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Relationship between Personality Change and the Onset and Course of Alcohol Dependence in Young Adulthood

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Abstract

Aims—Examine the reciprocal effects between the onset and course of alcohol use disorder (AUD) and normative changes in personality traits of behavioral disinhibition and negative emotionality during the transition between adolescence and young adulthood.

Design—Longitudinal-epidemiological study assessing AUD and personality at age 17 and 24.

Setting—Participants were recruited from the community and took part in a day-long, in-person assessment.

Participants—Male ($n_{\text{men}} = 1161$) and female ($n_{\text{women}} = 1022$) twins participating in the Minnesota Twin Family Study.

Measurements—The effects of onset (adolescent versus young adult) and course (persistent versus desistent) of AUD on change in personality traits of behavioral disinhibition and negative emotionality from age 17 to 24.

Findings—Onset and course of AUD moderated personality change from age 17 to 24. Adolescent onset AUD was associated with greater decreases in behavioral disinhibition. Those with an adolescent onset and persistent course failed to exhibit normative declines in negative emotionality. Desistence was associated with a “recovery” toward psychological maturity in young adulthood, while persistence was associated with continued personality dysfunction. Personality traits at age 11 predicted onset and course of AUD, indicating personality differences were not due to active substance abuse.

Conclusions—Personality differences present prior to initiation of use increase risk for AUD, but the course of AUD affects the rate of personality change during emerging adulthood. Examining the reciprocal effects of personality and AUD within a developmental context is necessary to improve understanding of theory and intervention.

The developmental transition from adolescence to young adulthood entails important psychosocial and neurobiological changes¹⁻³. Several theories suggest that alcohol use disorders (AUD; alcohol abuse and dependence) might suppress psychological growth

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during this period, preventing those who abuse alcohol early in life from reaching a degree of maturity necessary for successful adjustment in adulthood^{1,2,4}. A lay description of such an effect might be that a person who begins to abuse alcohol at age 16 will continue to exhibit the psychological maturity of a 16-year-old until he or she desists from active substance abuse. While interesting, there have been few empirical tests of such notions^{4,5}, or whether other mechanisms such as personality characteristics present prior to the onset of AUD might better account for the link between AUD and psychological maturity.

Personality traits are important risk factors in etiologic theories of AUDs⁶⁻⁹. Although the notion that AUDs reflect a unique configuration of personality traits (i.e., an “addictive personality”)¹⁰ has largely been abandoned, the last 20 years of research has demonstrated that the traits of *behavioral disinhibition* and *negative emotionality* are associated with increased risk for substance use disorders¹¹⁻¹⁴. Behavioral disinhibition refers to the failure to inhibit one’s behavioral impulses and includes traits such as impulsivity, sensation seeking, unconventionality, and rebelliousness. Negative emotionality refers to one’s tendency to experience psychological distress such as frequent negative emotions (sadness, fear, worry, anger), breaking down under stress, feelings of isolation and suspiciousness, and interpersonal hostility. Several longitudinal studies have established prospective associations between substance use disorders and these personality traits assessed as young as age 3^{11,15-19}. These prospective associations are stronger for behavioral disinhibition than negative emotionality and are consistent across gender and different substances including alcohol, nicotine, and illicit drugs.

Few studies, however, have examined reciprocal effects underlying the association between the onset and course of AUD and personality development⁵. Such an analysis must necessarily be informed by patterns of normative change. Most important for personality development is the *maturity principle*, a pattern of personality change that describes a normative trend towards increased self-control, risk avoidance, and emotional stability over the life-course. This trend is evinced by normative declines in behavioral disinhibition and negative emotionality, with the most pronounced changes occurring during the transition from late adolescence to young adulthood²⁰⁻²⁵. One perspective on the maturity principle is that psychological maturity can be defined in terms of personality traits, that is, the ability to be planful, responsible, disciplined, and to effectively cope with unpleasant emotions^{26,27}. AUD also exhibits normative patterns of onset, escalation, and decline that are similar to the maturity principle. Specifically, AUD emerges in late adolescence, increases and peaks in prevalence during the transition from adolescence to young adulthood, and then declines markedly by age 30²⁸⁻³¹.

Interestingly, people who experience the most personality change during the transition to adulthood are those who exhibit the most “immature” personality styles in adolescence (i.e., high negative emotionality and behavioral disinhibition)^{21,22,24}. One interpretation of this finding is that personality reflects an overall competence to successfully manage age appropriate developmental tasks (e.g., academic achievement and peer relationships in adolescence; career development and intimate partner relationships in adulthood)^{2,26,32}. Throughout the transition into adulthood, the complexity of such tasks increases while external supports are removed (parental home, structured school environment). As such, maintaining competence requires greater behavioral control and emotional stability. Therefore, those with less mature personality styles in adolescence will experience a greater “press” to catch up with their competent peers, resulting in greater declines in negative emotionality and behavioral disinhibition during the transition to adulthood²⁶. People who continue to exhibit high negative emotionality and behavioral disinhibition relative to their peers, however, will struggle to manage the expanding roles and growing responsibilities of adulthood²⁶.

Using a large, mixed-gender community sample, we examined the relationship between the onset and course of AUD and personality development (a proxy for psychological growth and maturity) during the transition from adolescence (age 17) to young adulthood (age 24). Specifically, previous research has shown that an adolescent onset of AUD (relative to a young adult onset) is associated with numerous psychosocial deficits^{33,34}. Additionally, a persistent course of AUD is associated with continued psychosocial deficits throughout young adulthood, while those who desist from AUD exhibit signs of recovery and normative functioning³³. Therefore, we wanted to examine the distinct effects of an adolescent onset and persistent versus desistent course of AUD on personality. Finally, to ensure the association between personality and AUD was not solely due to active substance abuse, we also examined the link between onset and course of AUD on personality traits assessed at age 11, prior to the initiation of alcohol use for most participants.

Method

Participants

The sample consisted of male and female twins participating in the Minnesota Twin Family Study (MTFS), a prospective study investigating the development of substance use disorders and related conditions^{35,36}. The MTFS includes two age cohorts with participants entering the study at either age 11 or 17. Participants are given the opportunity to return for follow-up assessments every 3-4 years. Recruitment entailed locating all families that included a twin birth in Minnesota between 1972 and 1984 using publicly available birth records and data bases. Over 90% of families were successfully located for each target birth year. Eligible families were required to live within a one-day drive of our Minneapolis laboratories with neither twin having an intellectual or physical disability that would preclude participation in the day-long, in-person assessment. Seventeen percent of eligible families declined participation. Based on a survey completed by over 80% of non-participating families, parents in the participating families differed only slightly in terms of socioeconomic status (0.25 years more education), but did not differ in terms of history of mental health problems or treatment. Consistent with the demographics of Minnesota for the target birth years, 96% of participants reported European American ancestry.

The MTFS design includes assessments at target ages of 17, 20, and 24. Personality data were collected from participants at the age 17 ($M = 17.83$ years, $SD = 0.69$ years) and age 24 assessments ($M = 24.95$ years, $SD = 0.90$ years). At the time of this writing, all male twins and female twins from the older cohort had completed the age 24 follow-up assessment, while assessments for the female twins of the younger cohort were ongoing. As such, 2183 ($n_{\text{men}} = 1161$, $n_{\text{women}} = 1022$) participants had diagnostic data available for the age 24 assessment with retention rates for male and female twins from the older cohort of 91.8% and 93.3%, respectively. Analyses utilizing all male twins and female twins from the older cohort revealed minimal bias due to attrition (Cohen's $d = .14$, $.22$, and $.12$ for symptoms alcohol, nicotine, and cannabis abuse/dependence at age 17, with those not participating at age 24 exhibited slightly more symptoms).

Assessment

AUD—The Substance Abuse Module of the Composite International Diagnostic Interview^{37,38} was used to assess symptoms of alcohol abuse and dependence according to *DSM-III-R* criteria (the diagnostic system in use at the time of the intake assessment). At age 17, the assessment was for lifetime symptoms. For the age 20 and 24 assessments, participants reported on the time interval since their last assessment. Thus, twins who did not participate in the age 20 assessment were not necessarily lost to follow-up. All interviewers held at least a Bachelor's degree in psychology or a related discipline and

received extensive training in psychiatric interviewing. All interviews were reviewed by a team of at least two clinical psychology graduate students who were required to meet consensus regarding the presence of all symptoms prior to assigning diagnoses. Kappa statistic for diagnostic reliability was $> .91$ for AUD diagnoses. To balance sensitivity and specificity, the threshold for an AUD diagnosis was set at 2 symptoms (3 symptoms are needed for a dependence diagnosis, but only 1 symptom is required for an abuse diagnosis). Abuse and dependence symptoms contributed equally to the symptom tally for an AUD diagnosis. Using this definition, the prevalence of an AUD was 12.7% and 24.1% at age 17 and 24, respectively. To examine the effects of onset, persistence, and desistence of AUD, participants were classified into four AUD groups: never onset (did not meet criteria at any age; $n = 1211$; 61.3%), early adult onset (criteria met at age 20 or 24; $n = 545$; 27.6%), adolescent onset and persistent course (criteria met at age 17 and age 24; $n = 149$; 7.5%), adolescent onset and desistent course (criteria met at age 17 and 0 symptoms at age 24; $n = 71$; 3.6%).

Personality—Negative emotionality and behavioral disinhibition were assessed at age 17 and 24 using the 198-item version of the Multidimensional Personality Questionnaire (MPQ), a self-report questionnaire designed to comprehensively assess normal range personality³⁹. The MPQ includes 3 higher-order factors: Positive Emotionality, Negative Emotionality, and Behavioral Constraint. Positive Emotionality (propensity to experience positive emotions, sociability, and social dominance) was unrelated to AUD and failed to exhibit mean-level developmental change, and so was excluded from the analyses. Negative Emotionality is a measure of the construct of the same name while Behavioral Constraint measures the tendency to be playful and cautious, to avoid thrills and danger, and to conform to social norms. Behavioral Constraint scores were reversed for all analyses so that the scale reflected Behavioral Disinhibition. MPQ data were available for 90.6% and 89.2% of participants at the age 17 and 24 assessments, respectively, with 1626 ($n_{\text{men}} = 871$, $n_{\text{women}} = 755$) participants having MPQ data at both time points.

To ensure personality differences across groups at age 17 were not solely due to active substance abuse for the adolescent onset group, we also examined parent and teacher ratings of similar personality traits at age 11 for the twins from the younger cohort. The validity, reliability, and psychometric structure of the parent and teacher ratings have been reported elsewhere^{40,41}. The mean of the standardized parent and teacher ratings was used as the age 11 measures of Negative Emotionality and Behavioral Disinhibition ($n_{\text{men}} = 492$, $n_{\text{women}} = 325$). Only 4.3% of participants in the age 11 cohort reported ever drinking alcohol without their parents' permission at the intake assessment. Results were unchanged if these participants were excluded from the analysis.

Statistical Analyses

For cross-sectional group comparisons, we report effect sizes (Cohen's d) and p -values from post hoc tests using an AUD group factor as the predictor variable. The linear mixed model module of SPSS was used to adjust p -values for the twin observations and a Bonferroni correction was used in the post hoc tests. HLM 6.08⁴² was used for analyses examining personality change from age 17 to 24. Each model included 3 levels: observations at each time point (level 1), nested within individuals (level 2), nested within twin pairs (level 3). The effects of age were examined in level 1 of the model, using the actual chronological age at which each participant completed the personality measures as there was some heterogeneity in terms of when participants completed the age 17 (range 16.55 to 20.12 years; 3% were > 19 years old) and age 24 assessments (range 22.63 to 29.30 years; 1.4% were < 23 years old and approximately 10% were > 26 years old). Sex and AUD status were then modeled at level 2 of the equation to predict variance in the level-1 age parameter, that

is, individual differences in the rate of personality change. The variance components for the level 1 slope and all level 2 predictors were fixed, and we centered age at 17 so that the intercept estimates reflected trait scores at age 17. Interactions between sex and AUD group were also tested, but none were significant so we report results for models with main effects only.

Results

Descriptive Statistics

Table 1 provides the descriptive statistics for negative emotionality and behavioral disinhibition for the AUD groups at each age. We also report the effect size for the mean difference between age 17 and age 24 scores. Because a different informant and method was used for the age 11 observer rating, these scores cannot be compared to the age 17 and age 24 MPQ self-report scores in terms of change over time. All AUD groups exhibit significant declines from age 17 to 24 for negative emotionality and behavioral disinhibition. The adolescent onset-desist group exhibited the greatest declines with large effects sizes for both traits. The never onset and adult onset groups exhibited comparable declines with medium to large effects for negative emotionality and small to medium effects for behavioral disinhibition. Interestingly, the adolescent onset-persist group exhibited the least decline for negative emotionality (small to medium effect), but a medium to large decline in behavioral disinhibition.

Cross-sectional comparisons

For both traits, the adult onset group scored significantly higher than the never onset group at each age with a small effect for negative emotionality ($d = .21$ to $.28$) and a medium effect for behavioral disinhibition ($d = .43$ to $.58$). For both traits, the adolescent onset-desist group scored significantly higher than the never onset group at age 11 and 17 ($d = .43$ to $.57$), but the groups were no longer significantly different at age 24 (d 's $< .18$). The adolescent onset-desist group was not significantly different from the adult onset group at any age for negative emotionality (though $d = .34$ at age 11), and the two groups did not differ on behavioral disinhibition at age 11 and 17. At age 24, however, the adult onset group scored significantly higher than the adolescent onset-desist group on behavioral disinhibition. The adolescent onset-persist group scored significantly higher than the never onset (medium to large effects; $d = .55$ to 1.00) and adult onset (small to medium effects; $d = .26$ to $.59$) groups at each age for both negative emotionality and behavioral disinhibition. Notably, group differences increased with age for negative emotionality, but declined with age for behavioral disinhibition. The two adolescent onset groups did not differ on negative emotionality at age 11 and 17, but at age 24, the persist group scored significantly higher than the desist group. For behavioral disinhibition, the persist group scored significantly higher than the desist group at each age ($d = .35$ to $.65$). Differences between the adolescent onset persist and desist groups were greatest at age 24 for both negative emotionality and behavioral disinhibition.

AUD Group Differences in Personality Change from age 17 to 24

Figures 1 and 2 display the means for the AUD groups at age 17 and 24 for negative emotionality and behavioral disinhibition, respectively. Results of the HLM analyses for negative emotionality are reported in Table 2. The intercept refers to the model predicted mean value at age 17 for members of the two groups being compared. Age refers to the units of change in negative emotionality per year between the age 17 and age 24 assessments for the reference group in the comparison (i.e., the first group listed). Sex and AUD group status were entered as predictors of individual differences in the rate of change. Sex is coded 0 for female and 1 for male. Because the overall sample trajectory was a decrease in negative

emotionality, the positive values for the effect of sex on the age effect indicate men change at a slower rate than women. AUD group is coded 0 for the first group and 1 for the second group listed in the comparison. Positive values again indicate the second group in the comparison changes at a slower rate than the first group. For example, in the first comparison between the never vs. adult onset groups, men in the adult onset group had a rate of change of $-1.33 + 0.20 + 0.23 = -0.90$ units per year between the age 17 and age 24 assessments.

For comparisons between the never onset and AUD groups, there was a significant sex effect such that men declined at a slower rate than women. The adult onset group declined at a significantly slower rate than the never onset group. The adolescent onset-desist group exhibited a similar rate of decline to that of the never onset and adult onset groups. The adolescent onset-persist group exhibited the least decline in negative emotionality with a significantly slower rate of change than all the other groups.

The results of the HLM for the AUD groups on behavioral disinhibition are reported in Table 3. For all comparisons, men declined at a slower rate than women. The adult onset and adolescent onset-persist groups declined at a significantly slower rate than the never onset group. The adolescent onset-desist group exhibited a significantly greater rate of decline than the adult onset and adolescent onset-persist groups (and the never onset group, but this difference was not statistically significant). The adult onset and adolescent onset-persist groups exhibited comparable rates of decline.

Comment

Behavioral disinhibition and negative emotionality are well-established risk factors for AUD. However, few studies have examined the reciprocal processes underlying the link between AUD and personality during the transition from adolescence to young adulthood when there are substantial normative declines on these traits. We were especially interested in the association between onset (adolescent versus young adult) and course (persistent versus desistent) of AUD and these normative declines. For example, would an adolescent onset and persistent course stunt personality change toward growth and maturity? Or, would there be evidence of a developmental “press” such that those with an adolescent onset of AUD would exhibit greater change in order to “catch-up” to their non-AUD peers?

In terms of AUD affecting personality, we continued to detect normative declines in behavioral disinhibition and negative emotionality, despite active AUD for many participants. However, the *amount* of change was moderated by the course of AUD and the particular personality trait. For behavioral disinhibition, adolescent onset AUD was associated with greater declines, consistent with a developmental press model. For negative emotionality, there was an interaction between onset and course such that, among people with an adolescent onset, those that desisted exhibited greater declines while those that persisted exhibited less declines relative to their non-AUD peers. This suggests persistent AUD may lead to “canalization”⁴³, that is, a narrowing of potential developmental trajectories that helps maintain a deviant personality structure and AUD. In contrast, desistence from AUD suggests a recovery such that movement toward growth and maturity is accelerated to match levels reached by their non-AUD peers. These different patterns of effects could be due to the nature of the most salient developmental tasks during the transition from adolescence to adulthood. For example, these tasks may relate more to behavioral control (what one does) than emotional stability (how one feels).

In terms of personality affecting the onset and course of AUD, another interesting finding was that the course of AUD was clearly distinguished by age 11 personality traits, that is,

characteristics present prior to the initiation of alcohol use. First, these findings rule out the possibility that the personality differences we observed at age 17 and 24 were solely due to active alcohol abuse (personality differences between the no onset and adult onset group at age 17 also rule out this possibility). Second, it suggests that important individual differences factors that contribute both to an adolescent onset and a persistent course of AUD are present in childhood. Also, there was a clear ordering of personality differences reflective of the severity of later of AUD (no onset < adult onset < adolescent onset-desist < adolescent onset-persist). Consistent with previous studies³³, behavioral disinhibition is especially predictive. For example, even among those with adolescent onset AUD, behavioral disinhibition at age 11 and 17 discriminated those who would persist versus desist by age 24. Thus, personality characteristics that precede both initiation and problem use are not only key risk factors for the onset and persistence of AUD, but also likely index important etiological processes.

While the study had notable strengths including a large, community-based sample and prospective design, it has several limitations. One is that our sample is not racially or ethnically diverse, thereby limiting generalizability. Second, we had only 2 time points of personality data to examine change, for which few definitive conclusions can be drawn regarding the timing and processes of change. A third limitation is that while we often refer to psychological growth and maturity and psychosocial functioning, we have relied solely on self-reported personality as indirect proxies for these constructs. Finally, we did not examine specific variables such as leaving the rearing home, entering into educational training or an occupation, or romantic relationships that might mediate and underlie the broad changes we identified in personality traits^{2,5,20}.

To conclude, both AUD and personality traits exhibit normative patterns of change and stability, and their reciprocal effects can only be understood in the context of normal development. Clearly, the onset and persistence of AUDs has substantial impact on the lives of people who experience them. Future studies that continue to examine the interplay between normative personality development and the onset and persistence of AUD will yield important insights into personality theory and intervention for substance use disorders.

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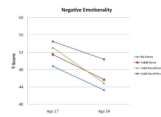


Figure 1.

The graphs depict the mean negative emotionality scores for the no onset, adult onset, adolescent onset-desist, and adolescent onset-persist alcohol dependence groups at age 17 and 24. Negative emotionality scores are in a T-score metric ($M = 50$, $SD = 10$) standardized to the age 17 data. Adol = Adolescent.

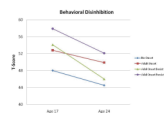


Figure 2.

The graphs depict the mean behavioral disinhibition scores for the no onset, adult onset, adolescent onset-desist, and adolescent onset-persist alcohol dependence groups at age 17 and 24. Behavioral disinhibition scores are in a T-score metric ($M = 50$, $SD = 10$) standardized to the age 17 data. Adol = Adolescent.

Table 1
Descriptive Statistics, Cross-sectional Comparisons, and Mean-level Change from Age 17 to 24 of Negative Emotionality and Behavioral Disinhibition among Alcohol Use Disorder Groups

	a Never (n=1211)	b Adult Onset (n=545)	c Adolescent Onset Desist (n=71)	d Adolescent Onset Persist (n=149)	Cohen's d for Cross-sectional comparisons ($M_2 - M_1 / SD$)					
					a vs b	a vs c	a vs d	b vs c	b vs d	c vs d
<i>Negative Emotionality</i>										
Age 11 Observer rating										
Mean	48.7	50.7	54.7	55.0	0.21**	0.51*	0.57***	0.34	0.38**	0.02
SD	9.1	9.4	13.7	12.7						
Age 17 MPQ										
Mean	87.7	91.4	93.5	95.4	0.28***	0.43***	0.55***	0.16	0.29**	0.13
SD	13.5	13.1	13.7	14.6						
Age 24 MPQ										
Mean	80.1	83.3	82.2	89.9	0.25***	0.17	0.74***	-0.08	0.49**	0.58***
SD	13.1	13.4	12.8	13.5						
Mean diff Age 24 - Age 17										
Cohen's d	-0.57***	-0.61***	-0.85***	-0.39***						
<i>Behavioral Disinhibition</i>										
Age 11 Observer rating										
Mean	48.3	52.3	53.6	58.2	0.43***	0.56***	1.00***	0.14	0.59**	0.44*
SD	8.9	9.5	10.1	10.7						
Age 17 MPQ										
Mean	48.6	56.2	58.3	64.3	0.52***	0.57***	1.00***	0.13	0.53***	0.35*
SD	15.1	14.3	18.5	16.2						
Age 24 MPQ										
Mean	43.0	51.5	45.4	55.1	0.58***	0.15	0.86***	-0.39**	0.26***	0.65***
SD	14.9	14.6	16.6	13.4						
Mean diff Age 24 - Age 17										
Cohen's d	-0.37***	-0.33***	-0.73***	-0.62***						

Note. The observer rating and self-report measures are on different metrics and so cannot be compared across time. Age 11 variables were only available for twins of the younger cohort so that sample sizes for the age 11 comparisons are much smaller than the age 17 and 24 comparisons: never onset (n=500), adult onset (n=270), adolescent onset-desist (n=33), and adolescent onset-persist (n=77). Values for personality change are standardized mean differences or Cohen's $d = (M1 - M2)/SD$; small effect $d = .20$, medium effect $d = .50$, large effect $d = .80$.

* $p < .05$

** $p < .01$

*** $p < .001$

Table 2
Results of Multilevel Modeling of Change in Negative Emotionality from Age 17 to 24 and AUD Group Contrasts

AUD Group Contrast	Level-1 parameters		Level-2 predictors of Age parameter	
	Intercept (SE)	Age (SE)	Sex (SE)	AUD group (SE)
Never vs. Adult Onset	90.45 ^{***} (0.41)	-1.33 ^{***} (0.07)	0.20 [*] (0.09)	0.23 [*] (0.09)
Never vs. Adolescent onset desist	89.75 ^{***} (0.47)	-1.31 ^{***} (0.07)	0.25 [*] (0.10)	0.01 (0.17)
Never vs. Adolescent onset persist	90.23 ^{***} (0.47)	-1.33 ^{***} (0.07)	0.26 [*] (0.10)	0.65 ^{***} (0.16)
Adult onset vs. Adolescent onset desist	92.96 ^{***} (0.63)	-1.24 ^{***} (0.14)	0.14 (0.15)	-0.23 (0.19)
Adult onset vs. Adolescent onset persist	93.42 ^{***} (0.62)	-1.31 ^{***} (0.15)	0.19 (0.17)	0.54 ^{**} (0.17)
Adolescent onset desist vs. Adolescent onset persist	96.28 ^{***} (1.15)	-1.85 ^{***} (0.23)	0.42 (0.29)	0.62 [*] (0.24)

Note. The intercept refers to the predicted mean value at age 17 for Negative Emotionality for individuals in the group comparison (e.g., Never vs. Adult Onset). Age refers to the units of change per year between age 17 and 24 for individuals in the group comparison. Sex and AUD group effects account for a portion of the Age parameter effect with female coded 0 and male coded 1. AUD group is coded 0 for the first group and coded 1 for the second group listed in the row. For example, for the Never vs. Adult Onset comparison, a male with an adult onset AUD would have a model estimated Age effect of $-1.33 + .20 + .23 = -0.90$ units per year.

*
 $p < .05$

**
 $p < .01$

 $p < .001$.

Table 3
Results of Multilevel Modeling of Change in Behavioral Disinhibition from Age 17 to 24
and AUD Group Contrasts

AUD Group Contrast	Level-1 parameters		Level-2 predictors of Age parameter	
	Intercept (SE)	Age (SE)	Sex (SE)	AUD group (SE)
Never vs. Adult Onset	51.95 ^{***} (0.46)	-0.93 ^{***} (0.07)	0.60 ^{***} (0.10)	0.41 ^{***} (0.10)
Never vs. Adolescent onset desist	50.35 ^{***} (0.53)	-0.84 ^{***} (0.08)	0.60 ^{***} (0.11)	-0.41 (0.22)
Never vs. Adolescent onset persist	51.46 ^{***} (0.53)	-0.88 ^{***} (0.07)	0.56 ^{***} (0.11)	0.36 [*] (0.15)
Adult onset vs. Adolescent onset desist	57.51 ^{***} (0.71)	-1.13 ^{***} (0.17)	0.93 ^{***} (0.17)	-0.83 ^{**} (0.23)
Adult onset vs. Adolescent onset persist	58.81 ^{***} (0.67)	-1.67 ^{***} (0.16)	0.88 ^{***} (0.17)	-0.06 (0.15)
Adolescent onset desist vs. Adolescent onset persist	64.06 ^{***} (1.29)	-2.40 ^{***} (0.30)	0.85 ^{**} (0.30)	0.79 ^{**} (0.27)

Note. The intercept refers to the predicted mean value at age 17 of Behavioral Disinhibition for individuals in the group comparison (e.g., Never vs. Adult Onset). Age refers to the units of change per year between age 17 and 24 for individuals in the group comparison. Sex and AUD group effects account for a portion of the Age parameter effect with female coded 0 and male coded 1. AUD group is coded 0 for the first group and coded 1 for the second group listed in the row. For example, for the Never vs. Adult Onset comparison, a male with an adult onset AUD would have a model estimated Age effect of $-0.93 + .60 + .41 = +0.08$ units per year.

*
 $p < .05$

**
 $p < .01$

 $p < .001$.