



Alcohol Outcome Expectancies Mediate the Relationship Between Social Anxiety and Alcohol Drinking in University Students: The Role of Gender

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Abstract

College alcohol drinking is a public health concern worldwide. A line of research indicates that higher social anxiety is associated with more severe college drinking. However, other studies reveal a protective role of social anxiety against alcohol drinking in college students. Attempting to reconcile contradictory findings, we examined the hypothesis that there are multiple antagonistic pathways that could explain the social anxiety-college drinking relationship. In addition, there may be individual difference variables that moderate these processes. Furthermore, it was expected that the processes could vary as a function of the alcohol drinking outcomes examined. Expectancy theory emphasizes the role of alcohol outcome expectancies in alcohol drinking. Thus, in the present study we tested whether global positive and negative alcohol outcome expectancies partially mediate the relationship between social anxiety, alcohol consumption, and alcohol-related problems in a sample of 245 university students. We also examined the moderating role of gender in these mediating processes. Results revealed parallel but oppositional processes. Higher social anxiety was associated with heavier alcohol drinking and more serious alcohol-related problems via stronger positive alcohol outcome expectancies. However, the mediating role of positive alcohol outcome expectancies varied as a function of gender. It appears that in female students the mediating effect of positive alcohol outcome expectancies was stronger than in male students. On the other hand, higher social anxiety had a protective role against alcohol consumption but not against alcohol-related problems via stronger negative alcohol outcome expectancies. Finally, there was an inverse direct relationship between social anxiety and alcohol consumption.

Keywords College alcohol drinking · Social anxiety · Alcohol outcome expectancies · University/college students · Indirect effect and moderated mediation

Introduction

Typically, alcohol-related problems fit into one or both of the following categories: (i) excessive alcohol consumption, and (ii) experience of negative alcohol-related consequences (Ham and Hope 2003). University students worldwide are at increased risk for developing difficulties related to excessive alcohol use or alcohol related consequences (Isaak et al. 2011). However, not all students develop such problems. In a review of the literature on college drinking, Ham and Hope (2003) argue that psychopathology as well as

situational, cultural, social-cognitive, and personality factors may account for individual differences in college drinking and these risk factors may differ from those in the general population.

Social anxiety and its clinical manifestation, social anxiety disorder, are common phenomena worldwide (Fehm et al. 2005; Ruscio et al. 2008). Social anxiety is assumed to lie along a continuum, from normal to subclinical and clinical levels, and its central theme is a fear of being negatively evaluated by others (Furmark 2002). Clinical and subclinical levels of social anxiety have been associated with increased risk of alcohol use disorders. In their review of the literature, Morris et al. (2005) report that epidemiological studies strongly indicate that there is a high comorbidity between social anxiety and alcohol use in both clinical samples and the general population. Moreover, there is evidence that social anxiety is causally related to alcohol use disorders

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(Buckner and Turner 2009). Crum and Pratt (2001) also reported that adults with subclinical social anxiety levels ran a higher risk of alcohol use disorders 13 years later than adults with few social fears.

Taken together, these findings are consistent with negative reinforcement models of alcohol use such as the tension-reduction theory (Conger 1956) and the self-medication hypothesis (Khantzian 1997). A basic tenet of these models is that alcohol drinking is maintained and escalated through negative reinforcement because alcohol functions as a compensatory means to reduce and avoid emotional distress. This may be especially relevant to college students who often face various challenges in the academic setting that could cause distress, such as socialization, living away from home, competition with peers, and curriculum difficulty. At the same time, heavy drinking is often encouraged by peers and is perceived as normative on university campuses (Ham and Hope 2003), which could facilitate alcohol use as a coping response. Theoretically speaking, if a university student also experiences an additional vulnerability such as higher social anxiety, then one would expect this individual to be at a greater risk for heavier drinking to reduce distress than a non-socially anxious student (Eggleston et al. 2004). In support of this argument, Lewis and O' Neill (2000) showed that among college students, problem drinkers reported higher social anxiety than non-problem drinkers. Furthermore, Kushner and Sher (1993) found that college students with social phobia were 1.7 times more likely to be diagnosed with an alcohol disorder than non-socially anxious students. Finally, Kidorf and Lang (1999) demonstrated that alcohol drinking increased in a stress-induction versus a control condition and socially-anxious students consumed more alcohol in the stress-induction condition than other students.

Nevertheless, the aforementioned negative reinforcement models have not been consistently supported in the literature. In their meta-analysis, Schry and White (2013) reported that an inverse or no relationship between social anxiety and alcohol use was often found in studies with college students. Furthermore, Holroyd (1978) showed that in a socialization situation, socially-anxious college students consumed less alcohol than did non-socially anxious students. Moreover, Eggleston et al. (2004) reported an inverse relationship between social anxiety, frequency of drinking, and binge drinking in college students. Theoretically speaking, inconsistencies in findings may result from a differential relationship of social anxiety to various alcohol-related outcomes (Morris et al. 2005). For example, socially-anxious students may tend to avoid social events such as parties in which drinking alcohol is the norm. As a result, frequency and quantity of drinking could be low for highly socially-anxious students (Yoder-Strahan et al. 2011). However, when they do not or cannot avoid a social situation they may drink in a problematic pattern (Schry and White 2013). In support

of this argument, Buckner et al. (2006) reported that social anxiety in undergraduate students was not related to quantity and frequency of alcohol drinking but was positively related to alcohol-related problems. Finally, among heavy drinking college students socially-anxious individuals consumed less alcohol but experienced more negative consequences than non-socially anxious students (Lewis et al. 2008).

In order to understand how social anxiety is related to college drinking it is important to examine variables through which social anxiety could exert its effects. Beliefs regarding alcohol effects and consequences, or alcohol outcome expectancies, could mediate this relationship (Morris et al. 2005). Alcohol outcome expectancies are conceptualized as structures in long-term memory acquired either through one's own alcohol use or through observation of others' drinking experiences (Jones et al. 2001) and concern either reinforcing or punitive effects of alcohol. Positive alcohol outcome expectancies are conceptualized as a set of beliefs that alcohol consumption will lead to a desirable outcome. On the other hand, negative alcohol outcome expectancies are beliefs that alcohol drinking will lead to unpleasant consequences (Leigh and Stacy 1993). According to the expectancy theory, these memories influence the probability that the individual will drink alcohol (Goldman et al. 1987). Early studies showed that global positive and negative alcohol outcome expectancies were positively and negatively associated with college heavy drinking, respectively (Leigh and Stacy 1993). More recently, Baer (2002) argued that there is a robust relationship between global positive alcohol expectancies and problematic drinking in college students. Furthermore, in first-year college students, greater global positive alcohol outcome expectancies were related to a higher risk of negative consequences from binge drinking (Turrisi et al. 2000).

Higher social anxiety might be hypothesized to increase the risk of increased drinking through the presence of stronger positive alcohol outcome expectancies related to desirable outcomes. When desirable outcomes are experienced, positive alcohol expectancies are strengthened and further increase the risk for increased drinking among socially-anxious students. However, aside from their specific social concerns, socially anxious students may also tend to have increased worries about negative outcomes of their actions. In theory, if heavy drinking occurs frequently, then the likelihood of alcohol-related negative experiences increases and subsequently the socially-anxious student may acquire strong negative alcohol outcome expectancies as well (Eggleston et al. 2004). Consequently, negative alcohol outcome expectancies may have a protective role among socially-anxious students, preventing excessive alcohol use (Schry and White 2013).

Bruch et al. (1992) illustrated that alcohol outcome expectancies in social evaluative conditions functioned as a

suppressor variable in the relationship between shyness and college alcohol drinking (frequency and quantity). Although the simple correlation between shyness and alcohol drinking was not statistically significant, inclusion of positive alcohol expectancies in the model revealed a statistically significant negative relation between shyness and college alcohol drinking. More recently, Ham (2009) used structural equation modeling and reported a negative total and direct relationship between social anxiety and hazardous drinking in undergraduate students. It was also shown that positive social alcohol outcome expectancies mediate the relationship between social anxiety and problematic drinking in college students. Other types of positive alcohol expectancies such as tension reduction or sexual enhancement did not mediate this relationship. Although there was a positive association between social anxiety and general negative alcohol outcome expectancies, the latter were not related to hazardous alcohol drinking. Furthermore, Ham and Hope (2006) used structural equation modeling and showed that social anxiety was unrelated to alcohol consumption and inversely associated with alcohol-related problems. Neither positive alcohol outcome expectancies nor negative alcohol outcome expectancies mediated the relationship between social anxiety and drinking variables. Moreover, Ham et al. (2009) used structural equation modeling and found an inverse direct relationship between social anxiety, quantity/frequency of drinking, and negative consequences of alcohol drinking as well as no relationship between social anxiety and dependence symptoms. Finally, Ham et al. (2016) performed a mediation analysis and demonstrated that social anxiety had a positive indirect link to alcohol use and alcohol-related problems through positive social alcohol outcome expectancies and a negative indirect relation via negative social alcohol outcome expectancies. On the other hand, social anxiety had a negative direct effect on alcohol consumption and was unrelated (direct effect) to alcohol-related problems. The aforementioned findings illustrate that there may be alternative pathways that link social anxiety to alcohol drinking variables in college students.

A deeper understanding of the social anxiety-college drinking relationship also requires to search for third variables that moderate it. Third variables could also have a differential impact on the mediating role of outcome expectancies, thus leading to different drinking patterns in socially-anxious students. Theoretically speaking, gender could be a moderator of the social anxiety-college drinking relationship (Schry and White 2013). In typical samples of college students, male students report heavier and more frequent alcohol drinking, engage more often in binge drinking, and experience more negative alcohol-related experiences than female students (Ham and Hope 2003). Furthermore, typical male and female college students demonstrate distinctive anxiety responses to alcohol. In particular, women

showed reduced anxiety following alcohol drinking during a social anxiety-provoking task, while men showed greater anxiety (Sinha et al. 1998).

Among college students, men hold more positive alcohol outcome expectancies than women especially about the tension reduction effects of alcohol (Nolen-Hoeksema 2004). Furthermore, global positive alcohol outcome expectancies predicted increases in beer consumption during a 2-month period in male but not in female college students (Kidorf et al. 1995). Regarding negative consequences, at a high level of intoxication female college students held greater expectancies of behavioural impairment than male students (Wall et al. 2000).

There is also preliminary evidence that gender modifies the relationship between social anxiety and alcohol drinking in young people and college students. Buckner and Turner (2009) found that social anxiety disorder predicted the development of alcohol use disorders in young women but not in young men. In the same vein, Norberg et al. (2010) demonstrated that social anxiety was positively and negatively related to negative alcohol consequences in female and male college students, respectively. Finally, Yoder-Strahan et al. (2011) found an inverted-U shape social anxiety-problematic drinking relationship in male university students. Unlike what would have been predicted from the self-medication or tension reduction models, highly socially-anxious male students drank the least and problematic drinking peaked at moderate social anxiety levels. No linear or curvilinear relationship between social anxiety and problematic drinking was observed in female university students. Nevertheless, Ham et al. (2016) did not find gender moderation of the indirect effect of social anxiety on college drinking via social outcome expectancies in college students. The few and inconsistent findings underline the scarcity of research on the role of gender in modulating the social anxiety-college drinking relationship and on the mechanisms through which gender influences this relationship (Schry and White 2013).

The present study examined the mediating role of positive and negative alcohol outcome expectancies in the social anxiety-college drinking relationship in Greek-Cypriot undergraduate university students. Although the role of alcohol outcome expectancies in this relationship has been emphasized in the literature, very few studies have investigated the mediating role of both positive and negative alcohol outcome expectancies (Ham 2009; Ham et al. 2016). In addition, most of these studies have found supporting evidence for the mediating role of social expectancies and not of global positive and negative alcohol outcome expectancies. However, socially-anxious students report less positive affect and fewer positive and sexual experiences than non-socially anxious students (Alden and Taylor 2004; Kashdan and Steger 2006). Thus, not only social facilitation expectancies but also fun and sexual enhancement expectancies could be

important in the drinking behaviour of socially-anxious college students. Global expectancy factors could be relevant as their subfactors might be related to interpersonal processes and emotional experience in social anxiety. Consistent with this idea, Bruch et al. (1992) reported that their measure of positive alcohol outcome expectancies in social evaluative situations was strongly correlated with a measure of global positive alcohol outcome expectancies. On the basis of this correlation, the authors suggested that different types of positive alcohol outcome expectancies and global expectancies could potentially facilitate the shyness-college drinking relationship (Bruch et al. 1992). Consequently, in the present study we hypothesized that social anxiety would be positively and negatively related to alcohol drinking in college students via higher levels of global positive and negative alcohol outcome expectancies, respectively. We explored these mediating processes with two alcohol drinking variables, alcohol consumption and alcohol-related problems. Although Schry and White's (2013) meta-analysis suggests that social anxiety has a negative relationship on alcohol consumption, Ham et al. (2016) demonstrated that social anxiety was positively associated with alcohol use via positive social alcohol outcome expectancies and negatively associated with alcohol use via negative social alcohol outcome expectancies. Given the inconsistent findings, we did not form a specific hypothesis about the direct effect of social anxiety on drinking outcomes. Furthermore, given the few and inconsistent findings on the role of gender, we performed an exploratory analysis in order to investigate whether the mediating effects of outcome expectancies would vary as a function of gender without formulating any a priori hypotheses. Given the scarce literature, we did not form specific hypotheses about the nature and direction of the interaction between gender and alcohol outcome expectancies in the social anxiety-college drinking relationship.

Finally, as the majority of previous findings relied mainly on samples of Anglo-Saxon origin (Ham 2009; Ham et al. 2016), one goal of the present study was to investigate these processes with a sample from a different culture. There is evidence for differences between Anglo-Saxon and South-European populations not only in the amounts of alcohol consumed but also in their drinking patterns (Yoder-Strahan et al. 2011). Greek-Cypriot students reported more negative alcohol outcome expectancies and fewer positive alcohol outcome expectancies than US college students (Yoder-Strahan et al. 2011). Furthermore, Oei and Jardim (2007) demonstrated that alcohol outcome expectancies predicted heavier alcohol drinking in Caucasian-origin students but not in Asian-origin students. The two groups also differed in the type of outcome expectancies they held about alcohol. Unlike Asian students who expected more negative consequences from alcohol consumption, Caucasian students expected more positive alcohol-related consequences. These

results illustrate that the effects of alcohol outcome expectancies may also depend on the cultural context.

Methods

Participants

Three hundred and thirty-three Caucasian Greek-Cypriot undergraduate psychology students from the University of Cyprus volunteered to participate in the study. From them, two hundred and forty-five students were alcohol drinkers. The final sample consisted of 140 women (mean age = 21.08, $SD = 2.48$) and 105 men (mean age = 20.53, $SD = 2.29$). For their participation in the study, participants were rewarded with extra course credit.

Measures

Alcohol Use Disorders Identification Test (AUDIT)

Problematic drinking was assessed with the Greek version of the AUDIT (Saunders et al. 1993; Moussas et al. 2009; Yoder-Strahan et al. 2011). The instrument consists of ten multiple-choice items. Each item is scored from 0 to 4 and scores are summed to yield a total score. The AUDIT measures frequency and quantity of alcohol drinking, frequency of heavy drinking, and alcohol-related negative consequences and the total score is an index of alcohol involvement along a continuum of severity (Babor et al. 2001). In the general population cut-off scores greater than 8 indicate problematic drinking (Babor et al. 2001). Kokotailo et al. (2004) showed that the AUDIT is a valid tool for alcohol screening in college students but their findings indicate that a cut-off score of 6 or more demonstrate the greater sensitivity and specificity in the detection of high-risk drinkers in college students. Consistent with earlier research, in the present study we used two alcohol drinking variables, an alcohol consumption variable and an alcohol-related problems variable (Shields et al. 2004). The former is the sum of the first 3 AUDIT items (frequency, quantity, and heavy drinking). The latter is the sum the remaining 7 (4–10) AUDIT items (Ham et al. 2016). In the present sample, Cronbach's α for the 10-item AUDIT scores was 0.76. Cronbach's α for the alcohol consumption subscale scores was 0.73. Finally, Cronbach's α for the alcohol-related problems scores was 0.64.

Alcohol Outcome Expectancies Questionnaire

This is a measure of positive and negative expectancies regarding the consequences of alcohol consumption (Leigh and Stacy 1993; Yoder-Strahan et al. 2011). The Greek

version of the questionnaire in a Greek-Cypriot sample had a Cronbach's α of 0.92 (Yoder-Strahan et al. 2011). It consists of 34 items answered on a six-point Likert scale ranging from 1 (*something that is completely unlikely to happen*) to 6 (*something that surely happens*). There are two global factors for positive and negative alcohol outcome expectancies, respectively. Items were summed up to calculate a total score for each global factor, respectively. The positive global factor consists of the following subfactors: (i) social facilitation, (ii) sexual enhancement, (iii) fun, and (iv) negative reinforcement/tension reduction. The negative global factor consists of the following subfactors: (i) negative emotions, (ii) negative social consequences, (iii) physical consequences, and (iv) cognitive/performance impairment. In the present sample, Cronbach's alphas for the positive and negative global factors scores were 0.93.

Social Anxiety

Social anxiety was assessed with the Greek version of the 23-item Self-Consciousness Scale (SCS, Fenigstein et al. 1975; Panayiotou and Kokkinos 2006). The Greek SCS has adequate psychometric properties and is appropriate for use with Greek-speaking samples. Cronbach's α for the social anxiety subscale scores was 0.80 (Panayiotou and Kokkinos 2006). The instrument consists of 3 distinct subscales assessing Private Self-Consciousness, Public Self-Consciousness, and Social Anxiety. In the present study only the Social Anxiety subscale was used. Social anxiety measured with the Social Anxiety subscale (6 items) is defined as a general discomfort and apprehensiveness about negative evaluation experienced in social situations. Responses were scored on a 5-point Likert scale ranging from 0 (*does not describe me at all*) to 4 (*describes me exactly*). The instrument is a valid tool for the assessment of social anxiety and shows significant correlations with all facets of the Social Phobia and Anxiety Inventory, one of the most widely used measures of the social anxiety construct (Beidel et al. 1989; Panayiotou et al. 2017). The advantage of the specific scale in comparison with other social anxiety scales is that it is shorter than other social anxiety scales. In the present sample, Cronbach's α for the Social Anxiety subscale scores was 0.77.

Procedure

Participants were recruited via advertisement in classrooms at the university premises. They were invited to contact the experimenter for paper-and-pencil administration of the questionnaires. Prior to completing the questionnaires, all participants were first presented with and signed the informed consent form. On the consent form, it was explained that participants were invited to participate in a study on personality and they had to complete a package of

questionnaires. Neither alcohol consumption nor social anxiety were mentioned in the informed consent form in order to avoid defensive responses.

Statistical Analysis

All statistical analyses were performed using SPSS 20.0 (IBM SPSS Statistics). An alpha level of 0.05 was used for all statistical tests. The total number of missing values was 1.74%. Missing value analysis revealed no pattern on the occasional missing scores (Little's MCAR test, $\chi^2 = 2.41$, $df = 38$, ns.). Thus, missing values were imputed using the expectation-maximization algorithm (Schafer and Graham 2002) through SPSS Missing Value Analysis (MVA) module. Repeating analysis with and without (listwise) missing values indicated similar results. Therefore, only the results obtained by using the imputed data set ($N = 245$) are displayed. Outlier analyses revealed five potential univariate outliers in AUDIT. As removal of these outliers did not change the results, only results with outliers included in the data set are presented. There were no multivariate outliers as all Cook's distances < 1 and the leverage of all cases were within the boundaries of three times the average leverage (Field 2005; Tabachnick and Fidell 2007). Furthermore, zero-order bivariate correlations between all constructs in the present study were calculated. No correlation coefficients were over 0.80, and there was no indication of multicollinearity among the variables entered in the model (Table 1).

The main hypotheses of the present study were examined with tests of moderated mediation in Process macro for SPSS (Preacher and Hayes 2004). Recent research in mediation analysis suggests that the bootstrapping approach to mediation has more advantages over the traditional approach (Baron and Kenny 1986; Hayes 2013). In both models, the 95% accelerated bias-corrected confidence intervals (CI) were obtained with 10,000 bootstrap resamples. CIs that did not contain zero were interpreted as significant (Hayes 2013).

As both positive and negative alcohol outcome expectancies are often correlated in college students (Schry and White 2013), we decided to enter both positive and negative alcohol outcome expectancies as mediators to investigate whether the conditional direct and indirect effects of social anxiety on alcohol consumption and alcohol-related problems vary as a function of gender. Specific indirect effects estimated in models with mediators operating in parallel would allow for a test of each process independent of other processes in the model (Hayes 2013). Gender was a categorical variable using codes of 1 and 2 for female and male, respectively. Figure 1 is a conceptual diagram of the proposed moderated mediation models. Age was correlated significantly with alcohol consumption (Table 1). Thus, it

Table 1 Mean (*M*), minimum (*min*) and maximum (*max*) scores, standard deviations (*SD*) and bivariate correlations between AUDIT total score, AUDIT alcohol consumption, AUDIT alcohol-related

problems, social anxiety, positive and negative alcohol outcome expectancies and age

	<i>M</i>	<i>SD</i>	<i>min</i>	<i>max</i>	1	2	3	4	5	6	7
1. AUDIT total	4.02	3.48	1	22	–	.32**	–.16*	–.19**	.11	.85**	.90**
2. PAEs	70.23	16.46	19	108	.32**	–	.34**	.20**	.09	.33**	.25**
3. NAEs	53.31	15.45	15	85	–.16*	.34**	–	.16*	–.03	–.22**	–.08
4. SA	12.38	4.74	0	24	–.19**	.20**	.16*	–	–.03	–.22**	–.12
5. Age	20.84	2.41	18	31	.11	.09	–.03	–.03	–	.16*	.05
6. Alcohol consumption	2.85	1.81	1	12	.85**	.33**	–.22**	–.21**	.16*	–	.53**
7. Alcohol problems	1.76	2.17	0	15	.90**	.25**	–.08	–.12	.05	.53**	–

N = 245. PAEs positive alcohol outcome expectancies, NAEs negative alcohol outcome expectancies, SA social anxiety

***p* < .01; **p* < .05

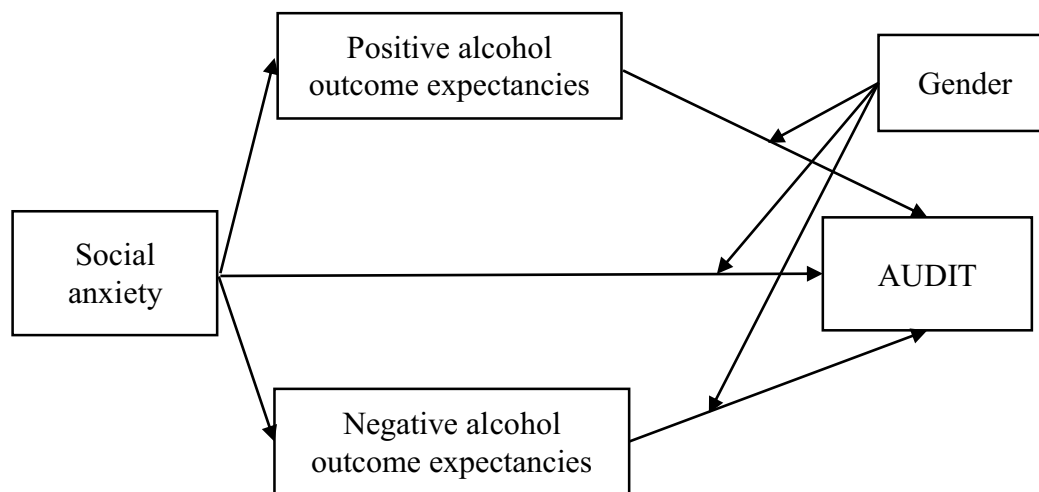


Fig. 1 A conceptual diagram of the proposed moderated mediation model testing the direct and indirect effects of social anxiety on AUDIT scores (alcohol consumption and alcohol-related problems) in male and female students, respectively

was entered as a covariate in the model with alcohol consumption as the outcome variable.

Results

Descriptive Statistics and Bivariate Correlations

Table 1 shows the mean (*M*), minimum (*min*), and maximum (*max*) scores as well as the standard deviations (*SD*) for the AUDIT total, AUDIT alcohol consumption, AUDIT alcohol problems, social anxiety, positive and negative alcohol outcome expectancies, and age in the present sample. Zero-order bivariate correlations between these variables are also presented in Table 1. Male and female college students did not differ in social anxiety levels (Men: *M* = 12.81, *SD* = 5.39; Women: *M* = 12.05, *SD* = 4.18). Similarly, there were no gender differences

in positive alcohol outcome expectancies. Nevertheless, men held more negative alcohol outcome expectancies than women, $t(240.411) = -4.61, p < .001$. Finally, students in the present sample tended to consume alcohol nearly 2–4 times per month (AUDIT item 1: *M* = 1.95, *SD* = 0.78) and consumed on average 1–2 drinks per drinking occasion (AUDIT item 2: *M* = 0.33, *SD* = 0.68). 20.8% of the students had an AUDIT score equal or higher than 6, while 79.2% of the students had an AUDIT score lower than 6. Women had higher AUDIT total scores than men, $t(227.91) = 4.37, p < .001$ (Female mean AUDIT total score = 4.78, *SD* = 4.01; Male mean AUDIT total score = 3.01, *SD* = 2.28). They also had higher AUDIT scores in alcohol consumption than men, $t(237.21) = 3.86, p < .001$ (Women: *M* = 3.2, *SD* = 2.05; Men: *M* = 2.37, *SD* = 1.30). Finally, women also had higher AUDIT scores in alcohol problems than men, $t(227.45) = 3.370, p < .001$ (Women: *M* = 1.58, *SD* = 2.52; Men: *M* = 0.64, *SD* = 1.42).

Alcohol Consumption

Table 2 depicts the results of the moderated mediation analysis for alcohol consumption. The interaction between positive alcohol outcome expectancies and gender on alcohol consumption scores is statistically significant. Inspection of the Index of Moderated Mediation confirms this finding. When the moderator is dichotomous, the Index of Moderated Mediation is a formal test of equality of the conditional

indirect effects in the two groups. The confidence interval for the Index of Moderated Mediation when the mediator is positive alcohol outcome expectancies does not contain the value of zero. Thus, the indirect effect of social anxiety on alcohol consumption scores via positive alcohol outcome expectancies varies as a function of gender. Inspection of the conditional indirect effect of social anxiety on alcohol consumption scores when the mediator is positive alcohol outcome expectancies reveals that the effect is positive and

Table 2 Moderated mediation model with alcohol consumption as the outcome variable

	<i>B</i> [CI]	<i>SE</i>	<i>t</i>	<i>p</i>
Outcome: PAEs				
Constant	47.89 [29.2384, 66.5315]	9.47	5.06	<.001
SA	0.69 [0.2621, 1.1196]	0.22	3.17	<.001
Age	0.66 [−0.1826, 1.5064]	0.43	1.54	.12
$R^2 = 4.79\%$, $F(2, 242) = 6.09$, $p < .01$				
Outcome: NAEs				
Constant	50.48 [32.7605, 68.1922]	8.99	5.61	<.001
SA	0.50 [0.0941, 0.9089]	0.21	2.43	<.05
Age	−0.16 [−0.9641, 0.6406]	0.41	−0.40	.69
$R^2 = 2.46\%$, $F(2, 242) = 3.05$, $p < .05$				
Outcome: AUDIT alcohol consumption				
Constant	−0.65 [−4.0156, 2.7196]	1.71	−0.38	.71
Age	0.05 [−0.0266, 0.1337]	0.04	1.32	.13
PAEs	0.10 [0.0626, 0.1377]	0.02	5.25	<.001
NAEs	−0.04 [−0.0761, 0.0064]	0.02	−1.67	.10
SA	−0.18 [−0.3149, −0.0457]	0.07	−2.64	<.01
PAEs × gender	−0.04 [−0.0640, −0.0102]	0.01	−2.72	<.01
NAEs × gender	−0.00 [−0.0299, 0.0271]	0.02	−0.10	.92
SA × gender	0.06 [−0.0239, 0.1419]	0.04	1.40	.16
$R^2 = 33.75\%$, $F(8, 236) = 15.03$, $p < .001$				
Conditional direct effect of SA on alcohol consumption in male and female students				
Female	−0.12 [−0.1825, −0.0601]	0.03	−3.91	<.001
Male	−0.06 [−0.1180, −0.0065]	0.03	−2.20	<.05
Index of moderated mediation				
Mediator	Index	SE	LL CI	UL CI
PAEs	−0.03	0.01	−0.0580	−0.0066
NAEs	−0.00	0.01	−0.0189	0.0153
Conditional indirect effect of SA on alcohol consumption in male and female students				
	<i>B</i>	<i>SE</i>	LL CI	UL CI
Mediator: PAEs				
Female	0.04	0.02	0.0167	0.0790
Male	0.02	0.01	0.0057	0.0377
Mediator: NAEs				
Female	−0.02	0.01	−0.0423	−0.0042
Male	−0.02	0.01	−0.0427	−0.0040

$N = 245$. Unstandardized regression coefficients are reported. *PAEs* positive alcohol outcome expectancies, *NAEs* negative alcohol outcome expectancies, *SA* social anxiety, *LL* lower limit, *UL* upper limit

statistically significant in males and females as the confidence intervals do not contain the value of zero. Inspection of the magnitude of the effect in Table 2 shows that the effect is stronger in females than in males.

Inspection of the conditional indirect effect of social anxiety on alcohol consumption scores when the mediator is negative alcohol outcome expectancies reveals that the effect is negative and statistically significant in both males and females as the confidence intervals do not contain the value of zero. However, the interaction between negative alcohol outcome expectancies and gender on alcohol consumption scores is not statistically significant. Inspection of the Index of Moderated Mediation when the mediator is negative alcohol outcome expectancies reveals that the confidence interval includes the value of zero. Thus, the indirect effect of social anxiety on alcohol consumption scores via negative alcohol outcome expectancies does not vary as a function of gender.

Finally, inspection of the conditional direct effect of social anxiety on alcohol consumption scores reveals a negative direct effect c' that is statistically significant in both males and females as the confidence intervals do not contain the value of zero. However, the interaction between social anxiety and gender on alcohol consumption scores is not statistically significant. The results showed that the negative direct effect c' of social anxiety on alcohol consumption scores does not vary as a function of gender.

Alcohol-Related Problems

Table 3 depicts the results of the moderated mediation analysis for alcohol problems. The interaction between positive alcohol outcome expectancies and gender on alcohol problems scores is statistically significant. When the moderator is dichotomous, the Index of Moderated Mediation is a formal test of equality of the conditional indirect effects in the two groups. The confidence interval for the Index of Moderated Mediation when the mediator is positive alcohol outcome expectancies does not contain the value of zero. Thus, the indirect effect of social anxiety on alcohol problems scores via positive alcohol outcome expectancies varies as a function of gender. Inspection of the conditional indirect effect of social anxiety on alcohol problems scores when the mediator is positive alcohol outcome expectancies reveals that the effect is positive and statistically significant in females as the confidence interval does not contain the value of zero. In males, the confidence interval for the conditional indirect effect contains the value of zero and as a result the effect is statistically non-significant.

Inspection of the conditional indirect effect of social anxiety on alcohol problems scores when the mediator is negative alcohol outcome expectancies reveals that the effect is statistically non-significant because in both males

and females the confidence intervals contain the value of zero. The interaction between negative alcohol outcome expectancies and gender on alcohol problems scores is not statistically significant. Inspection of the Index of Moderated Mediation when the mediator is negative alcohol outcome expectancies reveals that the confidence interval includes the value of zero. Thus, the indirect effect of social anxiety on alcohol problems scores via negative alcohol outcome expectancies does not vary as a function of gender.

Finally, inspection of the conditional direct effect of social anxiety on alcohol problems scores in males and females reveals a statistically non-significant direct effect c' as the confidence intervals contain the value of zero. The interaction between social anxiety and gender on alcohol problems scores is not statistically significant. The results showed that the negative direct effect c' of social anxiety on alcohol problems scores does not vary as a function of gender.

Discussion

The present study aimed to investigate the social anxiety-college drinking relationship, in hopes to reconcile previous conflictual findings (Eggleston et al. 2004; Ham 2009; Ham et al. 2016; Norberg et al. 2010; Yoder-Strahan et al. 2011). To do so, we performed separated analyses for two drinking variables, alcohol consumption and alcohol-related problems, that have been used to define the concept of problematic drinking in college students (Ham and Hope 2003). For each drinking variable, the study examined potential mediators of the association in the form of alcohol outcome expectancies and attempted to examine both positive and negative expectancies, hypothesized to have opposing effects, using multiple mediator analysis. The study attempted to specify the proposed model even further by considering gender as a potential moderator of the associations between social anxiety, global alcohol outcome expectancies, and college drinking (alcohol consumption and alcohol-related problems).

As regards alcohol consumption, the analysis revealed that social anxiety predicts alcohol consumption in college students indirectly via positive and negative alcohol outcome expectancies, respectively. The protective role of negative alcohol outcome expectancies is similar between male and female college students. However, the positive mediating effect of positive alcohol outcome expectancies appears to be stronger in female than in male college students. Finally, a protective direct effect of social anxiety on alcohol consumption, independent of alcohol outcome expectancies, was also found and did not vary as a function of gender.

On the other hand, the analysis demonstrated that social anxiety does not have a direct protective role against alcohol-related problems in college students. Similarly, there is

Table 3 Moderated mediation model with alcohol-related problems as the outcome variable

	<i>B</i> [CI]	<i>SE</i>	<i>t</i>	<i>p</i>
Outcome: PAEs				
Constant	6181 [56.1097, 67.4999]	2.89	21.38	< .001
SA	0.68 [0.2510, 1.1106]	0.22	3.12	< .01
$R^2 = 3.85\%$, $F(1, 243) = 9.74$, $p < .01$				
Outcome: NAEs				
Constant	47.08 [41.6892, 52.4615]	2.73	17.22	< .001
SA	0.50 [0.0975, 0.9104]	0.21	2.44	< .05
$R^2 = 2.4\%$, $F(1, 243) = 5.96$, $p < .05$				
Outcome: AUDIT alcohol-related problems				
Constant	-2.82 [-6.8298, 1.1827]	2.03	-1.39	0.17
PAEs	0.11 [0.0604, 0.1605]	0.03	4.35	< .001
NAEs	-0.03 [-0.0841, 0.0257]	0.03	-1.05	.30
SA	-0.09 [-0.2715, 0.0864]	0.09	-1.02	.31
PAEs × gender	-0.05 [-0.0889, -0.0172]	0.02	-2.92	< .01
NAEs × gender	0.01 [-0.0292, 0.0467]	0.02	0.46	.65
SA × gender	0.02 [-0.0890, 0.1316]	0.06	0.38	.70
$R^2 = 16.99\%$, $F(7, 237) = 6.93$, $p < .001$				
Conditional direct effect of SA on alcohol-related problems in male and female students				
Female	-0.07 [-0.1527, 0.0101]	0.04	-1.73	.09
Male	-0.05 [-0.1243, 0.0245]	0.04	-1.32	.19
Index of moderated mediation				
Mediator	Index	<i>SE</i>	LL CI	UL CI
PAEs	-0.04	0.02	-0.0804	-0.0112
NAEs	0.00	0.01	-0.0126	0.0318
Conditional indirect effect of SA on alcohol-related problems in male and female students				
	<i>B</i>	<i>SE</i>	LL CI	UL CI
Mediator: PAEs				
Female	0.04	0.02	0.0143	0.0785
Male	0.00	0.01	-0.0128	0.0185
Mediator: NAEs				
Female	-0.01	0.01	-0.0340	0.0004
Male	-0.01	0.01	-0.0268	0.0048

$N = 245$. Unstandardized regression coefficients are reported. *PAEs* positive alcohol outcome expectancies, *NAEs* negative alcohol outcome expectancies, *SA* social anxiety, *LL* lower limit, *UL* upper limit

no protective mediating effect of negative alcohol outcome expectancies in the social anxiety–alcohol-related problems relation. Nevertheless, the positive mediating effect of positive alcohol outcome expectancies in the social anxiety–alcohol-related problems relationship varies as a function of gender and holds true for female but not for male college students.

Our findings indicate that there might be various oppositional pathways through which social anxiety may influence the risk of alcohol drinking in college students. The existence of oppositional parallel pathways may differ between male and female college students and between different

drinking outcomes. The findings of the present study are also unique in that they demonstrate, for the first time to the authors' knowledge, that global positive and negative alcohol outcome expectancies could mediate the social anxiety–college drinking relationship. Similar to our findings, Bruch et al. (1992) argued that shyness inhibits college drinking because shy individuals worry that alcohol drinking will result in loss of self-control and possible embarrassment. However, as positive expectancies develop, their worry diminishes and the strength of negative relationship is reduced. Although they used a measure of positive alcohol expectancies for social evaluative concerns, they argued

that global positive expectancies could potentially function as suppressors of the shyness-alcohol drinking relationship (Bruch et al. 1992).

More recent studies on the social anxiety-college drinking relationship have emphasized the mediating role of social outcome expectancies and have not supported the role of global alcohol outcome expectancies in this relationship. For example, Eggleston et al. (2004) did not find evidence for the mediating role of global alcohol outcome expectancies in the social anxiety-college drinking relationship. Unlike the present study, Ham and Hope (2006) found that social anxiety was unrelated to alcohol consumption and inversely associated with alcohol-related problems. In contrast to the present study, neither positive nor negative alcohol outcome expectancies mediated the relationship between social anxiety and drinking variables (Ham and Hope 2006). Ham et al. (2016) also emphasized the role of social alcohol outcome expectancies. Like the present study, they demonstrated a positive indirect association of social anxiety with both alcohol use and alcohol-related problems through positive social alcohol outcome expectancies (Ham et al. 2016). In contrast to their findings, in the present sample the mediating effect of positive alcohol outcome expectancies on the social anxiety-college drinking relationship varies as a function of gender. The authors also reported a negative indirect relation of social anxiety to alcohol consumption and alcohol-related problems via negative social alcohol outcome expectancies (Ham et al. 2016). In the present sample the indirect effect of social anxiety on college drinking via negative alcohol outcome expectancies holds true for alcohol consumption but not for alcohol problems. Finally, in both Ham et al. (2016) and the present study, a protective direct effect of social anxiety on alcohol consumption but not on alcohol-related problems was revealed. Our results are rather different from the results of Yoder-Strahan et al.' (2011) study who reported a curvilinear relationship between social anxiety and alcohol drinking in male but not in female college students. However, in the present study we distinguish between alcohol consumption and alcohol-related problems, while in Yoder-Strahan et al.'s (2011) study the 10-item AUDIT total score was used. Furthermore, the mediating role of alcohol expectancies was not examined in that study (Yoder-Strahan et al. 2011). Unlike the present study, Norberg et al. (2010) reported that social anxiety was inversely related to alcohol-related negative consequences in men and positively related to negative consequences in women. The authors argued that highly socially-anxious male college students may experience few negative alcohol-related consequences because they tend to avoid social situations where one is likely to drink alcohol to enhance positive emotions. On the other hand, highly socially-anxious female college students may experience severe negative alcohol-related consequences because they tend to drink alcohol in order to conform and

to cope with unpleasant emotions and situations (Norberg et al. 2010). Buckner and Shah (2015) also reported that coping motives mediate the social anxiety–alcohol drinking relationship in female students, while conformity motives mediate the social anxiety–alcohol drinking in male college students.

Methodological issues between the studies could account for the different findings. In all aforementioned studies, social anxiety was measured with the Social Interaction Anxiety Scale (Mattick and Clarke 1998), while in the present study it was assessed with the Social Anxiety subscale from the SCS (Fenigstein et al. 1975). Social anxiety may be a multifaceted construct (Buckner et al. 2013) and different instruments may measure different aspects of it. For example, social anxiety as measured by the SCS social anxiety subscale is defined as a general discomfort and apprehensiveness about negative evaluation experienced in social situations (Fenigstein et al. 1975). However, social anxiety includes different components such as fear of negative evaluation, social avoidance and distress, social interaction anxiety, and shyness (Leary 1983; Panayiotou et al. 2017). Different drinking outcomes may have a different relationship with different aspects of social anxiety (Stewart et al. 2006). For example, Lewis and O'Neil (2000) reported that fear of negative evaluation and not shyness was positively associated with alcohol drinking. In addition, most of the aforementioned studies relied on samples of Anglo-Saxon origin, while the present study used a sample of South-Eastern European origin. Cultural differences between the samples and differences in the aspects of the construct measured with various tools could be linked to different types of alcohol outcome expectancies and their differential relationship with various alcohol drinking outcomes (Yoder-Strahan et al. 2011). Finally, the AUDIT scores in the present study were not particularly high (AUDIT total score: $M = 4.02$, $SD = 3.48$). Although some earlier studies have reported AUDIT scores of similar magnitude (see Ham 2009, $M = 4.24$, $SD = 4.12$), other studies have reported higher AUDIT scores (Ham et al. 2016, $M = 6.77$, $SD = 6.41$; Yoder-Strahan et al. 2011, $M = 6.23$, $SD = 5.87$). Even though this can be an important methodological difference, the present results are markedly different from Ham (2009) who reported similar AUDIT scores.

Our analysis showed that female students had higher AUDIT scores than male students. There is a tendency for female college students to approach the drinking patterns of male students (Ham and Hope 2003; Keys et al. 2008), and in the particular cultural context, children are progressively socialized into drinking from a younger age within the family (Yoder-Strahan et al. 2011). This however may hold true more for males than females as a result of gender stereotypes. Young females may have experienced a sharper increase in alcohol consumption after their entrance into

college living away from family regulations. On the other hand, we cannot exclude the possibility our sample to be somewhat atypical that, in this case, could restrict the generalizability of the present findings. Finally, the sample consists of psychology students and male psychology students may not be representative of all male students.

The study has its own limitations. First of all, the design of the study is cross-sectional and causality remains unclear. Although our hypothesized mediating and moderating processes were derived from theory and previous empirical findings, there is always the possibility of reciprocal relationships between social anxiety, outcome expectancies, and alcohol drinking outcomes. A second limitation is that all data in the study were assessed with self-report measures and scores on these measures can be affected by one's memory biases and honesty. Finally, we measured social anxiety with the social anxiety subscale from the Self-Consciousness Scale (Fenigstein et al. 1975; Panayiotou and Kokkinos 2006). Hope and Heimberg (1988) showed that treatment-seeking socially-anxious patients scored nearly one standard deviation higher on the Social Anxiety subscale of the SCS than college students in earlier studies. In the present study, male and female students had similar social anxiety scores to those reported for male and female students by Fenigstein et al. (1975). Thus, although our sample is not atypical regarding social anxiety levels in college students, social anxiety levels are not very high. It is unknown whether the present findings apply to students with higher social anxiety levels. Furthermore, the social anxiety subscale measures discomfort experienced in social situations, which could be somewhat different from the fear of social situations that defines clinical levels of social anxiety (LaBrie et al. 2008). However, in defense of the present sample choice, many authors see social anxiety as being on a continuum, with even low or subclinical levels being associated with substantial impairment and similar response patterns as clinical social anxiety (Kashdan 2007).

Regardless of the limitations, the study has also its strong points. Our findings are in agreement with earlier literature showing that social anxiety is associated with college drinking via oppositional parallel pathways (Ham et al. 2016; Schry and White 2013). Unlike previous studies, our results support the mediating role of global positive and negative alcohol outcome expectancies in the social anxiety-college drinking relation. An additional advantage of the present study is that it examines the mediating and moderating mechanisms in relation to two different alcohol drinking variables, alcohol consumption and alcohol-related problems. Our results also revealed a moderating role for gender in the indirect social anxiety-college drinking relationship when the mediator is positive alcohol outcome expectancies. As demonstrated, the moderating effect of gender applies to both drinking outcomes. Being a socially-anxious female

student may increase alcohol consumption and the risk for alcohol-related problems via a stronger effect of positive alcohol outcome expectancies.

As causal relationships cannot be assumed in the present study, our findings should be replicated in the future by experimental studies. Successful replication of the current findings would indicate that we may be able to interrupt the chain of events by reducing either social anxiety levels, or by altering positive alcohol outcome expectancies in college students. The latter path may be more feasible as attitudes may be more malleable to change than anxiety itself. In addition, the role of gender should be carefully considered in the design of future studies. Alternatively, we could strengthen negative alcohol outcome expectancies that have a negative impact on the alcohol consumption in college students. Finally, we should investigate further the role of other individual difference variables (e.g., self-efficacy, coping) that could affect the strength of the mediating role of positive and negative alcohol outcome expectancies and as a result could change college drinking levels in socially-anxious students. The current findings give us a glimpse into the highly complex chain of events in college drinking and inspire for future research on this serious public health problem.

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Compliance with Ethical Standards

Conflict of Interest Harilaos Papachristou, Evi Aresti, Marios Theodorou and Georgia Panayiotou declares that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Animal Rights This article does not contain any studies with animals performed by any of the authors.

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