

Heavy, Problematic College Drinking Predicts Increases in Impulsivity

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ABSTRACT. Objective: Impulsigenic personality traits are among the many factors demonstrated to predict drinking behavior among late adolescents. The current study tested the opposite possibility, that during the emerging adulthood developmental period, problematic drinking behavior predicts increases in impulsigenic traits. This possibility is important because such traits increase risk for multiple forms of dysfunction. **Method:** Using a prospective design, we studied the personality traits and drinking behavior of 458 traditional college freshmen over one year. **Results:** We found that drinking problems predicted increases in urgency

(the tendency to act rashly when highly emotional), lack of planning (the tendency to act without forethought), and lack of perseverance (difficulty maintaining focus on a task). **Conclusions:** Maladaptive personality change may be one mechanism that increases risk transdiagnostically for some individuals who drink problematically during college. Increases in impulsigenic traits predictable from problem drinking put individuals at risk for not only more drinking, but a host of other negative outcomes. (*J. Stud. Alcohol Drugs*, 79, 790–798, 2018)

YOUNG ADULTHOOD can be a time of heavy alcohol use (Hasin et al., 2007), particularly during the college years (Knight et al., 2002). Approximately 60% of college students report consistent alcohol use (Lipari & Jean-Francois, 2016), despite more than half of college students being under the legal drinking age. Underage alcohol use has been associated with significant problems, including morbidity and mortality from acute alcohol poisoning, violent crime, injury, and assault (Hingson et al., 2005; Nelson et al., 2009), as well as unplanned and unprotected sex (Wechsler et al., 2002), social/interpersonal problems, poor health behaviors (e.g., eating and/or sleeping patterns), and academic impairment (White & Hingson, 2014).

Personality is understood to operate as a distal and transdiagnostic contributor to psychological and physical health: numerous studies document that personality predicts both positive and negative life trajectories as reflected in many domains of functioning such as physical health, mortality, interpersonal functioning, educational and occupational attainment, life happiness, engagement in substance abuse, and psychopathology (Costa & McCrae, 1996; Roberts et al., 2007). Multiple traits, particularly those with impulsigenic properties, predict underage alcohol consumption (Guller et al., 2015).

Although the overall stability of personality across the life span has been well documented, there is also evidence of meaningful personality change. This is particularly true when individuals are going through periods of developmental transition (Roberts et al., 2006). During these transitions, one sees incremental changes in both behavior and in underlying personality traits. The transition into early adulthood is thought to be a particularly significant period of personality change. Individuals appear to become less neurotic, more agreeable, and more conscientious as they develop through the period of emerging adulthood and if they respond to the transitional challenges of young adulthood in positive, prosocial ways (Bleidorn, 2012; Roberts et al., 2006, 2008).

There is also evidence for personality change in a negative direction across developmental transitions when individuals respond to those transitions in dysfunctional ways. Individuals who engaged in counterproductive role behaviors developed increased levels of negative emotionality and decreased constraint across that transitional period (Roberts et al., 2006). Kaiser and colleagues (2016) found bidirectional predictive relationships between one dimension of college drinking behavior and several impulsigenic traits over 1 year in a college sample. Straddling two developmental periods, Horvath and colleagues (2004) found that middle adolescent substance use predicted sensation seeking levels in emerging adults. On the other hand, in a study of emerging adults, a relationship between changes in the trait of novelty seeking and drinking was observed, but only when drinking was measured during the same period as personality change (Littlefield et al., 2012). From these studies, it appears possible that just as engagement in positive, prosocial behaviors can lead to personality change in an adaptive direction, engagement in negative behaviors can lead to personality change in a maladaptive direction. It is clear that there is a great deal

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more to learn about the nature of personality change and its relationship to alcohol use during emerging adulthood.

Mechanisms of personality change and the possible role of drinking

Among the many possible mechanisms of personality change, one compelling hypothesis is the idea of bottom-up, behavior-based personality change: incremental but consistent changes in otherwise stable personality traits can be predicted from individuals' new engagement in behaviors that are consistent with those traits. As new behaviors become common and are reinforced, the personality underpinnings of those behaviors are reinforced as well, resulting in gradual personality change (Riley et al., 2017; Roberts et al., 2008). In times of developmental transitions, life events that prompt engagement in new behaviors may be more densely packed than in other periods of development. It is important to appreciate that, given the overall stability of personality over decades, the magnitude of personality change during any one developmental period is likely to be small.

Among early adolescents, there is support for a version of this hypothesized process, in which early alcohol use was considered a marker for a set of behaviors that might lead to personality change. Riley, Rukavina, and Smith (2016) found that, for each of seven time-lagged predictions across 4 years of early adolescence, drinking behavior predicted increases in urgency above and beyond prior levels of the trait and other predictors. This finding constitutes the first documentation that early engagement in alcohol consumption predicts subsequent changes in an otherwise highly stable personality trait during early adolescent years. Precise mechanisms of change were not studied, but the authors considered it likely that early drinking behavior operated as a marker for a set of behaviors that, together, could lead to increases in urgency.

Because personality traits predict a wide range of life outcomes, increases in impulsogenic traits that are predictable from early drinking have implications well beyond drinking behavior itself. Riley and Smith (2017) showed that urgency increases, predicted by elementary school drinking, predicted increases in multiple forms of dysfunction in high school, including smoking, binge eating, and depression along with further increases in drinking. Very early drinking behavior can thus be understood to confer transdiagnostic risk, through its prediction of increases in at least one high-risk personality trait.

Current study

Using a prospective design, we followed 458 college freshmen, all in the emerging adult developmental period, over 3 years. We assessed them annually on drinking frequency and drinking problems. We anticipated that the experience of problems from drinking would predict

personality change but that drinking frequency would not, because drinking is normative for college students (Lipari & Jean-François, 2016). We tested whether drinking problems and drinking frequency predicted subsequent change in any of four impulsogenic personality traits: urgency, lack of planning, lack of perseverance, and sensation seeking (the tendency to seek out thrilling stimulation).

Method

Participants

This study is part of a larger project, and data were collected in two cohorts. These cohorts were combined into a single sample ($N = 458$) because the cohorts did not differ on any study variables. The mean age of participants at baseline was 18.75 years, and all were under 21 years of age. The sample was 53.5% female. Most participants identified as White (82.50%), African American (12.0%), or biracial (2.0%).

"High-risk" participants were oversampled to ensure sufficient variability in substance use. Students in introductory psychology courses were administered a screening questionnaire that assessed conduct problem behaviors that occurred before age 18, such as stealing, lying, and fighting. Those whose scores fell within the top 25% for their gender were specifically invited to participate through email, but any first-year student enrolled in introductory psychology was eligible for participation.

Measures

Demographics. Participants self-reported demographics, including race and gender.

Alcohol use. The Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993) consists of 10 questions that tap frequency, quantity, and psychosocial problems from alcohol use (e.g., harm to self or others). Eight of the 10 AUDIT items were used to create a problems composite score. The two items omitted from the composite score were the drinking frequency and quantity items. The composite score had acceptable internal consistency, with alphas ranging from .72 (T1) to .75 (T3). The drinking frequency item constituted our measure of that variable.

Impulsogenic personality traits. Traits were assessed using the UPPS-P Impulsive Behaviors Scale (Lynam et al., 2007), a self-report measure on which participants respond to items on a four-point, Likert-type scale, with *agree strongly* at one end and *disagree strongly* at the other. Internal consistency reliability for the impulsogenic traits in the sample was good (Table 1). The urgency domain includes the facets positive and negative urgency, the tendencies to act rashly when experiencing very positive or very negative emotions, respectively. The low conscientiousness domain includes the facets

TABLE 1. Descriptive statistics all variables at all waves ($n = 458$): Mean (SD)

Variable	Wave 1	Wave 2	Wave 3
Drinking frequency	1.81 (1.11)	1.89 (0.99)	1.99 (0.91)
Drinking quantity	1.49 (1.27)	1.55 (1.18)	1.51 (1.09)
Drinking problems	9.57 (3.02)	9.66 (2.90)	9.58 (2.74)
Lack of planning (11 total items)	2.00 (0.45)	2.04 (0.42)	2.07 (0.39)
Lack of perseverance (10 total items)	1.85 (0.43)	1.93 (0.43)	1.95 (0.45)
Urgency (16 total items)	4.10 (1.05)	4.19 (0.97)	4.23 (0.93)

Notes: Trait means are mean item scores; urgency reflects the sum of positive and negative urgency.

of lack of planning and lack of perseverance. The urgency traits correlated highly in this sample ($r = .72$ at T1), and the low conscientiousness facets correlated modestly ($r = .39$ at T1). We tested whether the facets, when analyzed alone, produced different results from each other when conducting the model tests described below. For reasons described below, sensation seeking was dropped from the study and was not included in Table 1.

Procedure

The study was approved by the Institutional Review Board of the University of Kentucky and a federal Certificate of Confidentiality was acquired. Informed consent was obtained from participants at each assessment. Participants received course credit and were paid \$30 for completing the initial assessment (T1) and \$50 for the two additional assessments (T2 and T3). Follow-up sessions occurred approximately 1 year (T2) and 2 years (T3) following initial participation.

Data analysis

Model tests. We used structural equation modeling (SEM), through Mplus (Muthén & Muthén, 2004–2010) to test whether drinking behavior predicted subsequent personality change. We used random intercept cross-lagged panel analysis (RICLPA; Hamaker et al., 2015). Unlike traditional cross-lagged panel analysis, this method separates stable, between-person differences from within-person change. By separately modeling between- and within-person effects, one can isolate variability around a person's mean trait level and predict that variability over time. In brief, one models latent variables for each trait, with trait scores at each of the three waves as indicators. The latent variables reflect stable trait variance and one separately

models wave-specific scores on each trait to capture within-person variability on the traits.

We began with two sets of preliminary analyses. First, we found no differences in the predictive models between negative and positive urgency. In the absence of an empirical reason to study the facets separately, we combined them and studied the overall urgency trait. Second, we found an absence of meaningful change in sensation seeking over time. The latent sensation-seeking variable correlated 1.0 with wave-specific sensation-seeking scores. Because trait levels did not change over time, it was not possible to model prediction of sensation-seeking change.

We then ran a series of model tests, involving tests of prediction of each of the three impulsogenic traits (urgency, lack of planning, lack of perseverance) separately from drinking problems and then from drinking frequency.¹ We then ran a combined model, including both drinking variables and all three traits. We report detailed results of the combined model.

This model included the following features. The two drinking and three trait variables were modeled as latent variables, with scores on each of the three waves as indicators. We modeled autoregressions involving within-person deviations from the mean in each variable over time. For example, separate from the latent, stable variance in urgency, T1 urgency predicted T2 urgency, and T2 urgency predicted T3 urgency. The model also specified cross-lagged predictions from within-person deviations from mean levels of each impulsogenic trait to within-person deviations from the mean of each drinking variable measured the following wave and from the two drinking variables to each trait measured the following wave. The paths from drinking behavior to personality were those of primary interest. All variables or disturbance terms were allowed to covary within measurement wave. Following those model tests, we conducted multigroup analyses to see if the predictive models differed by self-reported gender.

To measure model fit, we relied on four fit indices: the comparative fit index (CFI), the nonnormed fit index (NNFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). CFI and NNFI values above either .90 or .95 are

¹Although our theoretical focus was on drinking frequency and drinking problems, we estimated additional models that included drinking quantity as one of the variables. The analytic strategy involved, RICLPA, separates stable, between-person differences (latent variables) from within-person change. The correlations between the latent variables of drinking quantity and drinking problems were estimated to be above 1.00, and the model was not able to converge (within-time residuals correlated modestly, indicated differences in within-person change between the two variables). Therefore, we present only the drinking frequency and drinking problems results. We note that when we modeled drinking quantity alone, excluding both frequency and problems, it did not predict personality change.

TABLE 2. Correlation matrix of all variables at all waves ($N = 458$)

	Freq W1	Freq W2	Freq W3	Prob W1	Prob W2	Prob W3	Plan W1	Plan W2	Plan W3	Persev W1	Persev W2	Persev W3	UR W1	UR W2
Freq W1														
Freq W2	.77*													
Freq W3	.67*	.77*												
Prob W1	.58*	.44*	.36*											
Prob W2	.58*	.56*	.51*	.72*										
Prob W3	.52*	.59*	.64*	.55*	.77*									
Plan W1	.30*	.28*	.22*	.33*	.22*	.26*								
Plan W2	.29*	.26*	.17*	.30*	.31*	.27*	.74*							
Plan W3	.29*	.27*	.23*	.20*	.31*	.36*	.64*	.72*						
Persev W1	.10	.11	.05	.15*	.06	.06	.39*	.36*	.34*					
Persev W2	.10	.06	-.01	.21*	.16*	.11	.31*	.49*	.41*	.72*				
Persev W3	.09	.07	.02	.09	.11	.13*	.21*	.32*	.46*	.68*	.76*			
UR W1	.25*	.21*	.19*	.41*	.33*	.31*	.47*	.44*	.31*	.35*	.31*	.29*		
UR W2	.21*	.20*	.19*	.40*	.41*	.36*	.40*	.55*	.41*	.29*	.42*	.33*	.77*	
UR W3	.25	.25*	.27*	.31*	.42*	.51*	.40*	.47*	.47*	.26*	.27*	.38*	.71*	.76*

Notes: Freq = drinking frequency, prob = drinking problems, plan = lack of planning (impulsivity trait), persev = lack of perseverance (impulsivity trait), UR = urgency (impulsivity trait).

* $p < .001$.

thought to represent very good fit, RMSEA values of .06 or lower are thought to indicate a close fit, and SRMR values below .09 are thought to indicate a good fit (Browne & Cudeck, 1992; Hu & Bentler, 1999; Kline, 2016). Models are judged to fit the data well when good fit is supported by most fit indices. We also report the model chi-square. To test for gender invariance, we compared the model with predictive pathways constrained to be equal to the model without those constraints, using the chi-square difference test and comparison of CFI and NNFI values between the two models.

Treatment of missing data. We first tested whether data were missing completely at random using the Little test in SPSS (Little, 1988). There was no significant effect for missingness: retained and nonretained participants did not differ on any study variables. Because listwise and pairwise deletion of missing data produces biased population parameter estimates (Allison, 2003; Enders & Peugh, 2004), we used expectation maximization (EM), a maximum likelihood process, to impute values for missing cases using SPSS. This method is a single imputation procedure. Although single imputation has historically produced underestimates of standard errors, the SPSS procedure includes a correction to the standard error to avoid/reduce this problem. Use of EM procedures has been shown to produce parameter estimates accurate to within two decimal points and of equal accuracy to full information maximum likelihood methods (Enders & Peugh, 2004).

Results

Of the 458 individuals who participated at T1, 330 (72%) participated again at T2, and of those participants who participated in T2, 88% participated at T3, resulting in T1 to T3 retention of 63.4%. Of the 458 individuals who participated

at T1, 103 (22.5%) were classified as high-risk participants; of those 103 high-risk participants who participated at T1, 73.8% participated again at T2, and of those participants who participated in T2, 85.5% participated at T3, resulting in T1 to T3 retention of 67.0%. As noted above, those who participated at all three waves did not differ from those who participated in fewer waves on any study variables; thus, using EM we were able to make full use of the entire sample ($N = 458$). Table 1 provides means and standard deviations for each study variable at each wave. Table 2 provides a correlation matrix of all study variables across the three waves of the study.

Testing the influence of drinking on personality

The overall model fit the data well: CFI = .99; NNFI = .96; RMSEA = .06, CI [.05, .08]; SRMR = .02; $\chi^2(26) = 72.46$, $p < .001$. Figure 1 presents the loadings of each drinking and trait variable on its respective latent variable as well as correlations among the latent variables. The high loadings reflect a high degree of stability over time for each variable, and there were substantial correlations among the two drinking and three trait latent variables.

Figure 2 presents the results of the RICLPA. As hypothesized, for both the T1–T2 and T2–T3 time lags, within-person elevations in the experience of drinking problems predicted within-person increases in urgency, lack of planning, and lack of perseverance. That is, beyond the stability of each trait and the stability of experiencing drinking problems, heightened problems predicted heightened scores on each of three impulsogenic traits. Beta weights for pathways presented in this model are standardized and can be found in Table 3. Thus, a weight of .25 reflects one quarter of a standard deviation change in the nonstable component of lack of perseverance for each 1 SD increase in drinking problems.

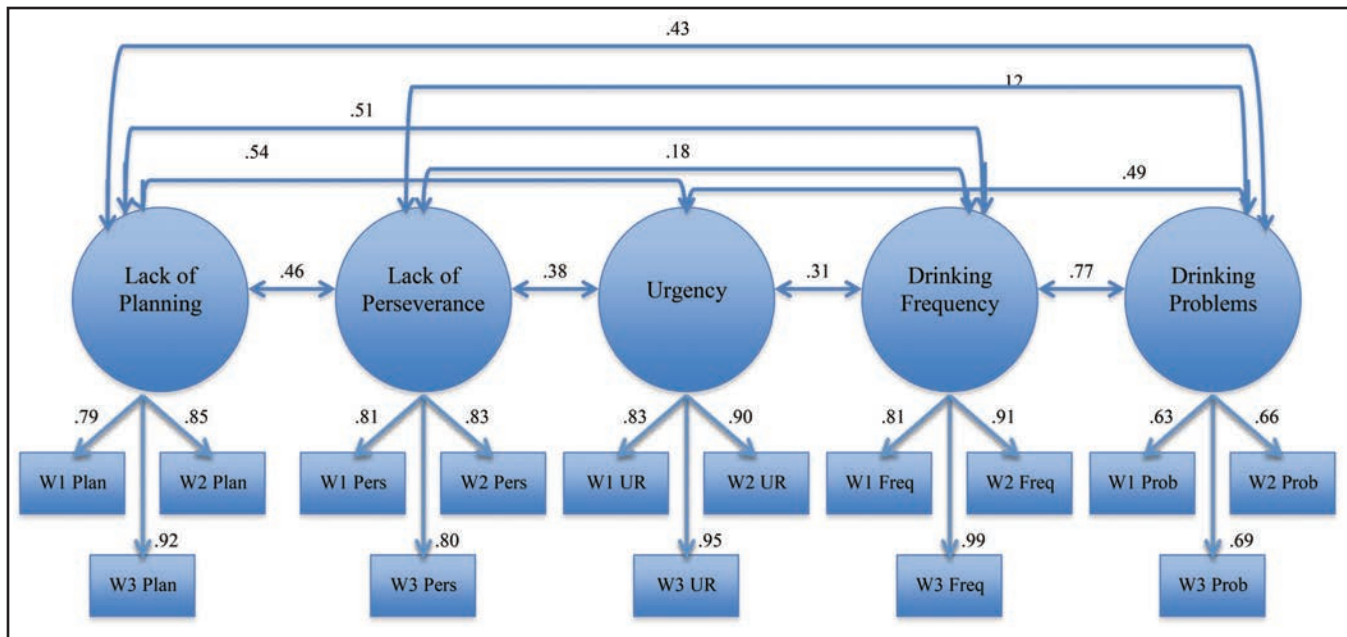


FIGURE 1. Loadings of each drinking and trait variable on its respective latent variable and correlations among the latent variables.

We did not anticipate that drinking frequency would predict increases in the traits because drinking behavior is normative in the college student population. Interestingly, for five of the six predictions over two time lags, within-person increases in drinking frequency predicted within-person decreases in impulsigenic traits.² This effect was present for urgency only for the T1–T2 lag, but for the other two traits was present across both time lags.

We provide two additional tables in the online appendix. Table S1 presents information on mean changes in drinking and traits over time. Table S2 provides cross-sectional associations among residuals for the model depicted in Figure 2.

Gender invariance of predictive model. We first specified the same predictive model as above for each of two groups: male and female. That model fit the data well: CFI = .99; NNFI = .96; RMSEA = .07, CI [.05, .09]; SRMR = .04; $\chi^2(62) = 127.70, p < .001$. We next constrained each of 12 path coefficients to be the same across group: each path from drinking problems and drinking frequency to each of the three impulsigenic traits, both for T1–T2 and T2–T3. We did so to test whether prediction of trait change from drinking was invariant across gender. This more constrained model also fit the data well: CFI = .99; NNFI = .96; RMSEA = .06, CI [.05, .08]; SRMR = .04; $\chi^2(74) = 145.02, p < .001$. The chi-square difference test was nonsignificant, $\chi^2(12) =$

17.32, $p > .05$, and there was no drop in any fit index. Accordingly, there is no evidence that the predictive process from drinking to personality varied by gender.

Discussion

The findings of this study provide important new information concerning the possibility of personality change during emerging adulthood and the role of drinking behavior as a predictor of such change. Over two different 1-year time lags, within-person elevations in the experience of drinking problems (i.e., drinking problem scores above the person's stable problem level over time) predicted subsequent within-person elevations in three impulsigenic traits: urgency, lack of planning, and lack of perseverance. We highlight four aspects of this set of findings.

First, increases in the three impulsigenic traits may be important because they increase risk transdiagnostically, for problem drinking, drug use, risky sexual behavior, nonsuicidal self-injury, binge eating, purging, gambling, risky sex, and even depression (Guller et al., 2015; Riley et al., 2015; Smith & Cyders, 2016; Smith et al., 2013). It is noteworthy that increases in such high-risk traits can be predicted by elevations in the experience of drinking problems during emerging adulthood. Whether serving as a marker of other behaviors or contributing directly to personality change, problematic drinking can thus be understood to confer transdiagnostic risk.

Second, personality change that can be predicted from problem drinking appears to operate in an ongoing way

²Separately, we modeled drinking frequency without controlling it for drinking problems. By itself, drinking frequency did not predict personality change. Although the variance in drinking frequency controlled for its overlap with drinking problems predicted personality change, bivariate, drinking frequency did not.

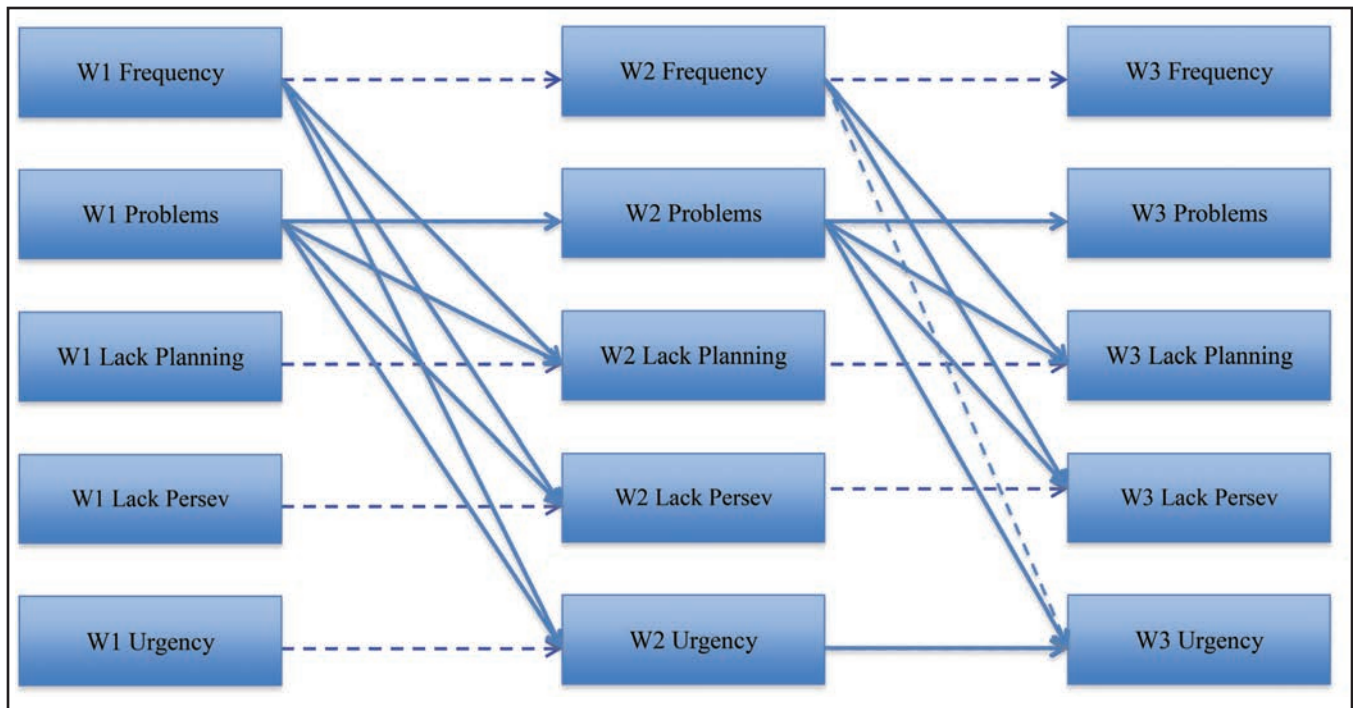


FIGURE 2. Random intercept cross-lagged panel analysis results. *Note:* $n = 458$. Dashed lines represent nonsignificant pathways; solid lines represent significant pathways. All pathways from personality variables to drinking variables were included in the model but not significant; those nonsignificant pathways were not included in increase readability of the model. Beta weight coefficients are presented for significant pathways in Table 3.

across multiple developmental time points. Positive prospective prediction has been documented as follows: (1) Urgency increases predicted from early onset drinking from fifth through ninth grades (Riley et al., 2016); (2) Urgency, lack of planning, and lack of perseverance increases predicted now from drinking problems during the college years; (3) Decreases in constraint and control over four waves spanning the ages 10–32 (Blonigen et al., 2015). The findings of these studies indicate that there appears to be an ongoing process in which problematic forms of drinking behavior anticipate subsequent increases in maladaptive personality traits. In addition, these studies highlight personality change that occurs during a time of developmental transition, data that are consistent with theoretical work asserting that times of developmental transition are key potential points for personality change due to social role transitions and the dense spacing of life events to which individuals must adapt (e.g., Riley et al., 2017; Roberts et al., 2006).

Third, problem drinking prediction of changes in impulsogenic traits have consistently and uniquely involved increased risk. There is no evidence of a corrective mechanism, in which problem drinking leads to reduced trait-based risk.

Fourth, the personality changes across any one prospective interval are of small magnitude, particularly over against the remarkable stability observed in each impulsogenic trait. Such small effects are consistent with the hypothesized pro-

cess of gradual, incremental personality change following behavior change. Even small changes are noteworthy, particularly given the important role the traits plays in risk for many forms of dysfunction (Berg et al., 2015; Coskunpinar et al., 2013; Guller et al., 2015; Stautz & Cooper, 2013) and the possibility of ongoing incremental change over time (Riley et al., 2016).

These and other results are consistent with “bottom-up” models of personality change (Hudson & Roberts, 2016; Riley et al., 2017; Roberts et al., 2008), in which engagement in novel, reinforcing behaviors leads to reinforcement of the underlying disposition to engage in those behaviors, and thus gradual increases in those personality dispositions. Experiencing problems relating to drinking behavior may serve as a marker for a range of risky or maladaptive behavior patterns. Thus, it may reflect a range of behaviors potentiated by impulsogenic traits such that when those behaviors are reinforced, the disposing traits are also reinforced. Magidson and colleagues (2014) recently presented principles of a potential intervention framework to change personality traits that can be understood in terms of behaviorally based, “bottom-up” models of personality change. Perhaps personality traits can be changed intentionally in incremental ways by repeated engagement in novel behaviors (Magidson et al., 2014).

An interesting, unanticipated finding was that within-person increases in drinking frequency unrelated to drinking problems predicted subsequent within-person decreases in

TABLE 3. Beta weight for significant pathways from random intercept cross-lagged panel analysis results model (Figure 2) ($N = 458$)

Pathway from	Pathway to	Beta weight (standardized)
W1 drinking frequency	W2 lack planning	-.18**
W1 drinking frequency	W2 lack perseverance	-.16**
W1 drinking frequency	W2 urgency	-.13**
W1 drinking problems	W2 drinking problems	.37**
W1 drinking problems	W2 lack planning	.20**
W1 drinking problems	W2 lack perseverance	.25**
W1 drinking problems	W2 urgency	.23**
W2 drinking frequency	W3 lack planning	-.19**
W2 drinking frequency	W3 lack perseverance	-.11*
W2 drinking problems	W3 drinking problems	.22**
W2 drinking problems	W3 lack planning	.18**
W2 drinking problems	W3 lack perseverance	.12*
W2 drinking problems	W3 urgency	.18**
W2 urgency	W3 urgency	-.16**

Notes: Coefficients are standardized, and variables represent deviations from overall mean across the three waves.

* $p < .01$; ** $p < .001$.

each of the impulsogenic traits. Because these effects were not hypothesized, they should be replicated before confident inferences are drawn from them. We suggest one possibility. Perhaps normal development during these years is associated with decreases in impulsogenic traits (e.g., Harden & Tucker-Drob, 2011). Because drinking frequency in the absence of drinking problems is also normative during these years, it may be that the association between this part of drinking frequency and the traits reflects normative experience. The effect of drinking problems on subsequent increases in maladaptive traits can be understood to reflect an atypical, nonnormative process. Perhaps those individuals who manifest smaller within-person change, or even decreases, in the impulsogenic traits represent a sample of individuals who are developing “good” or normative drinking habits (i.e., they are able to drink frequently yet not experience alcohol problems). That is, functional development during this period may reflect both reductions in impulsogenic traits and successful development of normative, nonproblem engagement in adult behaviors such as alcohol consumption.

There is another possible explanation for the drinking frequency results. Although drinking problems was measured using an eight-item scale from the AUDIT, drinking frequency was assessed using only one item. While there is good psychometric evidence that drinking frequency can be reliably and validly assessed using a single item, this limitation is noteworthy. Cross-lagged estimates of within-person change based on single item assessment should be viewed with caution; questions on the relationship between drinking frequency and personality change should be further probed in ongoing research with improved assessment.

A crucial issue for personality change research concerns the duration of putative personality change. The current study documented increases in measured personality

traits but did not investigate whether those increases were maintained in the months and years following the study. An alternative possibility is that the trait increases reflect acute shifts following the experience of drinking problems. Future investigations of the duration of measured personality change will be important. At the same time, the apparent ongoing nature of change in some traits following drinking behavior (Blonigen et al., 2015; Riley et al., 2016) suggests a lasting predictive effect.

There are a number of possible mechanisms of personality change other than the behavior-based process we have described. Perhaps high levels of alcohol use alter the brain in such a way that it results in personality change (Squeglia et al., 2009). It may also be the case that problem drinking and personality change stem from a common etiological factor that was already in place before the onset of this longitudinal study. For example, genetic factors and early developmental vulnerabilities could provide a diathesis that leads to the emergence of both factors; the current data certainly do not rule out this possibility.

Although prediction of drinking behavior from personality was not the focus of this study, we note there was almost no such prediction in the current sample. Within-person increases in drinking problems at T2 and T3 were not predicted by within-person change in any trait the previous wave. These findings are at odds with past trait-to-drinking prediction. Further studies on this relationship are needed.

The current study has several limitations. First, we did not control for other possible predictors of personality change, such as life stressors and other environmental events. Second, we did not examine individual developmental trajectories of change over time, thus risking loss of information that might have been provided by examination of individual trends. Third, although lost participants did not differ on any study variables, the retention rate was suboptimal and we cannot know whether the results would have differed with higher retention. Fourth, all data collected on personality and drinking behavior were obtained using self-report questionnaire and were not clarified by interview data. Finally, emerging adulthood and the college years are associated with rapid and profound social, intellectual, and personal development, a process that is influenced by a seemingly infinite number of factors. There is a need to integrate the current findings into larger models that include other factors, such as peer behavior and genetic risk, to create a more comprehensive understanding of the evolution of risk and dysfunction in young adults.

The current findings raise important questions regarding the nature of personality change and substance use during the developmental transition of emerging adulthood. Because increases in impulsogenic traits increase risk for multiple forms of dysfunction such as drug use, disordered eating, and risky sexual behavior, problem drinking may serve as a marker for elevations in risk transdiagnostically. The need to

intervene to reduce problematic levels of drinking in college students, as well as among adolescents, may be even more important than currently understood, and the possibility of intervening to reduce maladaptive personality change merits exploration.

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