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Drinking patterns of college students with comorbid depression and anxiety symptoms: The moderating role of gender

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Abstract

Students with anxiety *or* mood issues tend to engage in more problematic drinking, but less is known about those students with co-occurring anxiety *and* mood symptoms. This study compares rates of weekly alcohol use, hazardous drinking, and alcohol-related negative consequences in a sample of 699 college students with symptoms of comorbid anxiety and depression (35% of the sample) compared to their non-symptomatic drinking peers, as well as the moderating role of gender. We found main effects of gender and comorbidity status such that participants with comorbid symptoms of anxiety and depression or who were male reported higher rates of weekly alcohol use, more hazardous drinking and more alcohol-related negative consequences than their non-symptomatic and female peers. We also found an interaction effect on alcohol-related negative consequences such that male participants with comorbid anxiety and depression reported more alcohol-related negative consequences than all other groups. These findings imply that while any student drinker with both anxiety and depression may be considered at higher risk for problematic drinking behavior, the risk of negative consequences in particular may be highest in the men of that group.

Keywords

anxiety; depression; alcohol use; college students; gender

Introduction

College student drinking is often perceived as a normal social behavior, with minimal concern about the associated risks. Approximately 53% of college students have reported past-month alcohol use, and almost 35% reported past-month binge drinking (i.e., 5/4 or more drinks in a one sitting for men/women; Center for Behavioral Health Statistics and Quality, 2018). Whereas weekly alcohol use does not necessarily result in negative outcomes, students who engage in binge drinking often report a myriad of consequences,

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including physical harm, academic failings, and sexual assault, among others (Perkins, 2002). Though many students "mature out" of heavy drinking after college (Linden-Carmichael & Lanza, 2018), roughly 30% of students meet criteria for an alcohol use disorder (AUD) each year, demonstrating the beginning of a long struggle that some students have with drinking. To better prevent students from developing longer-term drinking issues, it is critical to identify those students who may be more vulnerable to problematic drinking behaviors.

Students with elevated mental health issues are particularly vulnerable given their tendency to drink to manage their negative affect. Anxiety and mood issues are the two most common mental health complaints among college students, and existing work has demonstrated their high co-occurrence with each other, as well as with problematic drinking patterns (Auerbach et al., 2016). In the past year, 45.1% of students endorsed depressive symptoms and 65.7% endorsed overwhelming anxiety (American College Health Association, 2019), and rates of past-year comorbid depression and anxiety have ranged from 50–67.8% (Hirschfeld, 2001; Kessler et al., 2003). Further, as students experience more severe mental health issues, they are more likely to engage in problematic drinking (49% increase; Lo et al., 2013). Compounding these issues, students rarely seek formal mental health or substance use treatment (Blanco et al., 2008; Capron et al., 2018). Given the high prevalence of anxiety, depression and alcohol use among college students, it would be beneficial to investigate factors that influence the association between comorbid depression/anxiety and risky drinking patterns.

Existing work has largely focused on the distinct effects of depression and anxiety on problematic drinking patterns. For example, depression symptoms are consistently associated with riskier drinking patterns and developing an AUD among college students (Geisner et al., 2012; Holahan et al., 2003; Weitzman, 2004). Relatedly, evidence suggests that more anxiety symptoms are associated with more problematic alcohol use (Kushner et al., 2008). Coping-motivated alcohol use is one explanation for the high co-occurrence of anxiety or depression and alcohol use (Gonzalez et al., 2011; Kuntsche et al., 2005; Villarosa et al., 2017). However, these findings are less clear when gender is taken into account. Evidence suggests that the association between depression and problematic drinking may be stronger among men (e.g., Geisner et al., 2012) whereas the association between anxiety and drinking may be stronger among women (Norberg et al., 2010). Clarifying the role of gender on drinking patterns may be best achieved by examining those students who endorse *both* anxiety and depression.

College may be a time of prevalent social drinking, but it is also a bottleneck that presents a unique opportunity for screening and intervention. Understanding how college students experiencing comorbid anxiety and depression symptoms engage with alcohol is a vital component of our ability to develop targeted interventions. Gender is an important factor to consider given the differential associations between anxiety or depression on alcohol use. This study compares rates of weekly drinking, hazardous drinking, and alcohol-related negative consequences among college students with symptoms of comorbid anxiety and depression compared to their non-symptomatic peers. We hypothesized that men and

students with comorbid anxiety and depression will drink more heavily and experience more negative consequences than women and non-symptomatic students.

Materials and Methods

Participants and procedures

Participants comprised 678 traditional-aged college students (*M*=20.08, *SD*=1.52) from a single university in the southeastern region of the US who endorsed alcohol use in the last month. The majority of the sample was female (69.5%) and non-Hispanic White (62.5%). Other racial categories include Black (29.6%), Hispanic (1.8%), American Indian/Alaska Native (1.2%), Asian (1%), Native Hawaiian/Pacific Islander (0.4%), and Other (3.4%). Recruitment was done through an online recruitment system (i.e., SONA), with class credit being given in exchange for participation. Interested participants were directed to a secure online system (Qualtrics) where they completed a University Institutional Review Board-approved informed consent, followed by a series of measures of mental health and drinking behaviors.

Measures

Alcohol Use Disorders Identification Test (AUDIT).—The AUDIT is a 10-item self-report measure developed by the World Health Organization to assess hazardous drinking (Flemming et al., 1991; Saunders et al., 1993). Respondents answer a series of questions related to their drinking, using a five-point scale. Example items and response options include “How often do you have a drink containing alcohol” (0 – *never* to 4 – *4 or more times a week*) and “Have you or someone else been injured as a result of your drinking?” (0 – *no* to 4 – *yes, during the last year*). The AUDIT has been studied extensively and found to have strong psychometric properties (Reinert & Allen, 2002). Internal consistency with this sample was good (α = .81).

Daily Drinking Questionnaire (DDQ).—The DDQ was used to categorize respondents by how much alcohol they consume (Collins et al., 1985). Specifically, the DDQ measures weekly alcohol use with a self-report survey asking participants to indicate how many standard drinks they had in a typical week of the past month, producing an approximation of frequency and volume. Drinks are summed across days to calculate drinks per week. Weekly drinking has been found to be highly related to problems caused by alcohol (Borsari et. al., 2001).

Depression Anxiety Stress Scales (DASS).—The DASS is a 21-item self-report measure that assesses symptoms of stress, anxiety, and depression (Antony et al., 1998; Osman et al., 2012). Respondents indicate the extent to which each statement applies to them using a four-point scale, ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). The current study used the depression and anxiety subscales. Example items include, “I felt I was close to panic” (anxiety) and “I could see nothing in the future to be hopeful about” (depression). The DASS-21 has demonstrated strong psychometric properties (Brown et al, 1997). Internal consistencies were good with this sample (anxiety = .87; depression = .87).

Rutgers Alcohol Problem Index (RAPI).—The RAPI (White & Labouvie, 1989) is a 23-item self-report scale that measures the frequency of negative alcohol-related consequences. The RAPI assesses consequences across multiple domains with items such as "neglected your responsibilities" and "had a fight, argument or bad feelings with a friend". Respondents indicate the frequency of each consequence using a five-point scale (0: *never* to 4: *10 or more times*). The RAPI has demonstrated strong psychometric properties (e.g., Neal et. al., 2006). Internal consistency with this sample was excellent ($\alpha = .95$).

Planned analyses

A 2 (comorbid status: yes or no) x 2 (gender: men or women) multivariate analysis of variance (MANOVA) was conducted to examine mean differences on three drinking outcomes (i.e., weekly alcohol use, hazardous drinking, and alcohol-related consequences). Several descriptive analyses were performed to confirm the appropriateness of conducting a MANOVA. First, MANOVA involves several assumptions that were examined, including data normality, linearity and homogeneity of variances. Though violation of assumptions may weaken the power of the analysis, one potential explanation for such violations may be unequal sample sizes across groups. Next, bivariate correlations of the three dependent variables were performed to assure that the three drinking variables were not strongly associated and MANOVA, rather than ANOVA or a structural equation model (SEM) approach is appropriate. A MANOVA permits the evaluation of all three drinking outcomes simultaneously, offering important information about which of the drinking variables may be driving the difference between groups while also mitigating possible Type I error by conducting three separate analyses of covariance (ANOVAs). Finally, Eta-squared (η^2) offers an effect size estimate such that $\eta^2 = .01$ is a small effect, $\eta^2 = .06$ is a medium effect, and $\eta^2 = .14$ is a large effect (Cohen, 1988).

Results

Descriptive analyses

Means, standard deviations, and intercorrelations of study measures are presented in Table 1. Of the total sample, 300 participants (44.3%) endorsed no anxiety or depression symptoms, 234 (34.6%) endorsed symptoms of both anxiety and depression, and 143 (22.1%) endorsed symptoms of anxiety *or* depression. Given the small number of participants who endorsed only anxiety (n=38; 5.6%) or only depression (n=105; 15.5%), we restricted the primary analyses to participants with or without co-occurring anxiety and depression. Regarding drinking outcomes, 263 participants (38.8% of the total sample) exceeded the clinical cutoff score on the AUDIT (i.e., score>7), indicating hazardous drinking levels (Devos-Comby & Lang, 2008). The drinking variables were moderately associated ($.43<r<.57$), supporting the application of MANOVA.

Primary analyses

Results demonstrated significant multivariate main effects of comorbidity status (Wilk's $\lambda = .75$, $F(3, 526) = 57.39$, $p < .001$) and gender (Wilk's $\lambda = .91$, $F(3, 526) = 17.18$, $p < .001$), as well as an interaction effect between comorbidity status and gender (Wilk's $\lambda = .98$, $F(3, 526) = 4.17$, $p < .01$) on drinking outcomes. An examination of univariate

effects revealed significant differences in comorbidity status and gender on each of the three drinking outcomes (see Table 2). Specifically, participants with co-occurring anxiety and depression symptoms reported more weekly drinking (η^2=.02), hazardous drinking (η^2=.10), and alcohol-related consequences (η^2=.24) than participants with no symptoms. Further, college men reported more weekly drinking (η^2=.06), hazardous drinking (η^2=.05), and alcohol-related consequences (η^2=.06) than college women. The main effect on alcohol-related negative consequences was qualified by a significant interaction effect (F(1, 528) = 10.31, p < .001) such that participants who endorsed co-occurring anxiety and depression symptoms and were male reported the most alcohol-related consequences (η^2=.02; see Figure 1).

Exploratory analyses

We performed an exploratory 3 (comorbid status: no, depression-only, depression and anxiety) x 2 (gender: men or women) MANOVA to determine if differences in drinking outcomes would emerge between participants with depression only and those with depression and anxiety. Multivariate analyses demonstrated significant main effects of comorbidity status (Wilk's λ = .77, F(6, 1256) = 29.50, p < .001) and gender (Wilk's λ = .93, F(3, 628) = 16.63, p < .001), as well as an interaction effect between comorbidity status and gender (Wilk's λ = .97, F(6, 1256) = 2.88, p < .01). Univariate analyses also revealed significant main effects of comorbid status and gender on each drinking outcome (see Table 3). Post-hoc analyses revealed participants with comorbid anxiety and depression endorsed more weekly and hazardous drinking than participants in the depression-only and no symptoms conditions. Further, participants in the depression-only condition endorsed more hazardous, but not weekly drinking than participants in the no symptoms condition (see Table 3). A significant interaction was found on negative consequences (F(2, 630) = 6.47, p < .01) such that men with comorbid anxiety and depression reported more negative consequences than women with comorbid symptoms and participants with depression-only or no symptoms (η^2=.02; see Figure 2).

Discussion

Despite evidence demonstrating unique effects of anxiety and depression symptoms on problematic drinking among college students, less is known about the drinking patterns of those with both anxiety and depression. The current study evaluated the drinking patterns of students with anxiety and depression symptoms in comparison to their non-symptomatic peers. As hypothesized, participants with anxiety and depression symptoms and college men reported more problematic drinking than their non-symptomatic peers and college women. Gender impacted the relationship between mental health and alcohol-related negative consequences such that college men who endorsed co-occurring anxiety and depression symptoms endorsed the most negative consequences. Finally, exploratory analyses suggested that students with anxiety and depression engaged in more problematic drinking than students with only depression symptoms.

Our finding of higher weekly and hazardous drinking among students with anxiety and depression symptoms is consistent with prior work on the effects of depression or anxiety on

drinking behavior (Geisner et al., 2012; Nourse et al., 2017). These students also endorsed more risky drinking than students with only depression symptoms, highlighting the need to focus on the composition of mental health issues. While the smaller sample of depression-only students is a notable limitation, examination of factors that may underlie depression, anxiety, and alcohol use is needed. Drinking to cope is one such established factor in substance use research (Ham & Hope, 2003; Park & Levenson, 2002). The students in this study with anxiety and depression symptoms likely experienced a more aversive mental state than their depression-only and non-symptomatic peers. While a higher motivation to drink to cope is one possible explanation, additional investigation of factors underlying anxiety/depression and alcohol use, particularly in contrast to depression and alcohol use, is needed.

Consistent with previous research, men in our study endorsed more problematic drinking patterns than women (Ham & Hope, 2003; O'Malley & Johnston 2002). Further, men with anxiety and depression symptoms reported more negative alcohol-related consequences than all other groups. In general, larger quantities of alcohol consumed leads to more consequences, but this interaction effect suggests other factors in the mix. Despite some consistency with prior studies (e.g., Geisner et al., 2004), our findings only revealed gender differences in alcohol-related consequences among participants with anxiety and depression, not those with depression only. It may be that men endorsing comorbid anxiety and depression symptoms were experiencing higher levels of psychological distress than their depression-only or non-symptomatic counterparts. The problematic outcomes for men in particular may also stem from gender differences in resource utilization. Specifically, women are more likely than men to seek support and professional help to manage their negative affect (Mackenzie et al., 2006; Taylor, 2011). Not utilizing such resources may leave men more vulnerable to substance use as a management strategy.

In this analysis, we assumed anxiety and depression were present prior to heavy drinking behavior, based on existing epidemiological and longitudinal studies (Cheng et al., 2004; Goodwin et al., 2004; Holahan et al., 2003). With anxiety, this pattern is fairly consistent in the research (e.g., Villarosa-Hurlocker et al., 2018). Drinking to cope with symptoms of depression is also common, although the temporal relationship is less clear. Some evidence suggests that alcohol use predicts later depression (Boden & Fergusson, 2011). One possible reason is that heavy drinking can induce depression. It is possible to distinguish between people experiencing depression induced by alcohol and those with depression independent from alcohol use, with the latter group displaying a weaker link between depressive symptoms and drinking behavior (Preuss et al, 2002; Schuckit et al, 2013). While these studies focused on clinical adults, it's worth noting that the effect of depression predicted by alcohol use exists, and we may have ordered these two variables in the wrong direction.

There are several clinical implications of study findings. Anxiety, depression, and alcohol use disorders are the most prevalent mental health concerns among college students, in part due to their high comorbidity. Interventions for alcohol misuse alone are not effective in individuals with comorbid mood/anxiety issues (e.g., Terlecki et al., 2011). Best practices recommend that alcohol use and mental health symptoms be addressed simultaneously, as treatment of only one condition is unlikely to succeed. Screening students for problematic drinking and other mental health issues is an important first step. Further, incorporating

mood and anxiety management strategies into alcohol interventions for these students may help assure positive outcomes. Our study also speaks to the need to target college men with awareness campaigns to mitigate negative alcohol-related consequences particularly during times of elevated depression/anxiety.

Limitations

This study did have some limitations. First, our self-report measure of depression and anxiety suggested the presence of anxiety and depression symptoms as opposed to the disorders themselves. While there are benefits to studying sub-clinical populations, use of self-report tools instead of a clinical interview prevents us from distinguishing between participants with clinically diagnosable mood or anxiety disorders. Second, while important information can be gleaned from our exploratory analyses, the number of participants who endorsed only depression warrants caution and future replication. Further, the very small proportion of participants with only anxiety precluded any exploratory analyses with this subgroup. Replication with a larger sample to compare students with no mood/anxiety, only mood, only anxiety, and both mood/anxiety symptoms will be critical to improve prevention and intervention efforts. Third, this study was cross-sectional in nature, precluding any causal interpretation of findings. Future work would benefit from experimental and longitudinal designs to evaluate the temporal association among depression, anxiety, and alcohol use. Finally, data was collected from a single institution and comprised primarily White, non-Hispanic women. Replication with a larger and more diverse sample is needed.

Future directions

This study leaves the door open for a variety of future directions. First, there are newer, effective methods to better capture college students' dynamic drinking patterns. For example, our alcohol use tools were unable to differentiate between 6 drinks consumed over four hours and 4 drinks over ten minutes. Ecological momentary methods are one way to better capture student drinking habits, as well as the naturally fluctuating role of mood and anxiety symptoms. Another area of future study could focus on specific types of alcohol-related consequences and their relation to gender. For example, a more detailed examination of sexual assault-related consequences can help identify those students that are more vulnerable and more likely to sexual assault under the influence of alcohol regardless of gender (Abbey et al., 2004; Perkins, 2002).

Conclusion

Our findings highlight the importance of examining mental health when looking at student drinking. College drinkers with symptoms of anxiety and depression appear to be at higher risk for problematic drinking than their non-symptomatic peers. Our findings indicate that this high-risk group is fairly large, which is concerning given the growing number of students reporting anxiety/depression symptoms in conjunction with their generally heavy drinking behavior. College men with anxiety and depression appear at greatest risk for problematic drinking and prevention and intervention efforts should target these students.

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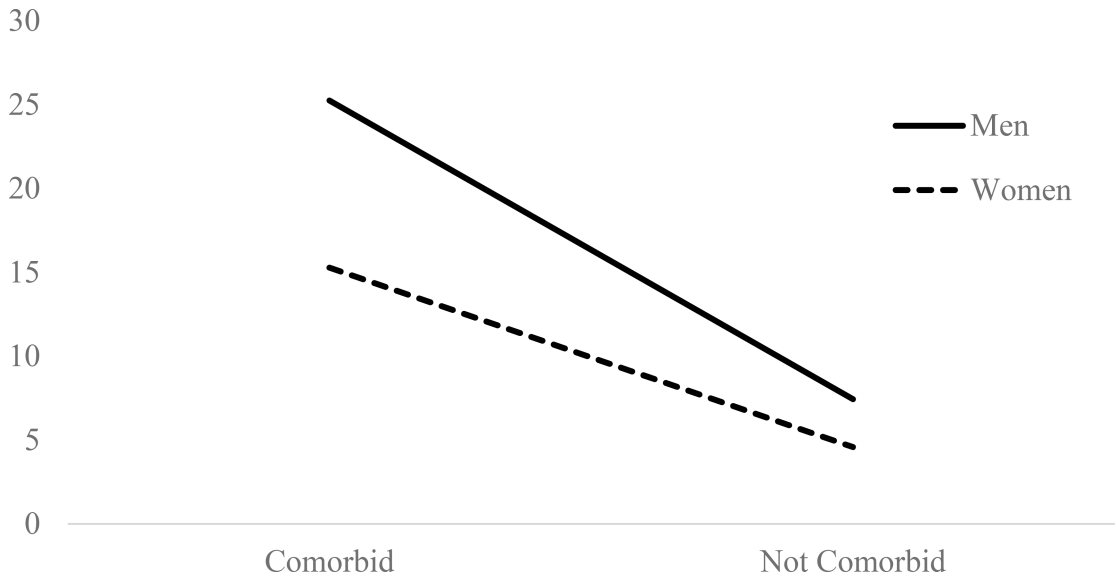

Figure 1.
Interaction of comorbidity status and gender on raw mean scores for alcohol-related negative consequences.

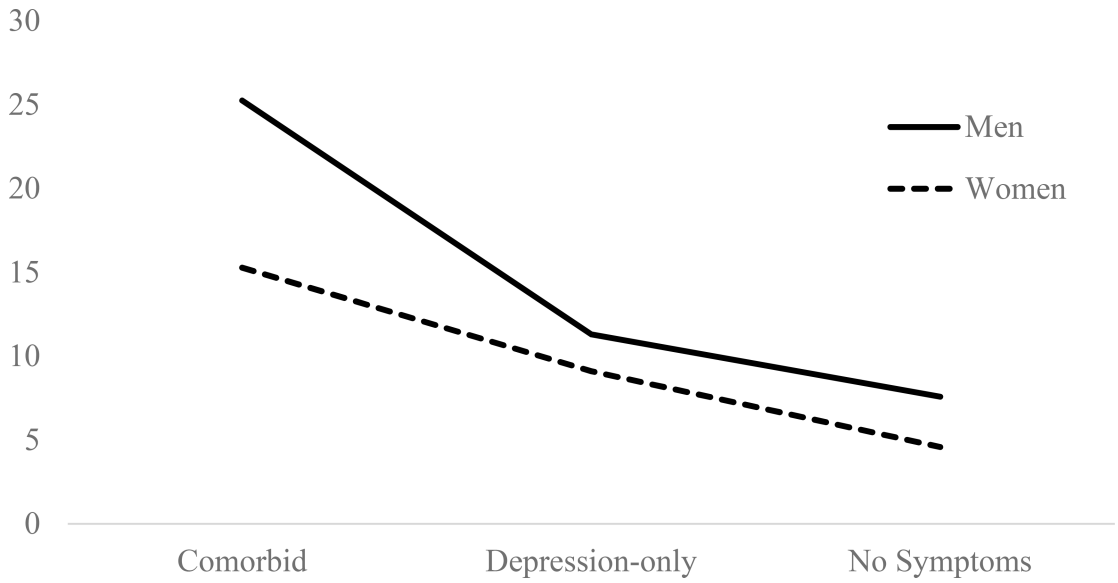

Figure 2.
Interaction of comorbidity status (3 conditions) and gender on raw mean scores for alcohol-related negative consequences.

Table 1.

Means, standard deviations, and intercorrelations of study measures

	1	2	3	4	5
1. Depression	---				
2. Anxiety	.74*	---			
3. Weekly drinking	.13*	.18*	---		
4. Hazardous drinking	.27*	.27*	.53*	---	
5. Negative Consequences	.37*	.44*	.43*	.57*	---
Total: M (SD)	5.21 (4.54)	3.84 (4.26)	14.67 (16.37)	7.26 (5.35)	10.95 (13.22)
Women: M (SD)	5.20 (4.63)	3.74 (4.28)	11.78 (12.82)	6.45 (4.77)	9.32 (11.30)
Men: M (SD)	5.25 (4.38)	4.06 (4.23)	21.42 (21.06)	9.14 (6.10)	14.80 (16.25)

Note. Depression and anxiety refer to total scores on the DASS subscales

* $p < .001$

Table 2.

Main effects of comorbid status and gender on drinking outcomes

Comorbid status effects	Comorbid		Not comorbid		F-test	Eta-Squared
	M	SD	M	SD		
Weekly drinking	18.43	20.09	12.86	14.30	12.92*	.024
Hazardous drinking	9.35	5.80	5.68	4.58	60.48*	.103
Negative consequences	18.47	16.14	5.43	7.71	165.41*	.239
Gender effects	Men		Women		F-test	Eta-Squared
	M	SD	M	SD		
Weekly drinking	21.74	21.98	12.44	13.84	34.80*	.062
Hazardous drinking	9.14	6.11	6.48	4.94	29.90*	.054
Negative consequences	15.59	17.20	9.20	11.42	33.52*	.06

Note. Findings obtained from 2 (comorbid status) × 2 (gender) ANOVA model

* $p < .001$

Table 3.

Exploratory effects of comorbid status and gender on drinking outcomes

Comorbid status effects	Comorbid		Depression-only		No Symptoms		F-test	Eta-Squared	Comparisons ($p < .05$)
	M	SD	M	SD	M	SD			
Weekly drinking	18.43	20.09	12.97	11.77	12.86	14.30	7.72*	.024	C > D; C > N
Hazardous drinking	9.35	5.80	7.61	5.33	5.68	4.58	30.27*	.088	C > D > N
Negative consequences	18.47	16.14	9.73	9.58	5.43	7.71	88.8*	.22	C > D > N
Gender effects	Men		Women				F-test	Eta-Squared	
	M	SD	M	SD					
Weekly drinking	21.47	21.14	12.05	13.08			38.86*	.058	
Hazardous drinking	9.25	6.19	6.51	4.85			33.32*	.05	
Negative consequences	14.92	16.45	9.18	11.03			21.03*	.032	

Note. Findings obtained from 3 (comorbid status) × 2 (gender) ANOVA models

* $p < .001$