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Positive alcohol use expectancies moderate the association between anxiety sensitivity and alcohol use across adolescence

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Abstract

Anxiety sensitivity (AS), or the fear of anxious symptoms and the belief that these symptoms may have negative physical, social, and cognitive consequences, is one personality trait that emerges in early adolescence and may be linked to alcohol use. However, findings are equivocal as to whether elevated AS during adolescence directly predicts alcohol use. Adolescents do report increases in positive alcohol use expectancies during this developmental period, and these expectancies have been found to be significantly associated with alcohol use. The current study examined whether positive alcohol use expectancies and AS in early adolescence predicted changes in alcohol use throughout adolescence. This aim was examined via secondary data analyses from a longitudinal study examining the development of risk behaviors in adolescents. Results of univariate latent growth curve modeling suggest that AS alone was not a significant predictor of baseline alcohol use or change in use over time after controlling for gender, age, and self-reported anxiety. However, AS in early adolescence was found to be a significant predictor of increases in alcohol use across adolescence for youth who reported greater positive alcohol use expectancies. These results indicate that beliefs regarding the positive effects of alcohol use are an important moderator in the relation between AS and change in alcohol use during adolescence.

Keywords

Anxiety Sensitivity; Adolescence; Alcohol; Alcohol Use Expectancies

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1. Introduction

Adolescence is a developmental period associated with an increased risk for substance use initiation and escalation. Across licit and illicit substances, alcohol is the most reported substance used by adolescents (Johnston et al., 2015), and within a representative sample of adolescents residing in the United States (SAMHSA, 2015) 33% of adolescents report using alcohol before the age of fifteen. This percentage increases to over half of adolescents reporting ever drinking alcohol by the age of eighteen. Many adolescents also report heavy alcohol use and binge drinking during this developmental period (Johnston et al., 2015; Johnston et al., 2007), which is associated with adverse outcomes such as poor academic performance, risky sexual behavior, driving while intoxicated, and use of illicit substances (Miller et al., 2007). Additionally, some adolescents who report alcohol use during this period continue to experience alcohol-related problems into adulthood (Grant et al., 2006; McCambridge et al., 2011).

Research on the onset of alcohol use in adolescents has primarily focused on identifying individuals who are more likely to initiate alcohol use and maintain use throughout adolescence. Personality characteristics that predict how individuals behave or respond to emotions appear to be predictors of alcohol use onset (Castellanos-Ryan et al., 2013; Peeters et al., 2014). Anxiety sensitivity (AS), or the fear of anxious symptoms and the belief that these symptoms may have negative physical, social, and cognitive consequences (McNally, 2002; Reiss, 1991; Reiss and McNally, 1985), is one target personality trait that emerges in early adolescence and is associated with multiple anxiety disorders (Allan et al., 2014; Allan et al., 2016; et al., 2016; Weems et al., 2002). Empirical research indicates that there is variance in self-reported AS among adolescents, and findings from two longitudinal studies suggest that some adolescents endorse stable low-to-moderate levels of AS while others report stable-high or steadily increasing levels of AS over the course of adolescence (Allan et al., 2016; Weems et al., 2002). Therefore, AS may differentially affect the development of risky behaviors in adolescence, and individuals with greater AS may drink alcohol to reduce anxiety-related sensations and cognitions. Indeed, AS has been found to mediate the relationship between anxiety disorders and alcohol use in a sample of high school-aged adolescents (Wolitzky-Taylor et al., 2015).

These empirical findings suggest a possible functional association between AS and alcohol use such that adolescents with high AS may drink alcohol to reduce symptoms of anxiety or social/emotional discomfort as proposed by a negative reinforcement model of substance use (Baker et al., 2004). However, while AS may mediate the relationship between anxiety and alcohol use in adolescence, there appears to be mixed findings regarding the direct association between AS and actual alcohol use. In early adolescents, AS was not significantly associated with lifetime alcohol use (Malmberg et al., 2010), and among older adolescents, AS was neither associated with alcohol consumption (Novak et al., 2003) nor did it prospectively predict alcohol use or binge drinking over a two-year period (Malmberg et al., 2013). However, the association between AS and alcohol-use related problems appears to differ in later adolescence and young adulthood, and AS may be a significant predictor of problematic alcohol use for this age group. In young adults, AS prospectively predicted alcohol use disorder, and in adults, AS was associated with alcohol dependence and harmful

use of alcohol (Chavarria et al., 2015) as well as development of an alcohol use disorder (Schmidt et al., 2007). These findings suggest that AS may be a reliable predictor of alcohol use and alcohol-related problems in later adolescence and adulthood but not in early adolescence.

Since the relation between AS and alcohol use appears to change over time, and significant associations are observed later in adolescence, early predictors of this change in alcohol use may exist. Alcohol use expectancies that develop early on in adolescence may be one such predictor of changes in alcohol use, particularly for youth with elevated AS. Positive expectancies, or the beliefs that the use of alcohol will result in positive outcomes, such as improved mood, sexual enhancement, and reductions in tension or negative affect (Christiansen et al., 1982; Stein et al., 2007), may strengthen the association between AS and alcohol use for adolescents with elevated AS. Alcohol use expectancies have indeed been found to develop during early adolescence prior to any drinking experience (Christiansen et al., 1982; Miller, et al., 1990), and research suggests that positive expectancies increase in late childhood with more drastic increases occurring around twelve to fourteen years of age. Further, positive alcohol use expectancies are most commonly endorsed by adolescents (Knutsche et al., 2005) and to a greater extent than adults (Lundahl et al., 2001; Vilenne and Quertemont, 2015). Alcohol use expectancies have been found to predict initiation and maintenance of alcohol use (Jones et al., 2001), increases in alcohol consumption during middle school (Clark et al., 2011) and high school (Grube et al., 1995), and promote motives for drinking that, in turn, predict alcohol consumption (Kuntsche et al., 2010). Positive expectancies appear to both directly and indirectly predict alcohol consumption, suggesting that regardless of an individual's motivation to drink, holding the expectation that alcohol will result in positive outcomes, alone, predicts increased frequency of drinking and alcohol consumption (Kuntsche et al., 2010). Taken together, this research suggests that alcohol use expectancies present earlier on in adolescence may significantly predict future development of alcohol use for high AS youth.

In particular, for adolescents who report higher levels of AS and fear the physical, social, and cognitive consequences of anxiety, holding greater positive expectancies for the effects of alcohol may significantly increase the likelihood of alcohol use initiation and continued use. Although research suggests that AS may be associated with alcohol consumption, there are a few limitations to the extant literature. First, the majority of the research on AS and alcohol use has been conducted in samples of young adults, yet adolescents appear to report high levels of AS (Allan et al., 2014, Allan et al., 2014; Allan et al., 2016; Weems et al., 2002), positive expectancies for the effects of alcohol use (Lundahl et al., 1997; Satre and Knight, 2001; Vilenne and Quertemont, 2015), and increases in alcohol use during this developmental period (Johnston et al., 2015; SAMHSA, 2015). Second, the current research has primarily been cross-sectional, resulting in a limited understanding of how AS and positive expectancies may impact alcohol use over time, and only one study has found that AS predicts alcohol use cross-sectionally for male youth reporting greater tension reduction expectancies (O'Connor et al., 2008). For these reasons, it is important to extend the research on AS and alcohol use into a developmental framework and examine the effects of AS on alcohol use longitudinally.

Additionally, as posited by O'Connor and colleagues (2008), the current mixed results regarding the association between AS and alcohol use suggest that it is important to examine moderators of this relation. Positive alcohol use expectancies may be an important moderator between AS and alcohol use in adolescence, and investigating significant prospective effects of positive alcohol use expectancies on the development of alcohol use for youth with elevated AS has yet to be examined but may help inform the development of preventative or early interventions for alcohol use in youth.

The current study will examine the prospective effects of AS on alcohol use in a sample of adolescents and the moderating effects of positive alcohol use expectancies on this association. Based on the extant literature on AS and alcohol use in young adult samples, we hypothesized that alcohol use during adolescence will be greatest among youth endorsing both AS and beliefs that alcohol may have positive effects, such as tension reduction, improved cognitive and motor abilities, and global positive change (e.g., alcohol makes a person feel happy; future seems brighter). These results would suggest that alcohol use expectancies may be a potential target for interventions for youth with high levels of AS.

2. Method

2.1 Participants

Participants were 246 adolescents (44% female) recruited from a large metropolitan area where the legal age of alcohol consumption was 21 years of age. One parent or guardian (N=246) attended the experimental session with the adolescent. Participants were recruited via online postings and mailings to local schools, libraries, and recreational clubs to participate in a longitudinal study examining lifestyle behaviors. Adolescents were recruited between the ages of 9 and 13 and assessed annually for 8 years. Waves 1 and 2 were not utilized in the current study, as key measures were not conducted at these time points. Thus, all analyses start with data taken from Wave 3 (re-labeled Wave 1 throughout all analyses for clarity). The mean age of participants at the baseline data used in the current study was 13.06 (SD = 0.90) and adolescents reported drinking approximately three drinks (SD = 10.68) within the previous year on average (Table 1). Rates of drinking within the sample suggest that the participants exhibited moderate risk for alcohol use compared to population-based estimates (National Institute on Alcohol Abuse and Alcoholism, 2012). At Wave 3, 52.5% self-identified as White, 37.7% as Black, 1.6% as Asian, and 8.2% as "Other." The only inclusion criterion for the study was English proficiency. Prior to enrollment all adolescents and their parents or guardians were given information about the study. Following this information session, the parent/guardian and the adolescent provided consent and assent, respectively.

2.2 Procedures

The university's Institutional Review Board approved the following procedures, and all sessions were conducted in a laboratory at the university. At each annual assessment, confidentiality and the experimental procedures were explained to the adolescents and their parent/guardian, and consent and assent were obtained. Following this procedure parents provided demographic information including age, gender, race, and ethnicity about their

child. In a separate room, adolescents completed a battery of self-report measures that assessed AS, positive alcohol expectancies, and alcohol use. The same measures were administered at subsequent assessments. All participants and their parents/guardians were compensated for study participation.

2.3 Measures

2.3.1 Demographics—Demographic variables including age, gender, race and ethnicity were reported by the parent/guardian at each session.

2.3.2 Anxiety—The Revised Child Anxiety and Depression Scales (RCADS; Chorpita et al., 2000) was used to assess symptoms of anxiety disorders. Items are measured on a 4-point rating scale (never, sometimes, often, and always). Each adolescent's total anxiety score was summed by adding all items related to the anxiety subscales. The RCADS has been found to be a valid measure of anxiety and anxiety disorders (Chorpita et al., 2000). The coefficient alpha for the current study was 0.94.

2.3.3 Anxiety sensitivity—The Childhood Anxiety Sensitivity Index (CASI; Silverman et al., 1991) consists of 18 items that assess a child's or adolescent's belief that the symptoms of anxiety will result in negative social (i.e., "other kids can tell when I feel shaky"), cognitive (i.e., "when I am afraid I worry I might be crazy"), or physical consequences (i.e., "it scares me when my heart beats fast"). The items are rated on a 3-point scale that reflects the degree to which the adolescent experiences the item (i.e., "1=none" and "3=a lot"). Scores are calculated by summing all items of the CASI, which results in a range of scores from 18–54 with higher scores indicating greater AS. Coefficient alpha for the current sample was 0.78. Silverman and colleagues (1991) reported good test-retest reliability for the CASI with estimates ranging from 0.76 and 0.79 for nonclinical and clinical samples, respectively.

2.3.4 Alcohol expectancies—The Alcohol Expectancies Questionnaire-Adolescent Brief (AEQ-AB; Stein et al., 2007) is a brief version of the AEQ-A (Brown et al., 1987). The AEQ-AB contains seven items that assess an individual's positive and negative expectancies regarding the effects of alcohol. The positive expectancies items assess for the global positive effects of alcohol (i.e., "alcohol generally has powerful positive effects on people"), improved cognitive and motor abilities (i.e., "alcohol helps people think better and helps coordination"), sexual enhancement (i.e., "alcohol improves sex"), and relaxation and tension reduction (i.e., "alcohol helps a person relax, feel less tense, and can keep a person's mind off of mistakes at school or work"). The negative expectancies items consist of items that assess change in social behavior, cognitive and motor impairment, and increased arousal. The positive expectancies subscale was used in the current study by calculating the average of all of the items comprising the positive expectancies subscale. Items are rated using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The coefficient alpha for the current sample, 0.55, was slightly higher than those found in previous studies (see Stein et al., 2007).

2.3.5 Alcohol use—Alcohol use was assessed via a modified version of the Youth Risk Behavior Surveillance System (Center for Disease Control and Prevention, 2001; Banducci et al., 2015). Adolescents self-reported the approximate total number of alcoholic beverages consumed in the previous year, including both alcohol use with and without parental permission.

2.3.6 Data analytic plan—We utilized a latent growth modeling (LGM) approach to examine our hypotheses. LGM is a special case of structural equation modeling and can be used to assess for trends in alcohol use over time. We conducted our analyses with Mplus 6 (Muthén and Muthén, 2010) utilizing full information maximum likelihood (FIML) estimation procedures. FIML is more robust to violations of normality and provides less biased estimates compared to listwise or pairwise deletion. FIML also allows for us to conduct all analyses on the full sample of youth who completed measures on all predictor variables (N = 245).

LGM estimates means and variances for a latent intercept and slope by fixing the regression weights from each manifest variable to the intercept at 1.0. Regression weights for manifest variables loaded onto the slope set the shape of the trajectory of alcohol use over time. We initially estimated an intercept-only model then added growth terms (linear, quadratic, etc.) until we identified the most parsimonious good-fitting model. Error variances and intercept-slope correlations were allowed to be freely estimated. Several fit indices were used to evaluate the fit of the model to the data, including the χ^2 statistic, the Comparative Fit Index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker and Lewis, 1973) and the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990). Good fit was indicated by CFI and TLI values > .90, RMSEA values < .08, and nonsignificant chi-square values (Schweizer, 2010). Because χ^2 values are sensitive to sample size, the CFI, TLI, and RMSEA were used as primary measures of model fit. After a good fitting model was identified, means and variances of the intercept and slope factors were examined. Significant estimates of the means of these constructs suggest that they differ from zero, while significant estimates of the variances indicate individual differences around the estimates and support the inclusion of predictors of these differences.

We first examined an unconditional model of alcohol use to determine whether quantity of alcoholic beverages consumed was significantly different than zero at baseline and increased over development. We then utilized a model building approach to determine whether anxiety sensitivity was associated with past year quantity of youth alcohol use, controlling for baseline anxiety levels, sex, and age. Finally, we added positive alcohol use expectancies as a predictor of the relation between anxiety sensitivity and alcohol use frequency, controlling for all covariates.

3. Results

3.1 Preliminary analyses

First, Little's MCAR analyses were used to assess missing data patterns. These analyses suggest that the data were missing completely at random; χ^2 (268) = 260.93, p = .610. Skew and kurtosis statistics for key variables were then examined for univariate and multivariate

normality. All statistics appeared to be within the normal range with the exception of alcohol use, which was positively skewed and kurtotic at all waves. We transformed the data by taking the natural log of each alcohol use value at every wave and then re-assessed the descriptive statistics. The new distributions were within the acceptable bounds for skew and kurtosis (≤3.0) and were used throughout the following analyses.

Means and standard deviations of key study variables are included in Table 1. Table 1 also presents correlations between past year quantity of youth alcohol use at each assessment points and all major study independent variables. Notably, being female was significantly associated with greater levels of baseline anxiety and anxiety sensitivity. Baseline alcohol use was also correlated with positive alcohol expectancies and anxiety symptoms.

3.2 Latent growth models: Unconditional growth model

Next, we examined a univariate latent growth curve modeling changes in alcohol use over time. The intercept-only model fit the data poorly, whereas the linear model fit the data well; $\chi^2_{(df=16)} = 25.40$, p = 0.063; CFI = 0.98; TLI = 0.98; RMSEA = 0.048 (90%CI = 0.000 – 0.081). A quadratic model did not significantly improve the fit; thus, the linear model was retained throughout all analyses. Both the means of the intercept (M = 0.70, SE = 0.06, p < .001) and the slope (M = 0.24, SE = 0.02, p < .001) were significant, suggesting that baseline alcohol use was different from zero and that alcohol use increased significantly across adolescence. Further, the variances of the intercept (Var. = 0.62, SE = 0.08, p < .001) and the slope (Var. = 0.06, SE = 0.01, p < .001) were also significant, which supports the utility of adding predictors to the model. The correlation between the intercept and slope, however, was not significant (r = −0.13, p = .236).

3.3 Conditional model 1: Anxiety sensitivity as a predictor

First, we examined whether AS was associated with baseline and change over time in alcohol use via a conditional growth curve model of alcohol use in which we regressed the intercept and slope controlling for sex, anxiety levels, and age at baseline. The model continued to fit the data well; $\chi^2_{(df=32)} = 47.23$, p = .040, CFI = 0.97, TLI = 0.97, RMSEA = 0.04 (90%CI = 0.01 – 0.07). Sex (std. est. = 0.17 p = .023), anxiety (std. est. = 0.30 p = .002), and age at baseline (std. est. = 0.15 p = .038) were all significant predictors of the intercept, suggesting that boys, youth with higher initial levels of anxiety, and those who began the study at an older age reported higher levels of drinking at baseline. However, none of the predictors were significantly associated with change in alcohol use over time.

3.4 Conditional model 2: Interactions with positive expectancies

Our primary hypothesis postulated that positive expectancies for alcohol use would moderate the relation between anxiety sensitivity and alcohol use over time. To test this hypothesis, we added an interaction term between positive expectancies and anxiety sensitivity as a predictor of the latent growth curve. This model also fit the data well; $\chi^2_{(df=40)} = 47.69$, p =.188, CFI = 0.99, TLI = 0.98, RMSEA = 0.03 (90%CI = 0.00 – 0.06). Only anxiety levels at baseline (std. est. = 0.28 p = .003) remained a significant predictor of the intercept of alcohol use (see Table 2 for path estimates). In support of the primary hypothesis, the interaction between positive expectancies and anxiety sensitivity

significantly predicted the slope of alcohol use (std. est. = 0.82 p = .031).[1] Post-hoc analyses suggest that anxiety sensitivity had a more positive relation to alcohol use for youth with high (relative to low) levels of positive drinking expectancies. Put differently, anxiety sensitivity is a greater predictor of increases in alcohol use across adolescence for youth who report expecting positive consequences from using alcohol (see Figure 1).[2]

4. Discussion

The current study sought to examine whether anxiety sensitivity is associated with alcohol use and changes in alcohol use during adolescence. Empirical research based on tension-reduction models of substance use suggest that AS may promote drinking motives and alcohol use (Novak et al., 2003; Stewart et al., 1997), yet findings have been mixed as to whether a significant association exists within an adolescent population (Malmberg et al., 2010; Malmberg et al., 2013). Prior research suggests that positive alcohol use expectancies are significantly associated with alcohol use during this developmental period (Clark et al., 2011; Grube et al., 1995; Vilenne and Quertemont, 2015), and positive alcohol use expectancies, including both positive and negative reinforcement motives, may be particularly relevant to adolescents with elevated AS. Therefore, the study examined whether positive alcohol use expectancies moderate the relation between AS and changes in alcohol use.

The results of the current study suggest that AS was not significantly associated with initial alcohol consumption or changes in alcohol consumption over time, which supports extant research. Findings from cross-sectional research indicate a non-significant association between AS and alcohol use in both early adolescence (Malmberg et al., 2010) and later adolescence (Novak et al., 2003). Prospective research has also failed to support a relation between AS and alcohol use over a two-year period in a sample of high-school students (Malmberg et al., 2013). Although AS may not predict alcohol use in adolescence, AS is associated with alcohol and substance use in adulthood (Chavarria et al., 2015; Cox et al., 1993; Stewart et al., 1995), and elevated levels of AS have been shown to predict alcohol use disorders (Schmidt et al., 2007). These results support proposed models of the relation between AS and substance use (Novak et al., 2003; Stewart et al., 1997) that state that individuals may use substances to regulate anxious arousal and combat the anticipated negative social, cognitive, or physical effects of anxiety (Baker et al., 2004). The current results suggest that this model may be particularly relevant to adults who have had experience with alcohol and the positive and negative effects of its use. This experience may contribute to the significance of the direct relation between AS and alcohol consumption for adults. However, for adolescents, a more comprehensive theoretical model may exist to explain the relation between AS and the development of alcohol use. Specifically, alcohol use in youth with elevated AS may only be observed when adolescents hold greater

[1]The model was also examined without the inclusion of baseline anxiety symptoms, and the pattern of significant findings was the same as presented here.

[2]In order to examine whether effects differ by sex, we conducted post-hoc analyses examining a model in which sex moderated the interaction between AS and positive alcohol expectancies on alcohol use. The three-way interaction was not significant, suggesting our results did not indicate significant differences in alcohol use across time between males and females.

expectancies regarding the positive effects of alcohol on internal states and social interactions.

The findings from the current study support a comprehensive model and indicate that there is a stronger association between AS and alcohol use over time for adolescents who endorse greater levels of initial positive alcohol use expectancies. That is, adolescents who hold greater positive beliefs about the effects of alcohol (e.g., alcohol may reduce tension or improve social situations), are more sensitive to symptoms of anxiety, and fear the potential effects of anxiety (e.g., appearing nervous to other people) show greater increases in alcohol use over the course of adolescence. Positive alcohol use expectancies present early on in adolescence, even prior to any drinking experience, may therefore be important in the development of alcohol use for adolescents with AS, and the moderating effects of expectancies may contribute to the functional relation between anxiety symptoms, AS, and alcohol use.

The significant moderating effects of positive alcohol use expectancies support and expand upon initial results by O'Connor and colleagues (2008). The authors examined the moderating effects of alcohol use expectancies on the relation between anxiety sensitivity and heavy drinking in a sample of freshman college students, and there was a significant association between AS and heavy drinking only for males who reported elevated levels of tension reduction expectancies and not for any other category of expectancies. The current results may differ from these findings due to the age of the sample and the longitudinal investigation of the relation between AS, expectancies, and alcohol use. The current findings are unique in that they suggest a significant relation for male and female adolescents who hold general positive alcohol use expectancies beyond tension reduction.

In light of the significant findings, a few limitations to the current study should be noted. First, the current study utilized a shortened version (i.e., AEQ-AB; Stein et al., 2007) of the adolescent Alcohol Expectancy Questionnaire (Brown et al., 1987). Although the AEQ-AB was validated in a sample of adolescents, the measure consists of only seven items, four of which comprise the positive alcohol use expectancies subscale. The authors originally noted a weak coefficient alpha value for the subscales (Stein et al., 2007), and they attributed this value to the limited number of items in the scale. The alpha value for the positive alcohol use expectancies scale in the current study (coefficient alpha was 0.55) was larger than reported in the validation sample, but the lower reliability value should be noted as a potential limitation. Second, the study only examined the predictive potential of AS and expectancies when adolescents entered the study at the mean age of thirteen. Additional research is needed to examine whether changes in AS and expectancies predict changes in alcohol use across adolescence. Third, alcohol consumption was retrospectively recalled, which may reduce the accuracy of self-reported use (Shillington and Clapp, 1999; Williams and Nowatzki, 2005). There were also individual differences in the amount of alcohol consumed, with some youth reporting limited amounts of alcohol consumption, and variability in alcohol consumption increased throughout adolescence. Finally, research suggests that AS may be associated with harmful alcohol use, dependence, and alcohol use disorder in adults (Chavarria et al., 2015; Schmidt et al., 2007). The current study only examined the association between AS, expectancies, and use, but not dependence, and it still remains

unclear as to whether the observed trajectory for youth with high AS and positive expectancies would result in problematic use later in young adulthood and adulthood.

Findings from the current study expand on the previously proposed theoretical relation between AS and alcohol use (Novak, et al., 2003; Stewart, et al., 1997) that has not consistently been supported by empirical research. O'Connor and colleagues (2008) emphasize the importance of considering moderators in this relation, and there does appear to be a significant relation between AS and change in alcohol use only for adolescents who hold the belief that alcohol serves to improve social and cognitive performance as well as reduce tension. These results suggest that alcohol use expectancies may serve as a target for interventions for adolescent alcohol use. While AS has been conceptualized as a malleable trait variable (Otto and Reilly-Harrington, 1999; Smits et al., 2008), expectancies may be a more promising target to reduce alcohol use over time in youth with high AS.

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Highlights

- Anxiety sensitivity (AS) and alcohol use expectancies may predict adolescent alcohol use.
- AS alone did not predict change in alcohol use.
- AS predicted use for those reporting positive expectancies.

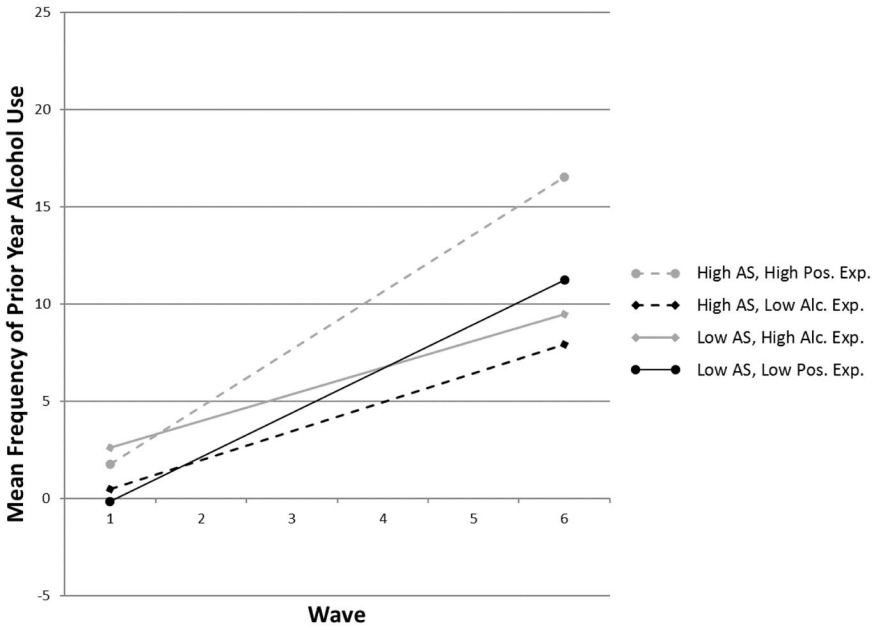

Figure 1.

Linear trajectories of alcohol use in youth with low and high levels of anxiety sensitivity and positive alcohol expectancies.

Note: Group membership was determined using upper and lower quartiles of anxiety sensitivity and positive alcohol expectancies.

AS = Anxiety Sensitivity.

Table 1

Means, standard deviations, and correlations between key study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Wave 1 Alcohol	1.00										
2. Wave 2 Alcohol	0.42**	1.00									
3. Wave 3 Alcohol	0.50**	0.43**	1.00								
4. Wave 4 Alcohol	0.31**	0.65**	0.66**	1.00							
5. Wave 5 Alcohol	0.20*	0.22*	0.43**	0.56**	1.00						
6. Wave 6 Alcohol	0.07	0.27**	0.33**	0.41**	0.58**	1.00					
7. Wave 1 RCADS	0.12	0.14*	−0.01	0.01	0.17*	0.10	1.00				
8. Wave 1 CASI	0.04	0.08	<0.01	0.02	0.23	0.17	0.63**	1.00			
9. Wave 1 AEQ-AB	0.04	0.07	0.10	−0.04	0.09	0.11	0.17	0.02	1.00		
10. Age	0.01	0.10	0.17*	0.08	0.10	0.18*	−0.08	−0.02	0.12	1.00	
11. Sex	0.10	0.08	0.02	0.05	−0.07	−0.06	−0.19	−0.13*	0.07	0.07	1.00
M (SD)	3.25 (10.68)	3.58 (8.90)	5.47 (12.97)	7.65 (13.79)	11.64 (21.03)	21.65 (40.24)	20.64 (13.01)	9.68 (4.96)	10.35 (2.98)	13.06 (0.90)	0.55 (.50)
Number of participants	242	221	197	168	143	140					

Note. Alcohol use variables are un-transformed for interpretabilit y; RCADS, Revised Child Anxiety and Depression Scales; CASI, Childhood Anxiety Sensitivity Index; AEQ-AB, Alcohol Expectancies Questionnaire-Adolescent Brief, Positive Expectancies Subscale; Sex is coded 0 = female, 1 = male.

* $p < .05$,

** $p < .01$.

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Table 2

Unstandardized (and standardized) parameter estimates for final latent growth curve model.

Predictor	Intercept			Slope		
	Unstd. Est. (S.E.)	**95% CI**	**Std. Est.**	**Unstd. Est. (S.E.)**	**95% CI**	**Std. Est.**
Age	.12 (.07)	−.01 to .25	.13	.04 (.03)	−.012 to .09	.12
Sex (Male)	.23 (.11)	−.06 to .45	.15*	−.05 (.04)	−.13 to .04	−.09
Wave 1 RCADS	.02 (.01)	.01 to .03	.28**	<.01 (<.01)	−.01 to .00	−.17
Wave 1 CASI	.02 (.04)	−.06 to .10	.14	−.03 (.02)	−.06 to .01	−.55
Wave 1 AEQ-B	.06 (.04)	−.02 to .14	.25	−.04 (.02)	−.07 to <− .01	−.43*
AEQ-AB*CASI	<.01 (<.01)	−.01 to .01	−.21	<.01 (<.01)*	>.01 to .01	.82*

Note. CI, Confidence Interval; RCADS, Revised Child Anxiety and Depression Scales; CASI, Childhood Anxiety Sensitivity Index; AEQ-AB, Alcohol Expectancies Questionnaire-Adolescent Brief, Positive Expectancies Subscale;

* $p < .05$,

** $p < .01$.