Journal of Intercollegiate Sport, 2023, 16.2
https://doi.org/10.17161/jis.v16i2.18397
© 2023 the Authors

Examining associations of coping strategies with stress, alcohol, and substance use among college athletes: Implications for improving athlete coping

Brandon A. Knettel[1,2], Emily M. Cherenack[2,3], Conner Rougier-Chapman[4], and Courtney Bianchi-Rossi[5,6]

[1]Duke University School of Nursing
[2] Duke Global Health Institute
[3] Department of Psychology and Neuroscience, Duke University
[4] Wake Forest University
[5] Gustavus Adolphus College
[6] Bethel University

Mental health challenges and substance use are common among college athletes, yet few studies have been conducted to understand substance use as a coping strategy. The pressures of collegiate athletics - including commitments to training, travel, and competition - can contribute to maladaptive coping among college athletes, including alcohol and other substance use. An online survey was completed by 188 college athletes competing across NCAA/NJCAA divisions at six institutions in the United States to examine factors associated with substance use coping and whether specific strategies of coping were associated with risk of substance use. Alcohol and drug use were assessed using the CRAFFT Screening Test, NIDA-Modified ASSIST, and Alcohol Use Disorders Identification Test. Coping was assessed with the Coping Orientation to Problems Experienced Inventory, stress was assessed using an adapted Graduate Stress Inventory, athletics-related anxiety was assessed with the Sport Anxiety Scale, and perceived control of stress was assessed using the Perceived Control Questionnaire. Older athletes, men, and those with higher stress were more likely to use substances to cope. Higher behavioral disengagement, higher substance use coping, and lower religious coping were associated with increased likelihood of binge drinking and substance-related risk behaviors. These findings point to the importance of developing targeted interventions aimed at addressing stress and facilitating healthy coping to reduce problematic drinking and substance use among college athletes.

Keywords: alcohol use disorder, cannabis, coping, substance-related disorders

This work is licensed under a Creative Commons Attribution-Non-Commercial-NoDerivatives 4.0 International License.

Introduction

College students, including college athletes, face a multitude of stressors that can affect their health and wellbeing. These may include pressures related to academics, athletic performance, time management, social relationships, financial concerns, and adjusting to life away from home (Baghurst & Kelley, 2014; Lopes Dos Santos et al., 2020; Salimi et al., 2021). As a result, there has been a dramatic rise in both mental health challenges and mental health care utilization among college students in the past two decades (Alonso et al., 2019; Lipson et al., 2019). One nationwide study found that 34% of college students had received mental health treatment in the past year and 36% had been diagnosed with a mental health condition at some point in their lifetime, both of which nearly doubled from 2007 to 2017 (Lipson et al., 2019).

College-aged adults experience higher levels of emotional distress compared to the general public (Villarroel & Terlizzi, 2020). A national survey conducted by the NCAA with nearly 20,000 student-athletes in the United States found high prevalence of self-reported depression (21% men, 28% women) and anxiety (31% men, 48% women) among college-athletes, but also found that these estimates were consistently 5-9% lower than non-athlete students (Brown et al., 2014). Unfortunately, college athletes who experience emotional distress are less likely than their non-athlete peers to seek mental health support (Kern et al., 2017). In studies examining barriers to seeking professional mental health care, college athletes often cited self-stigma and concerns about stigma from others as critical barriers (Bird et al., 2018; 2020; Moreland et al., 2018).

College athletes also report high levels of substance use. In studies with college athletes, 28-34% self-reported recent binge drinking (Knettel et al., 2021; Lewis et al., 2017), 22-28% reported using cannabis during the prior year (Knettel et al., 2021; Reardon & Creado, 2014), and between 1-4% reported using other illicit substances during the prior year, including cocaine, MDMA, unprescribed opioids, hallucinogens, and amphetamines (NCAA, 2018). The NCAA found prevalence of substance use among college athletes 1-8% lower than their non-athlete peers (NCAA, 2018). Substance use among college athletes may be partially mitigated by drug testing protocols; however, off-season drug use among college athletes is approximately double in-season consumption (Yusko et al., 2008). College athletes also frequently participate in high-risk behaviors after using substances, such as driving while intoxicated, at rates similar to their non-athlete peers (Bastien et al., 2019).

In their efforts to overcome college-related stressors, students employ a variety of coping strategies with varying degrees of success (Coiro et al., 2017; Houston et al., 2017; Metzger et al., 2017). Coping efforts may include approaching strategies, such as active problem solving or social support, or avoidant strategies such as denial or substance use (Carver, 1997; Eisenberg et al., 2012; Metzger et al., 2017). College students tend to favor coping strategies that rely on social relationships, which may fall into either the approaching (e.g., seeking advice) and avoidant (e.g., drinking at a party) categories (Freire et al., 2020; Kimball & Freysinger, 2003).

Pressures associated with collegiate athletics, including substantial time com-

mitments for training, travel, and competition, can contribute to maladaptive patterns of coping, including alcohol and drug use (Brown et al., 2014; Hatteberg, 2020; Taylor et al., 2017). In a cross-sectional study of more than 1,000 college students, Metzger and colleagues (2017) observed relationships among avoidant and maladaptive coping strategies with use of alcohol and other substances. Using alcohol and other substances is also commonly embedded in the social culture of collegiate athletics teams, which may lead to social pressure for athletes to engage in dangerous consumption (Graupensperger et al., 2018; Parisi et al., 2019). College athletes report higher prevalence of binge drinking and alcohol-related problems when compared to their non-athlete peers, but are less likely to use marijuana and illicit drugs (Kwan et al., 2014; Lisha & Sussman, 2010; Parisi et al., 2019). Nevertheless, prevalence estimates of all substance use among college athletes are high, and substance use and binge drinking are associated with increased likelihood of injury and lower academic success (Parisi et al., 2019), risk of being banned from athletics (Reardon & Creado, 2014), and poor mental and physical health outcomes (Patrick et al., 2020).

To date, many studies on coping among athletes have focused on associations between personality traits and athletic performance. Optimism and mental toughness were positively associated with approaching coping strategies and improved athletic performance (Nicholls et al., 2008). Relationships among stress, coping, and athletic performance have also been shown to be mutually reinforcing, as athletes' level of success has been shown to positively influence their emotional state while poor performance contributes to emotional distress (Hadd & Crocker, 2011).

Although studies have been conducted to understand patterns of mental health challenges and substance use among college athletes, few have sought to understand substance use as a coping strategy. The aims of the current study were to evaluate the correlates of substance use coping, and to assess whether specific strategies of coping are associated with increased risk of substance use among a sample of college athletes. Based on research showing a link between stress, maladaptive coping, and substance use (Bricker et al., 2011; Crocker et al., 2015; Doron et al., 2015; Wills et al., 2001), it was hypothesized that higher stress, lower perceived control of stress, and avoidant coping strategies (e.g., substance use coping, denial, behavioral disengagement) would be associated with greater substance use and substance-related risk behaviors.

Methods

An online survey was administered to athletes from six colleges and universities across five upper Midwest U.S. states - Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin - with athletics teams competing in each NCAA Division (I, II, and II) and at the NJCAA junior/community college level. Institutions were purposively selected for invitation in an effort to obtain perspectives from athletes residing in each state and across competition levels. Eleven athletic departments within the region were solicited for college athlete participation between November 2017 and May 2019. Of these, six institutions (55%) agreed to participate, including five that distributed email list invitations with the link to the survey and one that included the

invitation and link in a weekly email newsletter sent to all college athletes.

Invitations listed the study inclusion criteria: participants were required to be 18 years of age or older, currently enrolled full-time at the college/university, and a member of one or more varsity athletic teams during the current academic year. One follow-up invitation was also sent to each list. At the time of the surveys, the use of medical marijuana/cannabis with a physician's prescription was legal for adults in two states where participating universities were located; however, recreational marijuana use was illegal in all participating states and was considered a banned substance for all athletes by the NCAA, even when used legally or medically prescribed (Insurance Institute for Highway Safety, 2022; NCAA, 2022).

Upon clicking the link to the online survey, respondents were presented with an informed consent form and were required to indicate their understanding and agreement by checking a box before continuing to the survey. No names or other personally identifying information were collected on the survey. The survey took approximately 15-20 minutes to complete. Informed consent was provided by 225 participants, of whom 197 (87.6%) completed the survey. Three validity check items were included in the survey (e.g., "Please choose Option 4, 'Quite a bit' for this item") to identify participants who were not appropriately attending to the survey. We excluded nine participants (4.6%) from the final analysis for failing one or more validity check items, resulting in a final sample of 188 participants. Five institutions provided data on the total number of students who received the invitation to participate, resulting in a response rate of 9.8% among college athletes at these institutions. This falls within the normal range for online surveys with email recruitment (e.g., Van Mol, 2017).

Upon completing the survey, participants had the option to enter a random drawing for one of three $50 gift cards. Those who wished to enter the drawing clicked an additional link to navigate to a separate online form where they provided their email address. Thus, the email address was not linkable to any study data. All data were stored on a password-protected electronic database accessible only by the research team. Study procedures received ethical approval from the institutional review board at Gustavus Adolphus College.

Measures

Demographic and Background Data

The study survey began with questions related to demographic information and background data, including the participant's age, gender, race/ethnicity, year in school, sexual orientation, and sport(s) they compete in, as well as the NCAA or NJCAA division of their athletics team(s).

Coping

The 28-item Coping Orientation to Problems Experienced Inventory (Brief COPE; Carver, 1997) assesses 14 distinct coping strategies, including self-distraction (e.g., "turning to work or other activities to take my mind off things"), active coping (e.g., "taking action to try to make the situation better"), denial (e.g., "saying

to myself 'this isn't real'"), substance use (e.g., "using alcohol or other drugs to help me get through it"), emotional support (e.g., "getting comfort and understanding from someone"), instrumental support (e.g., "getting help and advice from other people"), behavioral disengagement (e.g., "giving up trying to deal with it"), venting (e.g., "expressing my negative feelings"), positive reframing (e.g., "looking for something good in what is happening"), planning (e.g., "thinking hard about what steps to take"), humor (e.g., "making fun of the situation"), acceptance (e.g., "learning to live with it"), religion (e.g., "praying or meditating"), and self-blame (e.g., "blaming myself for things that happened"). Brief COPE items are rated on a scale from 1 ("I haven't been doing this at all") to 4 ("I've been doing this a lot"). A mean of the two items for a score of 1 to 4 for each of the 14 subscales was calculated. Specifically, the Brief COPE substance use coping scale evaluates how often participants use drugs or alcohol to cope with stressors. This scale consists of the mean of two items asking participants how often they cope with hardships in their life by (1) "using alcohol or drugs to make myself feel better" and (2) "using alcohol or other drugs to help me get through it" (Carver, 1997).

Substance Use

Alcohol and drug use were assessed using three measures: the CRAFFT ("Car, Relax, Alone, Forget, Friends, Trouble") Screening Test (Knight et al., 2002), the NIDA-Modified Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) V2.0 (National Institute on Drug Abuse, 2012), and the brief form of the Alcohol Use Disorders Identification Test (AUDIT-C; Bush et al., 1998). The CRAFFT consists of nine yes/no questions examining the use of alcohol and other substances in the past 12 months and the lifetime incidence of substance-related risk behaviors (e.g., driving or riding in a car with someone who had been using, forgetting things that happened while using alcohol or drugs). A score of 1 is assigned for each "yes" response and the items are summed for a total score of 0 to 9. The ASSIST includes yes/no screening questions assessing lifetime use of various substances of abuse (e.g., amphetamines, hallucinogens, opioids, etc.). Responses to lifetime use of each of these categories were combined to obtain a single yes/no variable of lifetime use. The AUDIT-C is an assessment of alcohol use. A single AUDIT-C item was used for this specific research, "How often do you have six or more drinks on one occasion?", to assess the frequency of binge drinking. The responses were dichotomized by those who engaged in binge drinking at least monthly versus those who did not.

Stress

A measure assessing perceived stress among university students was adapted from the Graduate Stress Inventory (GSI; Rocha-Singh, 1994). This included 12 items assessing unique sources of stress (e.g., academics, finances, social relationships, athletics). Item responses ranged from 1, "Not at all stressful" to 5, "Extremely stressful". Item scores were summed for a total stress score ranging from 12 to 48, with a higher score indicating higher stress (Cronbach's alpha = .823).

Athletics-Related Anxiety

The survey included 13 items from the Sport Anxiety Scale (SAS-2; Smith et al., 2006) to evaluate perceived anxiety during athletic competition, including feelings of worry, difficulty concentrating, or physical symptoms (e.g., muscle tightness, uneasy stomach). These items were rated on a four-point scale from "not at all" to "very much" for a total score of 13 to 52, with a higher score indicating greater anxiety (Cronbach's alpha = .909).

Perceived Control of Athletics-Related Stress

The survey included four items from the Perceived Control Questionnaire (PCQ; Kowalski, 2000; Kowalski & Crocker, 2001) to assess self-rated control over stress related to participation in athletics. Items were rated on a scale of 1 ("strongly disagree") to 5 ("strongly agree") for a total score of 4 to 20 with higher ratings indicating more perceived control (Cronbach's alpha = .767).

Statistical Analysis

Descriptive statistics were used to report the characteristics of the sample and the use of coping strategies as measured by the Brief COPE. To examine correlates of using alcohol and drugs in an effort to cope, linear regression was used to assess self-rated stress level, athletics-related anxiety, and perceived control of stressors in relationship to substance use coping, measured by the substance use subscale of the Brief COPE. Research has shown moderating effects of age and gender on the associations between physical activity and substance use (Dunn, 2014; Kim & Kuan, 2020; Lisha et al., 2011); as such, these factors were explored as covariates. Problematic substance use was defined as binge drinking at least monthly or using an illegal substance to get high in the past year, as these behaviors have been associated with academic, legal, and health consequences (Aberg et al., 2017; Dennhardt & Murphy, 2013).

To examine whether other coping strategies were associated with substance use, four regression models were conducted to assess the 14 coping sub-scales on the Brief COPE as correlates of substance use outcomes, including (1) binge drinking once per month or more on the AUDIT-C, (2) any cannabis use in the past 12 months on the ASSIST, (3) any lifetime use of any other substance on the ASSIST, and (4) substance-related risk behaviors, as measured by the number of variables endorsed on the CRAFFT. Variables with a p-value less than .10 in univariable analyses were retained in the final multivariable models. For the first three models, binary logistic regression was used and for the fourth model Poisson regression with robust variance was used, which is a preferred statistical strategy for "count" variables (Schober & Vetter, 2021). Exploratory analyses were performed to assess the impact of limiting the regression models to only participants who engaged in problematic substance use. Doing so did not meaningfully influence the study findings; therefore, the full sample was retained for all analyses to maximize statistical power.

Results

Participants

Among the 188 college athletes in the study, the majority were women (n = 142, 75.5%), and the mean age was 20 years (range = 18 to 25, SD = 1.4). Participants in the sample were predominantly white (n = 165, 87.8%). Just over one-third of participants (n = 66, 35.1%) competed at the NCAA Division I level, 48 (25.5%) competed at the NCAA Division II level, 63 (33.5%) competed at the NCAA Division III level, and 11 (5.9%) competed at the NJCAA/Community College level.

Within this sample, 78 participants (41.5%) described patterns of problematic, illegal, or banned substance use, including binge drinking at least monthly (n = 44, 23.4%), using marijuana in the past year (n = 35, 18.6%), or using an illegal substance other than marijuana to get high (n = 44, 23.4%). Additional findings on patterns of substance use and substance-related risk behaviors in this sample are described in an earlier publication (Knettel et al., 2021). For additional participant characteristics, see Table 1.

Table 1
Characteristics of the Study Participants

Category	Value (%)
Total Participants	188
Gender	
Women	142 (75.5%)
Men	46 (24.5%)
Mean Age	20 years, SD = 1.4
Racial Identity (self-identified)	
White	165 (87.8%)
Multiracial/Mixed	8 (4.3%)
Black/African American	4 (2.1%)
Non-White Hispanic/Latino	3 (1.6%)
Asian	2 (1.1%)
Native American	2 (1.1%)
Sexual Identity (self-identified)	
Straight/Heterosexual	181 (96.3%)
Gay or Lesbian	5 (2.7%)
Unsure	2 (1.1%)

Year in School	
First Year	59 (31.4%)
Second Year	46 (24.5%)
Third Year	42 (22.3%
Fourth Year	38 (20.2%)
Fifth Year / Other	3 (1.6%)
Sport (Top 7 Most Common)	
Track & Field	50 (26.6%)
Softball	26 (13.8%)
Soccer	18 (9.6%)
Cross Country	18 (9.6%)
Volleyball	16 (8.5%)
Swimming/Diving	15 (8.0%)
Tennis	13 (6.9%)
Level of Competition	
NCAA Division I	66 (35.1%)
NCAA Division II	48 (25.5%)
NCAA Division III	63 (33.5%)
NJCAA/Community College	11 (5.9%)

Coping Strategies

Means for the 14 Brief COPE subscales are presented in Table 2, with separate means reported for those who reported binge drinking at least monthly, used marijuana in the past year, or used an illegal substance other than marijuana to get high. The most frequently endorsed coping strategies were largely adaptive, approaching strategies and included positive reframing ($M = 2.65$), acceptance ($M = 2.59$), active coping ($M = 2.59$), self-distraction ($M = 2.53$), and planning ($M = 2.52$). Substance use was the second least commonly endorsed coping strategy. The mean score for substance coping was 1.39 ($SD = .73$), which falls between "I haven't been doing this at all" and "I have been doing this a little bit." Most participants ($n = 118$, 62.8%) reported they did not use drugs or alcohol as a form of coping, while 22.9% ($n = 43$) reported using drugs or alcohol to cope a little bit or medium amount of the time, and 2.1% ($n = 4$) reported using drugs or alcohol to cope a lot of the time. When limited to the sub-sample of 78 participants who engaged in problematic, illegal, or banned substance use, the mean substance use coping score was slightly higher ($M = 1.60$, $SD = .85$).

Table 2

Endorsement of Coping Strategies as Measured by the Brief COPE (N = 188)

Coping Strategy	Mean	Binge Drinking		Marijuana Use		Other Substances	
		Yes	No	Yes	No	Yes	No
Positive Reframing	2.65	2.67	2.62	2.63	2.65	2.63	2.66
Acceptance	2.59	2.55	2.61	2.51	2.62	2.57	2.63
Active Coping	2.59	2.45	2.63	2.51	2.61	2.57	2.60
Self Distraction	2.53	2.66	2.46	2.50	2.53	2.53	2.53
Planning	2.52	2.42	2.55	2.49	2.53	2.33	2.58
Self Blame	2.38	2.34	2.38	2.21	2.42	2.30	2.41
Emotional Support	2.33	2.25	2.33	2.37	2.39	2.20	2.34
Humor	2.33	2.48	2.29	2.34	2.33	2.31	2.36
Instrumental Support	2.32	2.09	2.39	2.17	2.35	2.13	2.36
Venting	2.00	1.94	2.03	1.94	2.02	1.91	2.02
Religion	1.93	1.84	1.98	1.71	2.00	1.94	1.96
Behavioral Disengagement	1.52	1.51	1.52	1.56	1.50	1.63	1.46
Substance Use	1.39	1.80	1.19	1.76	1.25	1.58	1.28
Denial	1.22	1.18	1.24	1.21	1.23	1.24	1.21

In linear regressions examining variables associated with substance use coping, identifying as a man, age 21 and over, higher perceived stress, higher athletics-related anxiety, and lower perceived control of stressors were all significantly associated with substance use coping in univariable analysis (See Table 3). In the final multivariable model, only men and those with higher perceived stress were significantly more likely to employ substance use coping. With all else held constant, men scored .34 points higher on the substance use coping scale, indicating more frequent use of substances as a form of coping compared to women ($p < .01$). In addition, for every point increase in perceived stress, substance use coping increased by .02 ($p = .01$).

Table 3

Factors Associated with Using Substances as a Coping Strategy (N = 188)

	Substance Use Coping, mean	Univariable B (95% CI)	Multivariable B (95% CI)
Gender			
Women	1.3	REF	REF
Men	1.6	.29 (.03, .55)*	.34 (.09, .60)**
Age			
< 21 years old	1.3	REF	REF
21-25 years old	1.6	.26 (.03, .49)*	.19 (-.04, .41)
Stress (GSI)		.03 (.01, .04)***	.02 (.004, .04)*
Athletics-Related Anxiety (SAS-2)		.02 (.01, .04)**	.02 (-.001, .03)
Perceived Control of Stressors (PCQ)		-.05 (-.08, -.02)**	-.03 (-.06, .002)

Note. *$p < .05$. **$p < .01$. ***$p < .001$. B, unstandardized beta. CI, confidence interval. REF, reference category.

Relationships Among Coping Strategies and Substance Use

For the three binary logistic regression models, the 14 coping strategy subscales of the Brief COPE were assessed for relationships with 1) binge drinking in the past month, 2) marijuana use in the past year, 3) and lifetime other substance use. Higher substance use coping was the only COPE subscale significantly associated with increased binge drinking ($b = 1.23$, $p < .001$), marijuana use ($b = .90$, $p < .001$), and other substance use ($b = .60$, $p = .02$). The associations between substance use coping and both binge drinking and marijuana use remained significant after controlling for gender and age, but the association between substance use coping and other substance use was not significant in the multivariable model. When controlling for gender and age, for a 1-point increase in substance use coping, there was an estimated 3.23 times likelihood of binge drinking in the past month (95% CI [1.79, 5.84]) and 2.31 times likelihood of marijuana use in the past year (95% CI [1.36, 3.92]).

A Poisson regression was used to assess coping strategies as predictors of alcohol- and drug-related risk behaviors (see Table 4). In the univariable analyses, substance use coping ($b = .12$, $p < .001$) and behavioral disengagement ($b = .04$, $p = .03$) were associated with higher scores on the CRAFFT, indicating greater substance- and alcohol-related risk behaviors. Religious coping showed an inverse relationship, with more frequent religious coping associated with lower scores on the CRAFFT ($b = .03$, $p < .01$). In the multivariable model with substance use coping, behavioral disengagement, and religious coping as independent variables, substance use and religious coping were significantly associated with CRAFFT scores while behavioral disengagement was not a significant predictor in the final model. When controlling for gender and age, a 1-point increase in substance use coping was associated with a .10 log count increase in CRAFFT score ($p < .001$), and a 1-point increase in religious coping was associated with a .02 log count decrease in CRAFFT score ($p = .04$).

Discussion

The purpose of this study was to analyze the coping strategies of college athletes with an emphasis on their use of alcohol and other substances to cope with stress. Men and those with higher overall college-related stress were most likely to use substances as a coping strategy. In univariable models, being age 21 or older, higher athletics-related anxiety, and low perceived control of stressors were also related to substance use coping. Expectedly, substance use coping was strongly associated with problematic patterns of substance use, including binge drinking, illicit substance use, and engaging in substance related risk behaviors such as riding in a car with an intoxicated driver or forgetting things while using substances.

College athletes generally employed positive and approach-based coping strategies, including positive reframing, acceptance, active coping, self-distraction, and planning ahead. Of the 14 coping strategies assessed, substance use coping was the second least endorsed strategy. However, one-quarter of participants acknowledged

Table 4

Factors Associated with Alcohol- and Drug-Related Risk Behaviors (N = 188)

		Univariable B (95% CI)	Multivariable B (95% CI)
Brief COPE Subscales			
Self-Distraction		.01 (-.02, .04)	
Active Coping		-.02 (-.05, .02)	
Denial		.001 (-.04, .04)	
Substance Use Coping		.12 (.09, .15)***	.10 (.07, .13)***
Emotional Support		.01 (-.03, .04)	
Instrumental Support		-.02 (-.05, .01)	
Behavioral Disengagement		.04 (.004, .07)*	.02 (-.01, .04)
Venting		-.01 (-.04, .03)	
Positive Reframing		-.003 (-.03, .03)	
Planning		-.01 (-.04, .02)	
Acceptance		.01 (-.03, .04)	
Religious Coping		-.03 (-.06, -.01)**	-.02 (-.04, -.001)*
Self-Blame		.02 (-.003, .05)	
Humor		.01 (-.02, .04)	
	# CRAFFT Items Endorsed, mean	**Univariable B (95% CI)**	**Multivariable B (95% CI)**
Gender			
Women	2.2	REF	REF
Men	3.1	.08 (.02, .14)**	.03 (-.02, .08)
Age			
< 21 years old	2.1	REF	REF
21-25 years old	2.9	.08 (.03, .13)**	.05 (.01, .10)*

Note. *$p < .05$. **$p < .01$. ***$p < .001$. B, unstandardized beta. CI, confidence interval. REF, reference category.

that they used substances to cope moderately or frequently. Additionally, the relatively low ratings of substance-related coping strategies may reflect social desirability bias, as described in further detail in the limitations section (Borsari & Muellerleile, 2009; Walker & Cosden, 2007).

Among the coping strategies assessed, only substance use coping was associated with increased binge drinking, marijuana use, and other substance use. However, both substance use coping and behavioral disengagement strategies were associated with higher alcohol and substance related risk behaviors, while endorsement of religious coping was associated with lower risk. Other avoidant strategies such as denial and self-distraction were not associated with substance use or risk behavior, in contrast to previous findings (Giurgiu & Damian, 2015; Samuel et al., 2015). Future intervention research may seek to focus on the mechanisms of reducing substance-related risk, rather than focusing solely on the presence or amount of use.

Further research should explore mechanisms connecting religious coping with better substance use outcomes and investigate how behavioral disengagement and

the use of substances to cope may impact risk-reduction strategies among college athletes. Religious values associated with substance use may serve as a protective factor and an opportunity for intervention among religious students (Gallucci et al., 2018), while all students may benefit from education and support related to actively addressing stressors rather than disengaging or using substances to cope (Metzger et al., 2017).

Findings suggest interventions to reduce substance use may be especially warranted among college athletes who are older, identify as men, report higher levels of stress, and/or engage in behavioral disengagement and substance use coping. Higher rates of substance use coping among men is potentially related to masculine or hyper-masculine ideals that remain common in men's athletic environments (Ramaeker & Petrie, 2019). These ideals may stifle disclosure of emotional distress, hinder help-seeking, and promote more avoidant strategies of coping with stress. Increased substance use coping among older athletes is most likely due to the legality of using substances such as alcohol after age 21 and associated exposure. However, this finding might also be indicative of socialization to substance use coping through the course of one's collegiate career (Veliz et al., 2015).

Because college athletes may be unwilling to disclose substance use, it may be necessary screen for surrogate markers of risk, including stress, anxiety, and behavioral disengagement, to provide targeted interventions to college athletes most at risk for problematic substance use. Peer-to-peer interventions may assist in reducing stigma and encouraging openness about challenges related to substance use (Tracy & Wallace, 2016), and may use the social cohesion common in athletics teams to promote healthy, rather than unhealthy norms related to substance use (Graupensperger et al., 2019).

Additionally, colleges and universities should ensure resources are readily available to help students. Research highlights potential benefits of involving athletics personnel in the prevention and treatment of substance use among college athletes (Parisi et al., 2019), and reducing the stigma of help-seeking (Castaldelli-Maia et al., 2019; Gulliver et al., 2012). This reflects new trends toward holistic health in college athletics, which eschews the traditional over-prioritization of athletics performance and instead emphasizes the central importance of medical, social, cultural, and mental health among athletes (Barkley et al., 2018).

Interventions to intervene on the link between stress, coping, and substance use could take two approaches: (1) reducing stressors and/or (2) improving coping with stressors, even when they remain present. For example, holistic tutoring and mentoring programs, mental health resources, career coaching, injury prevention, and increased financial support may help reduce the unique stressors faced by college athletes, particularly those who are engaging in problematic substance use (Barkley et al., 2018). Even with stressors present, coping interventions can be effective for improving mental health and decreasing substance use despite not directly targeting substance use behaviors (Fogaca, 2021; Gabrielli et al., 2021; Houston et al., 2017; Meade et al., 2010). Research is needed to explore whether focusing on general coping skills rather than a substance use disorder can decrease stigma, which is a barrier

to engagement in mental health care.

Research is also necessary to compare the benefits of team-based interventions versus individual interventions. There is some prior evidence that sports participation shows different relationships to substance use compared to broad physical activity/exercise (Henchoz et al., 2014). It is possible this is due to performance pressures and other factors unique to sports, including team dynamics. Some teams may foster a culture of healthy coping, while other teams may practice maladaptive methods of coping and substance use. Research suggests men competing in team sports are more likely to binge drink compared to men in individual sports, but this relationship may not exist among women (Kim & Kuan, 2020). Future studies with larger samples should explore the relationships between various sports teams and the methods of coping among the teams' respective members to gain insight into how team dynamics can shape a college athlete's ability to combat stress (Graupensperger et al., 2019).

Limitations of the study included recruitment from a limited number of colleges/universities from the upper Midwest, with the sample consisting of predominantly White and heterosexual women. As such, findings might not generalize to all college athletes. Future studies may wish to enroll a more diverse sample of students. Data were collected prior to the emergence of COVID-19, and although early published findings seem to indicate that college athletes did not suffer disproportionately from mental health concerns during the pandemic (Valster et al., 2021), future studies may seek to replicate the findings in light of the continued challenges posed by COVID-19. Study response rate was low, similar to many studies with Internet recruitment, and it is not possible to identify whether non-responders would have given similar responses. Response rate in this sample of college athletes may have been low due to social desirability bias or concern that acknowledging substance use might lead to consequences from their athletic team (Johnson, 2014), despite assurance from the researchers that responses were confidential. In future studies, researchers may seek to employ alternative recruitment and data collection strategies designed to increase response rates and reduce social desirability bias.

Conclusion

Among college athletes, older age, identifying as a man, and higher perceived stress were associated with higher substance use coping. Higher behavioral disengagement coping, higher substance use coping, and lower religious coping were related to greater binge drinking and substance-related risk behaviors. Together, these findings point to the importance of developing interventions to reduce stressors and facilitate healthy coping with stress as strategies to reduce problematic drinking and substance use among college athletes. Coping-focused interventions are likely to have the dual benefit of reducing problematic substance use and enhancing problem solving for other stressors common among college athletes.

References

Aberg, F., Helenius-Hietala, J., Puukka, P., & Jula, A. (2017). Binge drinking and the risk of liver events: A population-based cohort study. *Liver International*, *37*(9), 1373–1381. https://doi.org/10.1111/liv.13408

Alonso, J., Vilagut, G., Mortier, P., Auerbach, R. P., Bruffaerts, R., Cuijpers, P., Demyttenaere, K., Ebert, D. D., Ennis, E., Gutiérrez-García, R. A., Green, J. G., Hasking, P., Lee, S., Bantjes, J., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Zaslavsky, A. M., Kessler, R. C. (2019). The role impairment associated with mental disorder risk profiles in the WHO World Mental Health International College Student Initiative. *International Journal of Methods in Psychiatric Research*, *28*(2), e1750. https://doi.org/10.1002/mpr.1750

Baghurst, T., & Kelley, B. C. (2014). An examination of stress in college students over the course of a semester. *Health Promotion Practice*, *15*(3), 438–447. https://doi.org/10.1177/1524839913510316

Barkley, L., Taliaferro, L. A., Baker, K., & Garcia, J. (2018). The Holistic Athletic Healthcare Model: Addressing the developmental, social, and cultural needs of collegiate athletes. *Journal of Higher Education Athletics & Innovation*, *3*, 26-47. https://doi.org/10.15763/issn.2376-5267.2018.1.3.26-47

Bastien, C. H., Ellis, J. G., Athey, A., Chakravorty, S., Robbins, R., Knowlden, A. P., Charest, J., & Grandner, M. A. (2019). Driving after drinking alcohol associated with insufficient sleep and insomnia among student athletes and non-athletes. *Brain Sciences*, *9*(2). https://doi.org/10.3390/brainsci9020046

Bird, M. D., Chow, G. M., & Cooper, B. T. (2020). Student-athletes' mental mealth help-seeking experiences: A mixed methodological approach. *Journal of College Student Psychotherapy*, *34*(1), 59–77. https://doi.org/10.1080/87568225.2018.1523699

Bird, M. D., Chow, G. M., Meir, G., & Freeman, J. (2018). Student-athlete and student non-athletes' stigma and attitudes toward seeking online and face-to-face counseling. *Journal of Clinical Sport Psychology*, *12*(3), 347–364. https://doi.org/10.1123/jcsp.2017-0010

Borsari, B., & Muellerleile, P. (2009). Collateral reports in the college setting: A meta-analytic integration. *Alcoholism, Clinical and Experimental Research*, *33*(5), 826–838. https://doi.org/10.1111/j.1530-0277.2009.00902.x

Bricker, J. B., Schiff, L., & Comstock, B. A. (2011). Does avoidant coping influence young adults' smoking?: A ten-year longitudinal study. *Nicotine & Tobacco Research*, *13*(10), 998–1002. https://doi.org/10.1093/ntr/ntr074

Brown, G. T., Hainline, B., Kroshus, E., & Wilfert, M. (2014). *Mind, body and sport: Understanding and supporting student-athlete mental wellness* (p. 120). NCAA. https://www.ncaapublications.com/productdownloads/MindBodySport.pdf

Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., & Bradley, K. A. (1998). The AUDIT alcohol consumption questions (AUDIT-C): An effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Archives of Internal Medicine*, *158*(16), 1789–1795. https://doi.org/10.1001/archinte.158.16.1789

Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the brief COPE. *International Journal of Behavioral Medicine*, *4*(1), 92–100. https://doi.org/10.1207/s15327558ijbm0401_6

Castaldelli-Maia, J. M., Gallinaro, J. G. de M. E., Falcão, R. S., Gouttebarge, V., Hitchcock, M. E., Hainline, B., Reardon, C. L., & Stull, T. (2019). Mental health symptoms and disorders in elite athletes: A systematic review on cultural influencers and barriers to athletes seeking treatment. *British Journal of Sports Medicine*, *53*(11), 707–721. https://doi.org/10.1136/bjsports-2019-100710

Coiro, M. J., Bettis, A. H., & Compas, B. E. (2017). College students coping with interpersonal stress: Examining a control-based model of coping. *Journal of American College Health*, *65*(3), 177–186. https://doi.org/10.1080/07448481.2016.1266641

Crocker, P. R. E., Tamminen, K. A., & Gaudreau, P. (2015). Coping in sport. In *Contemporary advances in sport psychology: A review* (pp. 28–67). Routledge/Taylor & Francis Group. https://doi.org/10.4324/9781315813059

Dennhardt, A. A., & Murphy, J. G. (2013). Prevention and treatment of college student drug use: A review of the literature. *Addictive Behaviors*, *38*(10), 2607–2618. https://doi.org/10.1016/j.addbeh.2013.06.006

Doron, J., Trouillet, R., Maneveau, A., Neveu, D., & Ninot, G. (2015). Coping profiles, perceived stress and health-related behaviors: A cluster analysis approach. *Health Promotion International*, *30*(1), 88–100. https://doi.org/10.1093/heapro/dau090

Eisenberg, S. A., Shen, B.-J., Schwarz, E. R., & Mallon, S. (2012). Avoidant coping moderates the association between anxiety and patient-rated physical functioning in heart failure patients. *Journal of Behavioral Medicine*, *35*(3), 253–261. https://doi.org/10.1007/s10865-011-9358-0

Fogaca, J. L. (2021). Combining mental health and performance interventions: Coping and social support for student-athletes. *Journal of Applied Sport Psychology*, *33*(1), 4–19. https://doi.org/10.1080/10413200.2019.1648326

Freire, C., Ferradás, M. del M., Regueiro, B., Rodríguez, S., Valle, A., & Núñez, J. C. (2020). Coping strategies and self-efficacy in university students: A person-centered approach. *Frontiers in Psychology*, *11*, 841. https://doi.org/10.3389/fpsyg.2020.00841

Gabrielli, S., Rizzi, S., Bassi, G., Carbone, S., Maimone, R., Marchesoni, M., & Forti, S. (2021). Engagement and effectiveness of a healthy-coping intervention via Chatbot for university students during the COVID-19 pandemic: Mixed methods proof-of-concept study. *JMIR MHealth and UHealth*, *9*(5), e27965. https://doi.org/10.2196/27965

Gallucci, A. R., Hackman, C., & Wilkerson, A. (2018). Examining the relationship between religious coping and the misuse of prescription stimulants among a sample of undergraduate students. *Substance Use & Misuse*, *53*(9), 1571–1579. https://doi.org/10.1080/10826084.2017.1416405

Giurgiu, R.-L., & Damian, M. (2015). Stress & coping in athletes and non-athletes students—Comparative study. *Procedia - Social and Behavioral Sciences*, *180*, 332–337. https://doi.org/10.1016/j.sbspro.2015.02.125

Graupensperger, S. A., Benson, A. J., & Blair Evans, M. (2018). Everyone else is doing it: The association between social identity and susceptibility to peer influence in NCAA athletes. *Journal of Sport & Exercise Psychology*, *40*(3), 117–127. https://doi.org/10.1123/jsep.2017-0339

Graupensperger, S., Benson, A., Bray, B., & Evans, M. B. (2019). Social cohesion and peer acceptance predict student-athletes' attitudes toward health-risk behaviors: A within- and between-group investigation. *Journal of Science and Medicine in Sport*, *22*. https://doi.org/10.1016/j.jsams.2019.07.003

Gulliver, A., Griffiths, K. M., & Christensen, H. (2012). Barriers and facilitators to mental health help-seeking for young elite athletes: A qualitative study. *BMC Psychiatry*, *12*, 157. https://doi.org/10.1186/1471-244X-12-157

Hadd, V., & Crocker, P. (2011). The effect of stress-related factors on post-performance affects in competitive adolescent swimmers. *International Journal of Sport and Exercise Psychology*, *5*. https://doi.org/10.1080/1612197X.2007.9671816

Hatteberg, S. (2020). "There's no way I can do all of this": The perceived impacts of stress exposure on the academic development of collegiate athletes. *Journal of Issues in Intercollegiate Athletics*, *Fall 2020 Special Issue*, 7–28.

Henchoz, Y., Dupuis, M., Deline, S., Studer, J., Baggio, S., N'Goran, A. A., Daeppen, J.-B., & Gmel, G. (2014). Associations of physical activity and sport and exercise with at-risk substance use in young men: A longitudinal study. *Preventive Medicine*, *64*, 27–31. https://doi.org/10.1016/j.ypmed.2014.03.022

Houston, J. B., First, J., Spialek, M. L., Sorenson, M. E., Mills-Sandoval, T., Lockett, M., First, N. L., Nitiéma, P., Allen, S. F., & Pfefferbaum, B. (2017). Randomized controlled trial of the Resilience and Coping Intervention (RCI) with undergraduate university students. *Journal of American College Health*, *65*(1), 1–9. https://doi.org/10.1080/07448481.2016.1227826

Insurance Institute for Highway Safety. (2022). *Marijuana laws by state*. IIHS-HLDI Crash Testing and Highway Safety. https://www.iihs.org/topics/alcohol-and-drugs/marijuana-laws-table

Johnson, T. P. (2014). Sources of error in substance use prevalence surveys. *International Scholarly Research Notices*, *2014*, 923290. https://doi.org/10.1155/2014/923290

Kern, A., Heininger, W., Klueh, E., Salazar, S., Hansen, B., Meyer, T., & Eisenberg, D. (2017). Athletes Connected: Results from a pilot project to address knowledge and attitudes about mental health among college student-athletes. *Journal of Clinical Sport Psychology*, *11*(4), 324–336. https://doi.org/10.1123/JCSP.2016-0028

Kim, Y., & Kuan, G. (2020). Relationship between alcohol consumption and drinking refusal self-efficacy among university students: The roles of sports type and gender. *International Journal of Environmental Research and Public Health*, *17*(12), Article 12. https://doi.org/10.3390/ijerph17124251

Kimball, A., & Freysinger, V. J. (2003). Leisure, stress, and coping: The sport participation of collegiate student-athletes. *Leisure Sciences*, *25*(2–3), 115–141. https://doi.org/10.1080/01490400306569

Knettel, B. A., Cherenack, E. M., & Bianchi-Rossi, C. (2021). Stress, anxiety, binge drinking, and substance use among college student-athletes: A cross-sectional analysis. *Journal of Intercollegiate Sport*, *14*(2), 116–135. https://doi.org/10.17161/jis.v14i2.14829

Knight, J. R., Sherritt, L., Shrier, L. A., Harris, S. K., & Chang, G. (2002). Validity of the CRAFFT substance abuse screening test among adolescent clinic patients. *Archives of Pediatrics & Adolescent Medicine*, *156*(6), 607–614. https://doi.org/10.1001/archpedi.156.6.607

Kowalski, K. C. (2000). *Development and validation of the Coping Function Questionnaire for adolescents in sport*. University of Saskatchewan. https://harvest.usask.ca/handle/10388/etd-10212004-002424

Kowalski, K. C., & Crocker, P. R. E. (2001). Development and validation of the Coping Function Questionnaire for adolescents in sport. *Journal of Sport & Exercise Psychology*, *23*(2), 136–155. https://doi.org/10.1123/jsep.23.2.136

Kwan, M., Bobko, S., Faulkner, G., Donnelly, P., & Cairney, J. (2014). Sport participation and alcohol and illicit drug use in adolescents and young adults: A systematic review of longitudinal studies. *Addictive Behaviors*, *39*(3), 497–506. https://doi.org/10.1016/j.addbeh.2013.11.006

Lewis, T. F., Milroy, J., Wyrick, D., Hebard, S. P., & Lamberson, K. A. (2017). Binge-drinking and non-binge-drinking student-athletes: The role of proximal norms, negative expectancies, and selected sociodemographic variables. *Journal of Child & Adolescent Substance Abuse*, *26*(2), 141–151. https://doi.org/10.1080/1067828X.2016.1222978

Lipson, S. K., Lattie, E. G., & Eisenberg, D. (2019). Increased rates of mental health service utilization by U.S. college students: 10-year population-level trends (2007–2017). *Psychiatric Services*, *70*(1), 60–63. https://doi.org/10.1176/appi.ps.201800332

Lisha, N. E., & Sussman, S. (2010). Relationship of high school and college sports participation with alcohol, tobacco, and illicit drug use: A review. *Addictive Behaviors*, *35*(5), 399–407. https://doi.org/10.1016/j.addbeh.2009.12.032

Lopes Dos Santos, M., Uftring, M., Stahl, C. A., Lockie, R. G., Alvar, B., Mann, J. B., & Dawes, J. J. (2020). Stress in academic and athletic performance in collegiate athletes: A narrative review of sources and monitoring strategies. *Frontiers in Sports and Active Living*, *2*. https://doi.org/10.3389/fspor.2020.00042

Meade, C. S., Drabkin, A. S., Hansen, N. B., Wilson, P. A., Kochman, A., & Sikkema, K. J. (2010). Reductions in alcohol and cocaine use following a group coping intervention for HIV-positive adults with childhood sexual abuse histories. *Addiction*, *105*(11), 1942–1951. https://doi.org/10.1111/j.1360-0443.2010.03075.x

Metzger, I. W., Blevins, C., Calhoun, C. D., Ritchwood, T. D., Gilmore, A. K., Stewart, R., & Bountress, K. E. (2017). An examination of the impact of maladaptive coping on the association between stressor type and alcohol use in college. *Journal of American College Health*, *65*(8), 534–541. https://doi.org/10.1080/07448481.2017.1351445

Moreland, J. J., Coxe, K. A., & Yang, J. (2018). Collegiate athletes' mental health services utilization: A systematic review of conceptualizations, operationalizations, facilitators, and barriers. *Journal of Sport and Health Science*, *7*(1), 58–69. https://doi.org/10.1016/j.jshs.2017.04.009

National Institute on Drug Abuse. (2012). *Resource guide: Screening for drug use in general medical settings*. National Institute on Drug Abuse. https://www.drugabuse.gov/sites/default/files/pdf/nmassist.pdf

NCAA. (2018). *National study on substance use habits of college student-athletes*. National Collegiate Athletics Association. http://www.ncaa.org/sites/default/files/2018RES_Substance_Use_Final_Report_FINAL_20180611.pdf

NCAA. (2022). *NCAA banned substances*. NCAA.Org. https://www.ncaa.org/sports/2015/6/10/ncaa-banned-substances.aspx

Nicholls, A. R., Polman, R. C. J., Levy, A. R., & Backhouse, S. H. (2008). Mental toughness, optimism, pessimism, and coping among athletes. *Personality and Individual Differences*, *44*(5), 1182–1192. https://doi.org/10.1016/j.paid.2007.11.011

Parisi, C. E., Bugbee, B. A., Vincent, K. B., Soong, A. M., & Arria, A. M. (2019). Risks associated with alcohol and marijuana use among college student athletes: The case for involving athletic personnel in prevention and intervention. *Journal of Issues in Intercollegiate Athletics*, *12*, 343–364.

Patrick, M. E., Berglund, P. A., Joshi, S., & Bray, B. C. (2020). A latent class analysis of heavy substance use in Young adulthood and impacts on physical, cognitive, and mental health outcomes in middle age. *Drug and Alcohol Dependence*, *212*, 108018. https://doi.org/10.1016/j.drugalcdep.2020.108018

Ramaeker, J., & Petrie, T. A. (2019). "Man up!": Exploring intersections of sport participation, masculinity, psychological distress, and help-seeking attitudes and intentions. *Psychology of Men & Masculinities*, *20*(4), 515–527. https://doi.org/10.1037/men0000198

Reardon, C. L., & Creado, S. (2014). Drug abuse in athletes. *Substance Abuse and Rehabilitation*, *5*, 95–105. https://doi.org/10.2147/SAR.S53784

Rocha-Singh, I. A. (1994). Perceived stress among graduate students: Development and validation of the Graduate Stress Inventory. *Educational and Psychological Measurement*, *54*(3), 714–727. https://doi.org/10.1177/0013164494054003018

Salimi, N., Gere, B., Talley, W., & Irioogbe, B. (2021). College students mental health challenges: Concerns and considerations in the COVID-19 pandemic. *Journal of College Student Psychotherapy*, 1–13. https://doi.org/10.1080/87568225.2021.1890298

Samuel, R. D., Tenenbaum, G., Mangel, E., Virshuvski, R., Chen, T., & Badir, A. (2015). Athletes' experiences of severe injuries as a career change-event. *Journal of Sport Psychology in Action*, *6*, 1–22. https://doi.org/10.1080/21520704.2015.1012249

Schober, P., & Vetter, T. R. (2021). Count data in medical research: Poisson Regression and Negative Binomial Regression. *Anesthesia & Analgesia*, *132*(5),

1378–1379. https://doi.org/10.1213/ANE.0000000000005398

Smith, R. E., Smoll, F. L., Cumming, S. P., & Grossbard, J. R. (2006). Measurement of multidimensional sport performance anxiety in children and adults: The Sport Anxiety Scale-2. *Journal of Sport & Exercise Psychology*, *28*(4), 479–501. https://doi.org/10.1123/jsep.28.4.479

Taylor, L., Ward, R. M., & Hardin, R. (2017). Examination of drinking habits and motives of collegiate student-athletes. *Journal of Applied Sport Management*, *9*. https://doi.org/10.18666/JASM-2017-V9-I1-7470

Tracy, K., & Wallace, S. P. (2016). Benefits of peer support groups in the treatment of addiction. *Substance Abuse and Rehabilitation*, *7*, 143–154. https://doi.org/10.2147/SAR.S81535

Valster, K. M., Cochrane-Snyman, K., Smith, D., & Jones, K. (2021). COVID-19 distress in NCAA Division III student-athletes. *Journal of Issues in Intercollegiate Athletics*, *14*, 674–693.

Van Mol, C. (2017). Improving web survey efficiency: The impact of an extra reminder and reminder content on web survey response. *International Journal of Social Research Methodology*, *20*(4), 317–327. https://doi.org/10.1080/13645579.2016.1185255

Veliz, P. T., Boyd, C. J., & McCabe, S. E. (2015). Competitive sport involvement and substance use among adolescents: A nationwide study. *Substance Use & Misuse*, *50*(2), 156–165. https://doi.org/10.3109/10826084.2014.962049

Villarroel, M. A., & Terlizzi, E. P. (2020). *Symptoms of depression among adults: United States, 2019*. National Center for Health Statistics. https://www.cdc.gov/nchs/products/databriefs/db379.htm

Walker, S., & Cosden, M. (2007). Reliability of college student self-reported drinking behavior. *Journal of Substance Abuse Treatment*, *33*(4), 405–409. https://doi.org/10.1016/j.jsat.2007.02.001

Wills, T. A., Sandy, J. M., Yaeger, A. M., Cleary, S. D., & Shinar, O. (2001). Coping dimensions, life stress, and adolescent substance use: A latent growth analysis. *Journal of Abnormal Psychology*, *110*(2), 309–323. https://doi.org/10.1037//0021-843x.110.2.309

Yusko, D. A., Buckman, J. F., White, H. R., & Pandina, R. J. (2008). Alcohol, tobacco, illicit drugs, and performance enhancers: A comparison of use by college student athletes and nonathletes. *Journal of American College Health : J of ACH*, *57*(3), 281–290. https://doi.org/10.3200/JACH.57.3.281-290