? If so, can this relationship be accounted for by the potential mediators of critical adult role statuses, such as marriage/parenthood?

Method

Participants and Procedure

Data were drawn from a prospective high-risk study on family history of alcoholism (FH) and other correlates of alcoholism (see Sher, Walitzer, Wood, & Brent, 1991, for a full description of the study). The baseline sample comprised 489 first-year college students (46% male, mean age = 18.2 years) from a large midwestern university. On the basis of criteria discussed below, half (51%) of the respondents were classified as FH positive (FH+). Respondents were prospectively assessed seven times over 16 years (roughly at ages 18, 19, 20, 21, 25, 29, and 35 years old) by both interview and paper-and-pencil questionnaire. In all, over 84% of participants were retained over the first 11 years of the study, and over 78% were retained through Year 16 (mean age = 34.5 years).

Measures

Family history of alcoholism—At baseline, criteria from the Short Michigan Alcoholism Screening Test (SMAST; Selzer, Vinokur, & van Rooijen, 1975), adapted to measure paternal and maternal drinking problems (F-SMAST and M-SMAST, respectively; Crews & Sher, 1992), and the Family History-Research Diagnostic Criteria interview (FH-RDC; Endicott, Andreasen, & Spitzer, 1978) were used to diagnose paternal FH. A positive FH was coded if the biological father scored a 4 or more on the F-SMAST (see Sher et al., 1991, for additional details concerning F-SMAST criteria) and met FH-RDC criteria for alcoholism. If no first-degree relative received a diagnosis of alcohol, drug abuse, or antisocial personality disorders and there was no AUD or drug use disorder in a second-degree relative, negative FH was coded. Sex and FH were entered as exogenous variables in all bivariate growth models to control for

the potential influence of these variables on alcohol involvement, personality, and marital/parental status.

Problematic alcohol involvement—A sum of 27 items consisting of both negative consequences associated with drinking and symptoms related to alcohol dependence (consistent with the alcohol dependence syndrome described by Edwards & Gross, 1976) was calculated at each wave (approximately corresponding to ages 18, 19, 20, 21, 25, 29, and 35). Items were based on items from the Michigan Alcoholism Screening Test (Selzer, 1971), and additional items were generated to produce a comprehensive list of negative consequences of alcohol consumption and dependence symptomatology (see Sher et al., 1991; items available upon request). Participants were asked if in the past year they had experienced alcohol-related consequences/symptoms (e.g., “In the past year, have you: Gotten in trouble at work or school because of drinking?”). Internal consistency, as measured by coefficient alpha, was .87 at age 18, .87 at age 19, .89 at age 20, .90 at age 21, .89 at age 25, .90 at age 29, and .90 at age 35.

Personality—A sum of 10 items was used to assess impulsivity at baseline (age 18) and subsequently at ages 25, 29, and 35, respectively. Four of these items (e.g., “I often do things on the spur of the moment”) were drawn from the Eysenck Personality Inventory (H. J. Eysenck & Eysenck, 1968), and the remaining six items (e.g., “I often follow my instincts, hunches, or intuition without thinking through all the details”) were taken from the short-form of the Tridimensional Personality Questionnaire (Sher, Wood, Crews, & Vandiver, 1995). Neuroticism and extraversion were assessed by the Eysenck Personality Questionnaire (EPQ; H. J. Eysenck & Eysenck, 1975) at age 18 and subsequently at ages 25, 29, and 35. The Neuroticism scale includes characteristics such as anxiety, depression, guilt, shyness, moodiness, and emotionality, and the Extraversion scale encompasses lower order traits such as sociability, assertiveness, liveliness, and surgency. Internal consistency, as measured by coefficient alpha, was .79 at age 18, .81 at age 25, .75 at age 29, and .75 at age 35 for the Impulsivity scale¹; .85 at age 18, .88 at age 25, .85 at age 29, and .88 at age 35 for the Neuroticism scale; and .83 at age 18, .84 at age 25, .85 at age 29, and .86 at age 35 for the Extraversion scale.

Marriage/parenthood—At each assessment period, participants were asked, “What is your current marital status—married, widowed, separated, divorced, engaged, or never married?” Also at each wave of assessment, participants were asked, “How many children have you (fathered/given birth to)?” Less than 5% and 4% of participants reported being married or having children, respectively, before the fifth assessment period. Therefore, only marital and parental statuses from assessments corresponding to roughly ages 25, 29, and 35 were used in subsequent analyses (see Results section, below).

¹The Psychoticism scale, which measures traits related to aggression, egocentrism, impulsivity, and antisociality, is a part of Eysenck's Big Three personality traits (along with neuroticism and extraversion) and is considered an excellent measure of the broad trait of behavioral undercontrol (e.g., Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). However, consistent with other studies, the Psychoticism scale yielded a lower estimate of internal consistency than other EPQ scales (.57 at age 18, .52 at age 25, .47 at age 29, and .55 at age 16; see S. G. B. Eysenck, Eysenck, & Barrett, 1985). Costa and McCrae (1995) reported a coefficient alpha of .62 for the Psychoticism scale of the Eysenck Personality Questionnaire-Revised (IEPQ-R) vs. .97 and .89 for the Extraversion and Neuroticism scales, respectively). Heath, Cloninger, and Martin (1994) found coefficient alphas for the Psychoticism scale ranging from .36 to .46 for men and .31 to .44 for women using a short version of the EPQ-R that, when adjusting for number of items, are equivalent to coefficient alphas on the full measure ranging from .48 to .59 for men and .44 and .46 for women. Due to the reliability concerns of the Psychoticism scale, we chose to utilize and present a scale consisting of items related to impulsivity and producing acceptable levels of alpha (.75 or higher) in the current article. However, it is important to note that parallel analyses utilizing the Psychoticism scale yielded nearly identical conclusions compared with the impulsivity analyses presented in the current article, though, notably, the Impulsivity scale utilized in the current article was not significantly correlated with family history of alcoholism.

Analytic Procedure

To understand how changes in problematic alcohol involvement correspond to change in personality, it is important to investigate the correlated change of problematic alcohol involvement and personality at the individual level. An analytic procedure utilized to examine correlated change between constructs of interest is that of latent growth models (LGMs). These models examine the development of individuals on one or more outcome variables over time by using random effects conceptualized as continuous latent growth factors (Bollen & Curran, 2006). This approach has a number of advantages, including the use of multiple assessment periods and the models being tolerant of missing data.

The baseline bivariate LGM is displayed in Figure 1. The personality intercept and personality slope depicted in Figure 1 represent the initial modeling of the respective personality constructs (i.e., impulsivity, neuroticism, extraversion), whereas the alcohol intercept and alcohol slope represent the initial modeling of the alcohol involvement variables (see Figure 1 caption for more details). The intercept factors represent the initial level (roughly age 18) in the respective constructs of personality and problematic alcohol involvement. Thus, a significant correlation between these factors would indicate a relation between baseline personality and baseline problematic alcohol involvement. The slope factors depicted in Figure 1 indicate change in the respective constructs of personality and problematic alcohol involvement. A significant correlation between the slope factors (as depicted by a dotted line in Figure 1) would indicate that changes in personality are associated with changes in problematic alcohol involvement. For example, a significant positive correlation between the slope of neuroticism and the slope of alcohol involvement would indicate that individuals who decreased in neuroticism were more likely to also decrease in problematic alcohol involvement.

Furthermore, the slopes of personality and alcohol involvement could be statistically controlled for the influence of marriage/parenthood to determine if a significant relation between the slope of personality and the slope of alcohol involvement remains when accounting for marriage/parenthood. Additionally, the influence of initial personality and problematic alcohol involvement on marriage/parenthood can be assessed. This model is depicted in Figure 2. In this figure, Path A indicates the relation of baseline personality to acquiring marriage/parenthood. Path B indicates the relation of baseline problematic alcohol involvement to acquiring marriage/parenthood. Path C indicates the relation of marriage/parenthood to personality change. Path D indicates the relation of marriage/parenthood to changes in problematic alcohol involvement. The solid line between the latent intercepts represents the correlation of the initial level of personality and problematic alcohol involvement. Of paramount interest, the dotted line between the latent slopes represents correlated change between personality and problematic alcohol involvement while accounting for marriage/parenthood.

Results

Latent Growth Models

Mean-level changes in impulsivity, neuroticism, extraversion, and problematic alcohol involvement are shown in Figure 3. Zero-order correlations among the personality constructs of impulsivity, neuroticism, and extraversion with problematic alcohol involvement, marital status, parental status, biological sex, and FH are presented in Table 1. Zero-order correlations among impulsivity, neuroticism, and extraversion are presented in Table 2. Zero-order correlations among problematic alcohol involvement, marital status, parental status, biological sex, and FH are presented in Table 3. Participants who reported abstaining from alcohol across all assessments ($n = 6$) were excluded from all analyses. LGMs were used to examine the respective changes in impulsivity, neuroticism, extraversion, and problematic alcohol

involvement. LGMs were estimated using the statistical package Mplus Version 5 (Muthén & Muthén, 2007). Unless noted otherwise, maximum likelihood estimation with robust standard errors (Satorra & Bentler, 1994) was employed for the LGMs. To allow for analysis of data containing missing values, all LGMs were estimated using full information maximum likelihood (FIML),² which assumes that data are missing at random.

Univariate Growth Models

To determine which LGMs best fit the data, three unconditional LGMs were modeled for each construct of interest: intercept only, linear (intercept and linear slope), and nonlinear (intercept and a nonlinear slope; Meredith & Tisak, 1990). For all four variables of interest, the nonlinear model was best fitting (see Table 4). This model involved linear coding of the measurement occasions corresponding approximately to ages 18–29 with the last time of measurement (approximate age 35) estimated freely, reflecting a leveling off of the rate of change as participants entered into the 4th decade of life. Furthermore, all longitudinally measured constructs exhibited significant variability in both the intercept and the slope, indicating the presence of meaningful individual differences in study constructs in both the initial level (at approximate age 18) and the rate of change over the study period (see Table 5).

Personality—The respective nonlinear univariate LGMs for impulsivity, neuroticism, and extraversion demonstrated adequate to excellent fit to the data: impulsivity, $\chi^2(4, N = 483) = 13.91, p < .01$, comparative fit index (CFI) = .97, root-mean-square error of approximation (RMSEA) = .07, standardized root-mean-square residual (SRMR) = .05; neuroticism, $\chi^2(4, N = 483) = 10.07, p < .05$, CFI = .99, RMSEA = .06, SRMR = .04; extraversion, $\chi^2(4, N = 483) = 22.86, p < .001$, CFI = .97, RMSEA = .10, SRMR = .05 (see Loehlin, 2004, on evaluating model fit). As indicated in Table 5, mean-level decreases in all three personality constructs occurred from ages 18 to 35. For impulsivity and neuroticism, results also revealed a significant negative relationship between the intercept and slope (see Table 5), indicating that individuals with higher initial levels of these respective constructs tended to decrease at steeper rates (i.e., have more negative slopes) in these respective constructs compared with those having lower initial levels.

Problematic alcohol involvement—The respective nonlinear univariate LGM for problematic alcohol involvement provided an adequate fit to the data, $\chi^2(22, N = 483) = 63.38, p < .001$, CFI = .93, RMSEA = .06, SRMR = .06. Mean-level decreases in problematic alcohol involvement also occurred from ages 18 to 35 (see Table 5). Results also revealed a significant negative relationship between the intercept and slope of problematic alcohol involvement.

Bivariate Growth Models

The extent of correlated change in personality and problematic alcohol involvement was examined in a series of bivariate LGMs following the specifications described earlier. On the basis of the results of the univariate models, all bivariate LGMs consisted of an intercept and a nonlinear slope (i.e., the slope loading for the last assessment was freely estimated) for each construct of interest. To enhance interpretability, the freely estimated slope loadings (at the final measurement occasion) for the respective alcohol and personality constructs in each bivariate growth model were constrained to be equal. Furthermore, FH and sex were included as exogenous variables (i.e., exerting a direct influence on all study constructs) in all models.

Additionally, supplementary LGMs of respective changes in alcohol involvement and personality that dropped the last point of assessment (i.e., age 35) were also estimated, allowing linear (as opposed to freely estimated) slopes for the constructs of interest to be specified. This

²Via TYPE = GENERAL MISSING with ESTIMATOR = MLR within Mplus.

further reduces any interpretive ambiguity surrounding the estimates of correlated change between the slopes of alcohol involvement and personality and the relation of the slope parameters to other covariates. The results of these supplementary analyses yielded findings that are entirely consistent with the results presented below, with the exception that they specifically pertain to changes in problematic alcohol involvement and personality modeled linearly from ages 18 to 29 (rather than from 18 to 35 with a freely estimated slope loading at age 35). These supplemental analyses yielded findings that are comparable in pattern, magnitude, and significance level and lead to the same types of inferences, bolstering confidence that findings are not being driven by nonlinear aspects of change observed toward the end of the observation period.³

Three separate bivariate growth models, one for each personality construct, were estimated. These models provided good to excellent fit to the data, $\chi^2_s(65, N = 483) = 143.74\text{--}167.05$, $ps < .001$, CFIs = .94–.95, RMSEAs = .05–.06, SRMRs = .04–.05. As shown in Table 6, the respective intercepts for all three personality constructs (i.e., impulsivity, neuroticism, and extraversion) were positively correlated to the respective intercepts of alcohol involvement. These results indicate that individuals high in initial levels in these personality constructs were also high in initial levels of problematic alcohol involvement.

To address whether changes in personality and problematic alcohol involvement are significantly related to one another, the correlation between the latent slopes was examined (see Figure 1). A significant correlation between the two slopes indicates that changes in personality relate to changes in problematic alcohol involvement. The correlation coefficients between the respective slopes of impulsivity and neuroticism and the slope of the problematic alcohol involvement construct were positive and significant (see Table 6), indicating that changes in impulsivity and neuroticism across time correspond to changes in problematic alcohol involvement. The magnitude of these significant correlations ranged from .39 to .42, roughly indicating medium effect sizes (Cohen, 1988). However, the correlation coefficient between the slope of extraversion and the slope of the alcohol involvement construct was nonsignificant (see Table 6), indicating that changes in extraversion across time do not correspond to changes in problematic alcohol involvement.

In sum, the results suggest that individuals who decreased at steeper rates in the respective constructs of impulsivity and neuroticism from ages 18 to 35 tended to also decrease at steeper rates in problematic alcohol involvement across this time span, whereas individuals who failed to decrease or increased in the respective constructs of impulsivity and neuroticism tended to show shallower decreases or increases in problematic alcohol involvement. Results also suggest that changes in extraversion are not associated with changes in problematic alcohol involvement across this time span. Since the primary aim of this article is to examine the correlated change between alcohol involvement and personality, LGMs involving extraversion have been excluded from all further analyses.

The Influence of Marriage/Parenthood

To assess the influence of marriage/parenthood on the association between changes in problematic alcohol involvement and personality, an overall marriage/parenthood variable was constructed so that participants who were married (and never divorced) and/or reported they had children at the fifth, sixth, or seventh assessment period were scored as a 1 and participants who were not married across these assessment periods or reported they were divorced at any of these assessment periods and did not report having children at any assessment period were scored a 0.⁴

³These supplementary analyses are available from Andrew K. Littlefield upon request.

In total, this resulted in two models that were estimated to examine the influence of marriage/parenthood on the relation between personality and alcohol involvement.⁵ In these models, marriage/parenthood was modeled as an intervening variable with directional paths from the respective alcohol and personality intercepts to the marriage/parenthood variable and directional paths from the marriage/parenthood variable to alcohol and personality slopes (see Figure 2). The results from these models for impulsivity and neuroticism are presented in Figures 4 and 5, respectively. As indicated in these figures, the statistical significance of the relation between personality and alcohol involvement was unaffected. The magnitude of these correlations ranged from .30 to .35, roughly indicating medium effect sizes (Cohen, 1988). Furthermore, these models indicate that marriage/parenthood had socialization influences on neuroticism and problematic alcohol involvement, such that individuals who married (and stayed married) and/or had children from ages 25 to 35 tended to respectively decline in neuroticism and problematic alcohol involvement at steeper rates (i.e., have more negative slopes) than individuals who remained unmarried (or got divorced) and/or did not have children from ages 25 to 35.

In sum, the results from these analyses indicate that changes in personality and changes in problematic alcohol involvement over emerging and young adulthood significantly correspond even when accounting for the influence of marriage and parenthood. Furthermore, there is evidence that getting married and/or having children influences changes in neuroticism and problematic alcohol involvement, such that individuals who marry and/or have children make steeper reductions in these constructs across time.

Discussion

Perhaps the most dramatic epidemiological finding concerning the phenomenon of AUDs in the general population is the peak prevalence in emerging adulthood followed by a precipitous decrease in prevalence in the latter part of the 3rd decade of life. This phenomenon, first described with respect to opiate addiction almost half a century ago as maturing out (Winick, 1962), has received surprisingly little research attention with respect to intrapersonal processes related to maturation. Instead, most researchers and theorists have focused on the life tasks that are normatively undertaken during this period of life and how these tasks inhibit or preclude heavy involvement in substance use (e.g., O'Malley, 2004–2005; Yamaguchi & Kandel, 1985). Results from the current analyses suggest that psychological maturation (i.e., changes in impulsivity and neuroticism) correspond to changes in problematic alcohol involvement, accounting for marriage/parenthood. Specifically, decreases in these personality constructs were associated with decreases in problematic alcohol involvement. These findings suggest that the respective changes in personality and problematic alcohol involvement should be

⁴In separate analyses, the influence of marriage/parenthood on the association between changes in problematic alcohol involvement and personality was addressed in a number of ways. Marital status at the fifth, sixth, and seventh assessment periods (corresponding to roughly ages 25, 29, and 35) were used to assess the influence of marital status on the slopes of personality and alcohol involvement. Participants who were married (and never divorced) at the fifth, sixth, or seventh assessment period were scored as a 1, and participants who were not married across these assessment periods or reported they were divorced at any of these assessment periods were scored as a 0. In a parallel manner, a parental status variable was constructed so that participants who reported that they had children at the fifth, sixth, or seventh assessment period were scored as a 1 and participants who did not report having children across these assessment periods were scored as a 0. Furthermore, marital and parental statuses at the fifth, sixth, and seventh assessment periods were modeled as time-varying covariates. In these analyses, the respective manifest variables of personality (i.e., impulsivity and neuroticism) and problematic alcohol involvement at the fifth, sixth, and seventh assessment periods were controlled for marital or parental status at the corresponding wave of assessment. Due to the multicollinearity of marriage and parenthood, these variables were included as time-varying covariates in separate models. The results from these analyses yielded similar results to those presented in the article and are available from the authors upon request.

⁵Due to the inclusion of endogenous categorical variables (i.e., marriage/parenthood), weighted least square parameter estimates were used. The number of participants reported equals 481 instead of 483 in all analyses that utilized weighted least square parameter estimates because 2 participants (1 man and 1 woman) had missing values on FH status, which is an exogenous variable in all bivariate LGMS. Models that employed maximum likelihood estimation with robust standard errors allowed for these two participants to be included in the respective analyses.

considered from a developmental framework in which changes in these constructs are viewed in the context of each other.

From the standpoint of assessment, the association of changes in personality with changes in alcohol involvement also has clinical relevance. Though speculative, changes in both problematic drinking behaviors and personality may indicate that the individual has undergone substantial and beneficial change that is likely to be durable, whereas changes in drinking behaviors but not personality may signal increased risk for relapse or continued risk for associated problem behaviors. Clearly, this is highly speculative, but with respect to treatment, alcohol interventions could adjunctively target strategies to reduce personality traits related to drinking. For example, on the basis of links found between neuroticism and work satisfaction, researchers have recently suggested career counseling as a possible intervention to decrease neuroticism (Scollon & Diener, 2006). Similarly, interventions ranging from exercise regimes to cognitive skills programs (Baumeister, Gailliot, DeWall, & Oaten, 2006) aid increased self-regulation and, consequently, may facilitate developmental changes in impulsivity. In light of the current findings, this research suggests that interventions on career counseling and other relevant interventions may also be considered as a part of alcohol treatment. Obviously, support for these suggestions needs to be strengthened by replicating the current findings in other samples and treatment/intervention studies targeted at inducing personality change.

However, it is important to note that the current focus of this article does not speak to causality of personality constructs on alcohol involvement but rather addresses the potential reciprocal relationship between changes in personality change and problematic alcohol involvement. This approach and the subsequent findings in the current article are consistent with transactional models (Roberts et al., 2005) that highlight the codevelopment of constructs across the life span. Transactional perspectives best depict the findings in recent research on the relation between changes in alcohol involvement and changes in marital quality (Kearns-Bodkin & Leonard, 2005) and changes in personality and changes in relationship satisfaction (Scollon & Diener, 2006). Similarly, the results of the current study highlight the reciprocal relation of changes in problematic alcohol involvement and changes in personality (i.e., impulsivity and neuroticism) but do not discern the temporal precedence of this association. The developmental processes involved in the corresponding changes of personality and problematic alcohol involvement most likely involve both genetic and environmental factors. In light of the current research findings, this complex relationship is best viewed from a transactional perspective rather than a simple “A causes B” framework.

Notably, changes in extraversion were not significantly linked to changes in problematic alcohol involvement. This is not entirely surprising, given the equivocal findings concerning the relation between extraversion and alcohol outcomes (see Sher et al., 2005). However, the initial level of extraversion was significantly linked to problematic alcohol involvement, indicating that those individuals who were higher in initial levels of extraversion were also higher in initial levels of problematic alcohol involvement. Recent work from this lab (Park, Sher, Wood, & Krull, 2009) has indicated that extraversion is associated with affiliation with Greek organizations, suggesting that extraversion plays a developmentally specific role in selection of drinking-relevant environments. That is, unlike the associations with impulsivity and neuroticism, the extraversion association may be attributable to age-specific, environmental effects. Taken together, these findings support the notion suggested by Sher et al. (2005) that extraverted individuals may be initially prone to heavy alcohol use but that the relation between being social and alcohol use declines as problematic outcomes from drinking increase.

Is Marriage/Parenthood a Sufficient Third-Variable Explanation for the Finding of Correlated Change?

Building on the findings from the previous analyses, the significant relation found between changes in personality (i.e., impulsivity and neuroticism) and problematic alcohol involvement was examined while accounting for marriage/parenthood. These analyses indicate that changes in problematic alcohol involvement and changes in personality significantly correspond while accounting for the influence of marriage/parenthood. Though the current analyses do not rule out the possibility that the corresponding changes between personality and alcohol involvement are best explained by a third-variable influence, they do suggest that marital/parental status is not a sufficient third-variable explanation for the finding of correlated change.

A possible, though highly speculative, third-variable explanation for the finding of correlated change is that neurodevelopment of the prefrontal cortex contributes to both changes in problematic alcohol involvement and personality in young adulthood. The prefrontal cortex undergoes considerable development during adolescence and emerging adulthood (Casey, Galvan, & Hare, 2005; Romine & Reynolds, 2005), and these changes coincide with the further development of processes, such as cognitive control, self-regulation, and affect regulation, that are thought to be important in coping with negative emotions and regulating one's behavior in general (Leibenluft, Charney, & Pine, 2003). The development of these processes could also account, at least partially, for declines in problematic alcohol involvement and the development of more mature personality configurations. Thus, though speculative, the corresponding changes between personality and alcohol involvement during late adolescence and emerging adulthood may be at least partially due to co-occurring neurodevelopment during this developmental period.

Additionally, the influence of initial problematic alcohol involvement and personality on the likelihood of getting married and/or having children and the influence of marital and/or parental status on changes in alcohol involvement and personality across time were examined. The bivariate LGMs suggested marital and/or parental status influenced changes in both neuroticism and problematic alcohol involvement. Individuals who married and/or had children tended to have steeper rates of decline in both problematic alcohol involvement and neuroticism. These results are consistent with previous research suggesting that marriage exerts a protective effect against problematic alcohol involvement (Bachman et al., 1997; Gotham et al., 2003; Kearns-Bodkin & Leonard, 2005). Additionally, the relation between marital and/or parental status and steeper rates of decline in neuroticism is consistent with the maturity principle (Caspi et al., 2005), which suggests that trends toward personality structures that reflect greater emotional stability (i.e., reverse-scored neuroticism) are linked to developmental adaptation to cope with the roles and tasks associated with adulthood (i.e., marriage/parenthood).

Limitations and Future Directions

Several limitations of the current study should be noted. One limitation of the current study is that the sample was initially drawn from first-time college freshmen entering a large university, which limits the ability to generalize findings to noncollege-attending populations. Furthermore, the sample is predominately White (93%). Thus, caution should be taken in generalizing these findings to other racial/ethnic groups. Additionally, the sample size was not large enough to allow separate LGMs for men/women or FH+/FH− individuals to be conducted.

It should also be noted that recent studies examining the respective relation between changes in personality and changes in alcohol involvement with adult roles, such as marriage, have focused on marital/relationship quality rather than marital/relationship status (e.g., Kearns-

Bodkin & Leonard, 2005; Scollon & Diener, 2006). It could be that marital quality, rather than status, influences changes in both alcohol involvement and personality (i.e., marital quality is a sufficient third-variable explanation for the finding of correlated change between alcohol involvement and personality). Similarly, parental status rather than parental involvement was assessed in the current analyses. It is possible that parental involvement (i.e., the degree to which the parent is the primary caregiver) as opposed to status accounts for the changes in both alcohol involvement and personality. The current analyses do not address these possibilities. Additionally, the influence of career changes on changes in both alcohol involvement and personality should be considered as a potential third-variable explanation for the finding of correlated change between alcohol involvement and personality in future studies.

Furthermore, with the exception of the impulsivity measure, the current study examined changes in broadband measures of personality (i.e., EPQ extraversion, neuroticism; H. J. Eysenck & Eysenck, 1975) rather than lower order structures or facets of personality. Researchers have recently suggested investigations of developmental trends for facets of personality (Costa & McCrae, 2006; Roberts et al., 2006). Whiteside and Lynam (2001) utilized factor analyses to identify four distinct personality facets associated with impulsive-like behavior: sensation seeking, lack of planning, lack of persistence, and urgency (which subsequently has been separated into positive and negative urgency; Cyders et al., 2007). Additionally, these facets were shown to account for different aspects of risky behaviors, including drinking-related behaviors (Smith et al., 2007). At face validity, the items utilized to measure impulsivity in the current study (e.g., [reverse-scored] "I think about all the facts in detail before I make a decision") tend to correspond with the lack of planning scale utilized by Whiteside and Lynam (e.g., [reverse-scored] "I usually think carefully before doing anything"), though factor analyses would be required to empirically validate this ostensible relation. Future research examining the nature of change in personality and alcohol involvement and the association of these changes would benefit from personality measures considered at the facet level.

Moreover, it would be beneficial to consider behavioral measures that may be useful intermediate phenotypes between personality and neurological functioning. As previously noted, significant neurodevelopment of the prefrontal cortex occurs during emerging and early adulthood and may contribute to changes in both problematic alcohol involvement and personality. Miyake et al. (2000) conducted factor analyses on behavioral measures of executive functioning and identified specific subtypes of this construct, including facets related to impulsivity. Future research should consider incorporating behavioral measures when examining personality change and related constructs.

In conclusion, the results of the current analyses suggest that both normative and individual changes in alcohol involvement occur between the ages of 18 and 35, and that changes are associated with changes in the personality constructs of impulsivity and neuroticism. Consistent with research supporting the ideas of maturing out and the maturity principle from the respective extant alcohol and personality literatures, these analyses suggest that marital and/or parental status influences changes in neuroticism and problematic alcohol involvement. However, marital and/or parental status does not appear to be sufficient third-variable explanation of the correlated change between problematic alcohol involvement and personality. These findings suggest that the respective changes in personality and problematic alcohol involvement should be considered from a developmental framework in which changes in these constructs are viewed in the context of each other. Furthermore, future research should examine both genetic and environmental factors that may contribute to the correlated change between problematic alcohol involvement and personality.

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Figure 1.

Bivariate latent growth model. Loadings for the intercept factors are constrained to unity. Loadings for the slope factors are equal to the number of years that has passed at each assessment since the beginning of the study, which represents linear change over time. The dotted line between the latent slopes represents correlated change between personality and problematic alcohol involvement. Pers. = personality; Alch. = problematic alcohol involvement.

Figure 2.

Bivariate latent growth model accounting for marriage/parenthood. Path A indicates the relation of initial personality to acquiring marriage/parenthood. Path B indicates the relation of initial problematic alcohol involvement to acquiring marriage/parenthood. Path C indicates the relation of marriage/parenthood to personality change. Path D indicates the relation of marriage/parenthood to changes in problematic alcohol involvement. The solid line between the latent intercepts represents the correlation of initial levels of personality and problematic alcohol involvement. The dotted line between the latent slopes represents correlated change between personality and problematic alcohol involvement while accounting for marriage/parenthood.

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Figure 3. Observed (full information maximum likelihood; $N = 483$) and estimated (from latent growth models) mean-level changes (with standard errors) for impulsivity, neuroticism, extraversion, and past-year problematic alcohol involvement. Reported means and prevalences were calculated from the respective univariate growth models for each construct.

Figure 4.

Bivariate latent growth model for impulsivity and problematic alcohol involvement with marriage/parenthood. Path A indicates the relation of initial personality to acquiring marriage/parenthood (estimated as a probit regression coefficient). Path B indicates the relation of initial problematic alcohol involvement to acquiring marriage/parenthood (estimated as a probit regression coefficient). Path C indicates the relation of marriage/parenthood to personality change. Path D indicates the relation of marriage/parenthood to changes in problematic alcohol involvement. The solid line between the latent intercepts represents the correlation of initial level of personality and problematic alcohol involvement. The dotted line between the latent slopes represents correlated change between personality and problematic alcohol involvement while accounting for marriage/parenthood. All within-construct and across-construct covariances were estimated but not presented. All variables were controlled for family history of alcoholism and sex. Model fit: $\chi^2(30, N = 481) = 96.26, p < .001$, comparative fit index = .93, root-mean-square error of approximation = .07. ** $p < .01$. *** $p < .001$.

Figure 5.

Bivariate latent growth model for neuroticism and problematic alcohol involvement with marriage/parenthood. Path A indicates the relation of initial personality to acquiring marriage/parenthood (estimated as a probit regression coefficient). Path B indicates the relation of initial problematic alcohol involvement to acquiring marriage/parenthood (estimated as a probit regression coefficient). Path C indicates the relation of marriage/parenthood to personality change. Path D indicates the relation of marriage/parenthood to changes in problematic alcohol involvement. The solid line between the latent intercepts represents the correlation of initial level of personality and problematic alcohol involvement. The dotted line between the latent slopes represents correlated change between personality and problematic alcohol involvement while accounting for marriage/parenthood. All within-construct and across-construct covariances were estimated but not presented. All variables were controlled for family history of alcoholism and sex. Model fit: $\chi^2(30, N = 481) = 89.63, p < .001$, comparative fit index = .93, root-mean-square error of approximation = .06. *** $p < .001$.

Table 1

Zero-Order Correlations Between Impulsivity, Neuroticism, Extraversion, and Indices of Past-Year Problematic Alcohol Involvement, Marital Status, Parental Status, Sex, and Family History of Alcoholism

Measure	Impulsivity				Neuroticism				Extraversion			
	Age 18	Age 25	Age 29	Age 35	Age 18	Age 25	Age 29	Age 35	Age 18	Age 25	Age 29	Age 35
Problematic alcohol involvement												
Age 18	.28**	.25**	.16**	.19**	.27**	.18**	.13**	.09**	.17**	.20**	.18**	.20**
Age 19	.33**	.28**	.18**	.25**	.23**	.21**	.12**	.11**	.16**	.17**	.16**	.18**
Age 20	.22**	.25**	.14**	.20**	.27**	.21**	.12**	.10**	.07**	.13**	.11**	.12**
Age 21	.14**	.18**	.14**	.10**	.22**	.18**	.14**	.07**	.08**	.09**	.05**	.08**
Age 25	.07**	.17**	.18**	.14**	.16**	.25**	.18**	.12**	.03**	.14**	.11**	.09**
Age 29	.08**	.12**	.19**	.14**	.10**	.22**	.21**	.13**	.09**	.08**	.08**	.09**
Age 35	.11**	.16**	.20**	.17**	.17**	.22**	.21**	.19**	.08**	.15**	.16**	.17**
Marital status												
Age 25	-.05	-.11	-.11	-.15**	-.01	-.01	.01	-.01	.05	-.11	-.08	-.07
Age 29	-.05	-.04	-.07	-.04	.02	-.08	-.08	-.07	.12	.02	-.01	.04
Age 35	-.02	-.04	-.06	-.03	.01	-.14**	-.14**	-.21**	.09	.05	.10	.05
Parental status												
Age 25	.03	-.04	.01	-.08	.07	.09	.07	.01	.10	-.09	.10	.02
Age 29	-.01	-.06	-.01	-.10	-.04	-.03	-.04	-.03	.07	-.04	-.05	.00
Age 35	-.05	-.07	-.04	-.10	-.04	-.04	-.07	-.08	.04	-.11	-.04	.00
Sex	.09	-.04	-.07	-.10	.10	.23**	.32**	.29**	.09	-.04	-.07	-.10
Family history	-.03	-.03	.05	.09	.22**	.23**	.12	.10	-.03	-.03	.05	.09
M	4.92**	3.63**	3.16**	3.06**	9.47**	8.09**	6.89**	7.58**	15.88**	14.61**	14.11**	13.20**
SD	2.88**	2.80**	2.47**	2.46**	5.01**	5.29**	4.76**	5.29**	2.58**	2.22**	2.07**	2.24**

Note. N = 483. 0 = men, 1 = women.

**
p < .05.

Table 2
Zero-Order Correlations Between Impulsivity, Neuroticism, and Extraversion

Measure	Impulsivity				Neuroticism				Extraversion			
	Age 18	Age 25	Age 29	Age 35	Age 18	Age 25	Age 29	Age 35	Age 18	Age 25	Age 29	Age 35
Impulsivity												
Age 18	—											
Age 25	.45**	—										
Age 29	.37**	.61**	—									
Age 35	.37**	.54**	.63**	—								
Neuroticism												
Age 18	.08	.12**	.07	.12**	—							
Age 25	.02	.04	.08	.06	.61**	—						
Age 29	.01	.02	.08	.06	.52**	.72**	—					
Age 35	.03	.04	.06	.04	.47**	.63**	.69**	—				
Extraversion												
Age 18	.27**	.20**	.21**	.20**	-.14**	-.02	-.02	-.07	—			
Age 25	.22**	.32**	.28**	.25**	-.05	-.15**	-.09	-.12**	.54**	—		
Age 29	.22**	.29**	.33**	.33**	-.02	-.09	-.12**	-.11**	.50**	.74**	—	
Age 35	.20**	.26**	.30**	.34**	.00	-.08	-.15**	-.22**	.51**	.68**	.78**	—

Note. $N = 483$. 0 = men, 1 = women.

**
 $p < .05$.

Table 3

Zero-Order Correlations Between Problematic Alcohol Involvement, Marital Status, Parental Status, Biological Sex, and Family History of Alcoholism

Measure	Problematic alcohol involvement						
	Year 1	Year 2	Year 3	Year 4	Year 7	Year 11	Year 16
Problematic alcohol involvement							
Age 18							
Age 19	.73**						
Age 20	.64**	.66**					
Age 21	.50**	.52**	.65**				
Age 25	.46**	.43**	.53**	.54**			
Age 29	.30**	.29**	.44**	.45**	.59**		
Age 35	.37**	.30**	.36**	.35**	.40**	.59**	
Marital status							
Age 25	-.05	-.09	-.19**	-.19**	-.42**	-.27**	-.21**
Age 29	-.08	-.06	-.15**	-.14**	-.25**	-.41**	-.29**
Age 35	.07	.04	-.08	-.04	-.17**	-.39**	-.36**
Parental status							
Age 25	.10	.01	.00	-.21**	-.13**	.00	.02
Age 29	-.07	-.11	-.15**	-.11**	-.29**	-.19**	-.11
Age 35	.02	.00	-.09	-.06	-.14**	-.24**	-.22**
Sex	-.12**	-.15**	-.20**	-.32**	-.30**	-.12**	-.11**
Family history	.22**	.23**	.13**	.18**	.15**	.18**	.15**
M	3.74**	3.20**	2.80**	2.61**	1.65**	1.04**	1.01**
SD	3.39**	3.21**	3.10**	3.05**	2.45**	1.97**	1.95**

Note. N = 483. 0 = men, 1 = women.

**
p < .05.

Table 4

Comparison of Model Fit Between Unconditional Latent Growth Curve Models for Impulsivity, Neuroticism, Extraversion, and Problematic Alcohol Involvement

Model	Model χ^2	df	Correction factor ^c	χ^2 difference	df difference
Impulsivity					
Intercept only	191.88	8	1.05		
Linear ^a	57.17	5	1.08	134.71 ^{****}	3
Nonlinear ^b	13.91	4	1.03	33.80 ^{****}	1
Neuroticism					
Intercept only	156.72	8	1.13		
Linear ^a	71.99	5	1.14	75.01 ^{****}	3
Nonlinear ^b	10.07	4	1.11	49.97 ^{****}	1
Extraversion					
Intercept only	220.64	8	1.04		
Linear ^a	28.49	5	1.00	174.10 ^{****}	3
Nonlinear ^b	22.86	4	0.86	3.65 [*]	1
Problematic alcohol involvement					
Intercept only	441.63	26	2.38		
Linear ^a	155.21	23	2.25	84.82 ^{****}	3
Nonlinear ^b	63.38	22	2.05	13.81 ^{****}	1

Note. $N = 483$.

^a Comparison for the chi-square difference test is between intercept and linear models.

^b Comparison is between nonlinear and linear models.

^c Correction factor was used to conduct the Satorra-Bentler scaled chi-square difference tests.

* $p < .06$.

**** $p < .001$.

Table 5

Standardized Estimates of Means (and Unstandardized Estimates of Variances) and Model-Estimated Correlations (and Covariances) of Latent Growth Curve Model Parameters Fit Separately for Impulsivity, Neuroticism, Extraversion, and Problematic Alcohol Involvement

Measure	Intercept (variance)	Slope (variance)	Correlation (covariance)
Personality			
Impulsivity	2.29 (4.49) ****	-1.04 **** (2.89) ***	-.46 (-1.64) ****
Neuroticism	2.20 (18.76) ****	-0.71 **** (13.01) ****	-.37 (-5.83) **
Extraversion	5.29 (9.00) ****	-0.84 **** (4.79) ***	.19 (1.23)
Alcohol involvement	1.23 (7.99) ****	-0.97 **** (6.63) ****	-.82 (-5.94) ****

Note. $N = 483$. Parameters estimated using maximum likelihood estimation with robust standard errors.

**
 $p < .05$.

 $p < .01$.

 $p < .001$.

Table 6
Correlations (and Covariances) for Bivariate Latent Growth Models of
Impulsivity, Neuroticism, and Extraversion With Problematic Alcohol
Involvement

Model	Problematic alcohol involvement	
	Intercept	Slope
Impulsivity and problematic alcohol involvement bivariate growth model		
Impulsivity		
Intercept	<i>.45 (2.48) ****</i>	<i>-.45 (-2.34) ****</i>
Slope	<i>-.26 (-1.15) **</i>	.42 (1.75) ***
Neuroticism and problematic alcohol involvement bivariate growth model		
Neuroticism		
Intercept	<i>.38 (4.28) ****</i>	<i>-.30 (-3.20) ***</i>
Slope	<i>-.22 (-1.92) ***</i>	.39 (3.20) **
Extraversion and problematic alcohol involvement bivariate growth model		
Extraversion		
Intercept	<i>.25 (2.09) ****</i>	<i>-.18 (-1.42) ***</i>
Slope	<i>-.01 (-0.04)</i>	.02 (0.12)

Note. $N = 483$. Model-estimated correlations (covariances) are presented for the bivariate latent growth models of impulsivity, neuroticism, and extraversion with problematic alcohol involvement (three models total). Boldface indicates correlation (covariance) between the latent slopes in the bivariate growth models. Italics indicate the correlation (covariance) between the latent intercepts in the bivariate growth models. All variables are controlled for family history of alcoholism and sex.

**
 $p < .05$.

 $p < .01$.

 $p < .001$.