EXAMINING DRUNKOREXIA IN COLLEGE STUDENTS: DOES MOTIVATION MODERATE THE ASSOCIATION BETWEEN PHYSICAL ACTIVITY AND ALCOHOL CONSUMPTION?

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by

Cody Robert Sze

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DEDICATION

Thank you to my mother Jennifer for leading by example and supporting me unwaveringly throughout my life. Without her, I would not be the man I am today, and none of this would have been possible. I love you, mom. Also, thank you to my undergraduate mentor Dr. Young for supporting me, guiding me, and instilling the confidence within me to apply for Ph.D. programs. You positively and dramatically altered the course of my life, and for that I will be forever thankful and always strive to be as selfless and optimistic as you are in all that you do. Lastly, thank you to my partner Joanna. Your love and support throughout this entire process contributed to both my motivation and perseverance more than you could ever know. I love you, Joanna. Thank you for always believing in me when I need someone to lean on.

ABSTRACT

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The literature has generally established a positive correlational relationship between physical activity (PA) and alcohol consumption (AC). Further inquiry investigating why this relationship exists, which factors explain variation in this relationship, which health behavior tends to precede the other, and why this relationship is sometimes only present in certain populations or for certain types of PA (i.e., moderate, or vigorous) have been ongoing. One such way researchers have attempted to assess PA and AC in young adults is through the lens of "Drunkorexia," which encompasses several preparatory and compensatory behaviors (i.e., meal skipping, eating less, eating disorder behaviors, exercise, etc.) in relation to one's AC to offset calories or speed up/exacerbate alcohol's effects. The present study examined the relationship between PA/AC in a large college student sample, assessed compensatory behaviors as moderators of the PA/AC link, and tested exercise motives for weight management and appearance for three-way interactions with PA and compensatory behaviors in predicting AC. There was a small but significant positive correlation between PA/AC within the present college student sample. Results also indicated levels of PA dampened a generally positive association between preparatory behaviors designed to enhance alcohol effects and AC quantity. Findings suggest universities may curb drinking by promoting PA among students with tendencies to engage in alcohol-related preparatory/compensatory behaviors.

KEY WORDS: Alcohol; Drunkorexia; Physical activity; Exercise motivation; College students

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TABLE OF CONTENTS

Page

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

CHAPTER I

Introduction

Purpose

Problematic drinking and physical inactivity have cost the United States (U.S.) a significant amount financially and contribute to a substantial death toll as well. The excessive alcohol consumption (AC) contributes to more than 80,000 deaths and amounts to an economic burden of approximately $223 billion annually (Bouchery et al., 2013). A lack of physical activity (PA) accounts for approximately just under $70 billion in U.S. health care costs annually (Centers for Medicare & Medicaid Services, 2013). Further, problematic drinking and inactivity respectively predispose individuals to an elevated risk of mortality, and they may also interact to exacerbate the risk (Soedamah-Muthu et al., 2013). Thus, various research has focused on assessing the link between PA and AC, because understanding the nature of the relationship between these two health behaviors has major implications at both individual and population levels.

Until recently, the literature evaluating the relationship between PA and AC has been somewhat ambiguous, with some findings showing a positive association, (Barry & Piazza-Gardner, 2012; Dodge, & Clarke, 2018; Musselman & Rutledge, 2010), and others indicating a lack of an association (Abrantes et al., 2017; Conroy et al., 2015; Kopp et al., 2015; Reilly et al., 2016). In some cases, the link has only been supported for specifically higher or lower intensities (i.e., moderate, or vigorous) of PA (see Dodge, & Clarke, 2018 and Leasure, & Neighbors, 2014 for contrasting findings). Other findings show support for the link existing only in individuals possessing certain characteristics such as being male and/or a member of a Greek organization (Barry et al., 2013;

Buscemi, et al., 2011). Some results support an association between higher levels of PA and specifically binge drinking or heavy episodic drinking (HED) (Barry & Piazza-Gardner, 2012), others show no association between PA and binge drinking and HED (Niedermeier et al., 2018), while some studies have supported a link between PA, and both general AC and HED (Bedendo & Noto, 2015).

Taken together, the literature suggests the existence of a positive relationship between PA and AC (Barry and Piazza, 2010; Dodge et al., 2017; French et al., 2009). The association has been shown to be strong among emerging and young adults (Dodge et al., 2017; Lisha et al., 2011). Whereas a consensus for a positive association has been mostly accepted, gaps in this literature still exist. More specifically, there is a lack of clarity with regards to what factors and mechanisms underlie this association and why the link may vary by PA intensity (Barry & Piazza-Gardner, 2012; Dodge & Clarke, 2018). In addition, there is scarce to little support for the temporal sequencing of these two health behaviors. Several hypotheses have been proposed and explored to better understand the nature of the PA-alcohol relationship, one of which is developed more fully below.

Drunkorexia

A particular aspect of the PA-alcohol relationship that has been highlighted in the popular press in recent years is the phenomenon of “Drunkorexia”. “Drunkorexia” encompasses a multitude of maladaptive eating and exercise behaviors, including voluntary dietary restrictions, excessive exercise, and/or disordered eating behaviors all in relation to AC (Wilkerson et al., 2017). Abrantes et al. (2017) examined correlates of the PA-alcohol relation including compensatory drinking. They found college students

that exhibited patterns of behavior consistent with a positive PA-alcohol relation within their sample also exhibited a tendency to engage in PA prior to or following drinking to compensate for alcohol calorie consumption.

"Drunkorexia" as it is currently understood has the potential to develop in a few different ways. When viewed through the transdiagnostic model developed by Choquette et al. (2018), individuals may eat in a restrictive manner, or exercise excessively in preparation for consuming calories in the form of alcohol. On the other hand, excessive drinking may contribute to negative subjective evaluation and emotions (Pisetsky et al., 2016), and prompt compensatory behaviors such as PA, or disordered eating behaviors (e.g., skipping meals, purging, consuming diuretics, etc.) after a drinking episode occurs. Thus, those who tend to binge drink regularly, may begin to repeatedly perform hyper-evaluation of their physical appearance or weight, which has the potential to develop into a viscous cycle of engaging in compensatory behaviors prior to, and/or after consuming alcohol. In a study by Barry et al. (2012), engaging in higher amounts of PA and disordered eating behaviors were both strong predictors of higher rates of binge drinking in college students. Findings from another study on college students provided support for a link between vigorous PA and HED, and motives for weight management were shown to be a mediator, but they did not find this relationship among moderate PA and drinking. Motives related to feelings of shame and guilt did not mediate either relationship (Dodge et al., 2018). Furthermore, the literature assessing the PA and drinking link among younger populations, specifically college students, suggests that the presence of similar problematic compensatory health behaviors in addition to PA, as well as motives and

ideals related to visually appealing physical health markers, to all be associated with higher rates of AC.

Expanding on these ideas, Wilkerson et al. (2017) examined the behaviors of weight conscious drinking (BWCD) in full-time undergraduate students. While exercise amount and intensity did not predict these types of behaviors, subjects who were members of a fraternity or sorority, or who had intentions to lose weight reported higher levels of BWCDs such as binge drinking, excessive PA, and eating restrictions (Wilkerson et al., 2017). In a sample of over 26,000 college students, an overall positive link between PA and drinking existed for only males. Although, for those students (both male and female), who worked out for the purpose of weight loss, and/or engaged in more weight loss behaviors (dieting, purging, abusing laxatives or diuretics, etc.), a positive relationship between PA and drinking was found (Barry et al., 2013). Interestingly, college aged women who tend to engage in compensatory PA also seem to endorse more drinking and exercise motives (drink larger quantities of alcohol, more bingeing, more problems related to alcohol, more motivated to drink, and are more motivated to exercise, engage in more PA, more body image issues, and more dietary restraint), but drink no more often than those women who do not engage in compensatory PA (Buchholz & Crowther, 2014). In addition to body image and weight management motives, some individuals also tend to engage in compensatory behaviors prior to drinking, to speed up, and/or increase the effects of alcohol (Bryant et al. 2012).

Alcohol Consumption, Physical Activity, and College Student Development.

The transitional period from adolescence into adulthood is a life stage at which strong habits are formed and established and pave the way for not only lifelong social and behavioral trajectories, but also health outcomes (Barnett et al., 2014; Bigelow et al., 2014). Two common behavioral health alterations that commonly take place during the college years is an increase in the consumption of alcohol and a decrease in exercise (Nelson et al., 2009; Weinstock et al., 2016).The change in these health behaviors is problematic not only for long-term future health outcomes, but heavy drinking among college students poses risks for several immediate repercussions such as violence, unplanned sex, mental health disturbance, and in extreme cases injury, death or even suicide (Nelson et al., 2009; White & Hingson 2013). Of focus to the current study are disordered eating behaviors, which are also generally known to be prevalent among college students. In a large multi-campus study of college freshmen, Castañeda et al. (2019) found that participants who reported more weight consciousness and/or engaged in more dietary restraint and exercise, were also more likely to engage in more frequent binge drinking. The presence of these co-occurring health behaviors in this sample of college students is indicative of "Drunkorexia," because it illuminates the combination of elevated alcohol use in conjunction with compensatory PA and eating behaviors. While the literature on "Drunkorexia" has made progress in assessing if and why these combinations of maladaptive health behaviors seem to co-occur in college students, there is further work to be done in identifying the underlying mechanisms that contribute to, and account for the complex relationship among them.

Present Study

Given the literature indicates factors related to "Drunkorexia" may serve as potential contributors for the existence of a positive link between PA and drinking among emerging/young adults, the current study strived to further understand the relations among PA, compensatory eating and behaviors, exercise motives related to appearance and weight management, and AC among a sample of college students from two Southeastern Texas Universities. While a limited number of recent studies examining "Drunkorexia" have been published, fewer have explored the specific role it may play in the association between PA and AC (Barry et al., 2012). Prior work in this area has primarily examined prevalence rates among specific populations and implications (Burke et al., 2010; Choquette et al., 2018; Gorrell et al., 2018; Lupi et al., 2017; Thompson-Memmer et al., 2019); how factors related to "Drunkorexia," relate to problematic AC without considering PA (Knight et al., 2017; Roosen & Mills, 2015; Ward et al., 2015; Youre, 2015); or how "Drunkorexia" factors relate specifically to varying levels of disordered eating thoughts/behaviors (Hill et al., 2019; Hunt & Forbush, 2016). Further, while some studies have taken the influence of exercise motives into account while assessing the presence of "Drunkorexia," (Eisenberg & Fitz, 2014; Hansen, 2017; Pompili & Laghi, 2018; Wilkerson et al., 2017) examination of both the potential influence of "Drunkorexia" related behaviors/symptoms and exercise motives together, was thought to potentially enhance knowledge regarding potential mechanisms underlying the association between PA and AC.

Furthermore, the present study specifically strived to better understand the potential influence (i.e., moderation) compensatory eating and behaviors posed on the

relationship between PA and AC, as well as whether exercise motives for weight management and appearance—which also may be associated with "Drunkorexic" behaviors (e.g., dietary restriction, excessive or compensatory exercise, skipping meals, purging, consuming diuretics, etc.) —would influence (i.e., moderated moderation) the degree to which compensatory eating and behaviors moderate the presence of this link in a college student population. This study focused on three specific hypotheses. First, it was predicted there would be a positive association between average weekly PA and monthly AC. This prediction was based on the consensus for the existence of a positive association between PA and drinking (Barry and Piazza, 2010; Dodge et al., 2017; French et al., 2009;). Secondly, higher scores on compensatory eating and behaviors were hypothesized to moderate the relationship between PA and AC, such that college students who reported higher levels of these compensatory behaviors would report stronger positive associations between PA and AC. Lastly, higher scores on weight management and appearance exercise motives were expected to moderate the influence that compensatory behaviors would have on the relationship between PA and AC, such that college students who endorsed higher levels of these exercise motives would also report higher levels of compensatory behaviors, and thus stronger associations between their PA and AC. Additionally, biological sex, race/ethnicity, age, and place of residence were considered as prospective covariates. These factors were shown to possess the potential to influence AC behaviors throughout the alcohol use literature, (Baer, et al., 1991; Barnett et al., 2014; Barry & Piazza-Gardner, 2012), and further, previous studies examining similar hypotheses have controlled for these selected factors (Barry & Piazza-Gardner, 2012; Castañeda et al. 2019; Niedermeier et al., 2018). Age was considered

because of the influence it poses on the accessibility of alcohol in the U.S. All data for the present study was obtained via an archival dataset from a previous study conducted by Sam Houston State University (SHSU) in collaboration with the University of Houston (The U of H) throughout the 2017-2018 academic school year (Henderson et al., 2021).

CHAPTER II

Method

Participants

Participants were college students attending either The U of H, or SHSU (*n* = 1691), during the 2017-2018 academic school year. To qualify for enrollment in the study, students had to (1) be between the ages of 18-25 years old, (2) report engaging in at least moderate PA for at least 30 minutes on average per week, and (3) report experiencing a hangover at least once in the past three months. The sample was 78.8% female. Ethnically, the sample was 32% Hispanic/Latino. In terms of racial make-up, the sample was 64.5 % White-Hispanic, 20.9% Black-African American, 6.6% Asian, 3.9% Multi-Ethnic, 2.9% Other, .9% Native American or American Indian and .4% Native Hawaiian-Pacific Islander.

Procedure

Participants were recruited through their respective university research system at both The U of H and SHSU, and completed the measures described below via a Qualtrics survey. The survey took students approximately 40 minutes. Participants who completed the study were compensated in the form of a research participation credit. The procedures carried out in this study received prior approval from each of the Universities' respective Institutional Review Boards (IRBs).

Measures

Physical Activity. PA was measured by the International Physical Activity Questionnaire (IPAQ; Hagströmer et al., 2006). The IPAQ is a self-report PA measure comprising 27-items, and assesses frequency (days per week), and duration (minutes per

day), of walking, moderate PA, and vigorous PA over the past week, by considering activities and behaviors encompassing transportation, work, housework, and leisure/recreation. The weekly averages for time spent engaging in each of the three PA types was summed and a total combined score for all three PA behaviors was computed for each subject. Scoring for the total average metabolic equivalent task (MET) was computed into average time per week in minutes and were completed using the Compendium of PA and IPAQ scoring guidelines (http://www.ipaq.ki.se). This tool multiplies the product of the frequency and duration of the specified activity by its appropriate MET energy expenditure estimate (Craig et al., 2003). The IPAQ possesses acceptable reliability (pooled $\rho = 0.81$, 95% CI 0.79–0.82) and criterion validity (pooled $\rho = 0.33$, 95% CI 0.26–0.39) relative to other validations studies on self-report measures (Craig et al., 2003).

Compensatory Eating and Behaviors. The Compensatory Eating and Behaviors in Response to Alcohol Consumption Scale (CEBRACS; Rahal et al., 2012) was developed to provide for the assessment of an individual's tendencies to engage in compensatory and restrictive sorts of eating/exercise behaviors before, during and/or after drinking alcohol to either offset the calories one takes in through alcohol, or to speed up/increase the psychoactive effects related to drinking alcohol. The CEBRACS is a 21-item self-report Likert scale that ranges from (1) Never to (5) Almost all the time. It has four subscales that assess the varying levels of subjects' different types of compensatory attitudes and behaviors including: 1) a desire to speed up and/or exacerbate the degree of the effects of alcohol, 2) bulimia, 3) diet and exercise, and 4) dietary restriction. Total scores for each of these four different subscales were calculated respectively. The

CEBRACS has demonstrated strong overall reliability in previous studies (a = .89), with each of the subscales' Cronbach alpha values ranging from (a = .79) to (a = .95) (Rahal et al., 2012). Pinna et al. (2015) also indicated strong internal consistency validity (a = .89), and the scale also has been shown to possess strong discriminant validity (r = .02, p > .05) with respect to beliefs in a just world (Lipkus, 2001), and adequate convergent validity with the Eating Disorder Inventory-2 (EDI-2; Garner, 1991) subscales: body dissatisfaction (r = .20, p < .01), Drive for Thinness (r = .41 p < .01), and bulimia symptoms (r = .43, p < .01) (Rahal et al., 2012).

Exercise Motives. The Exercise Motives Inventory revised (EMI-2; Markland & Ingledew, 1997) is a 51-item self-report Likert scale that ranges from (0) not at all true for me to (5) very true for me. It is composed of 14 total subscales. The EMI-2 has been validated specifically for use with college student populations (Kim & Cho, 2020). The two subscales used in the present study are weight management and appearance, as these are the most closely related to compensatory behaviors. These subscales have demonstrated strong internal consistency in previous validation studies: weight management (a = .914) and appearance (a = .859) (Markland & Ingledew, 1997). In addition, they both indicated high levels of discriminant validity from the other 12 subscales on the EIM-2, and each other, except for minimal instances of high respective correlations. The correlations that were particularly high, were those between the positive health subscale and weight management (r = .585, p < .05), and with the challenge (r = .584, p < .05) and positive health (r = .714, p < .05) subscales for appearance (Markland & Ingledew, 1997).

Alcohol Consumption. The Timeline Followback (TLFB; Sobell & Sobell, 1992) is a retrospective self-report measure used to evaluate several behaviors. A standard drink was defined for the subjects, and they were shown visuals of marked drinking glasses for each type of alcohol (see Appendix D). They were then provided with an electronic calendar and reported their drinking behaviors over the previous 30 days. There were separate fields to indicate both the quantity of alcohol participants drank, the duration of time they spent drinking on each given day over the previous month, and the number of hangovers they experienced. AC was then calculated and scored as total drinks consumed in the past month for each participant. The TLFB provides more than acceptable levels of test-retest-reliability and validity when evaluating AC and other health related behaviors among various populations, (Panza et al., 2012; Sobell & Sobell, 1992, 1996; Weinstock et al., 2014). Specifically, the TLFB has shown strong test-retest reliability for college students when reporting drinking for 30 days with Cronbach's alpha values ranging from (a = .92) to (a = .96) (Sobell & Sobell, 1992). The TLFB has also shown moderate, but expected and acceptable levels of concurrent validity (r = .52, p < .01) with the Alcohol Dependence Scale when assessing mean drinks per day (ADS; Skinner & Barbara, 1982; Sobell & Sobell, 1992).

Covariates. Four covariates will be considered during the analysis procedures, because of their potential influence on alcohol use: biological sex, race/ethnicity, age, and residence. Biological sex response categories were coded as "missing," "male," or "female." Race/ethnicity response categories included White-non-Hispanic, Hispanic, Black-African American, Asian, Multi-Ethnic, Other, Native American-American Indian and Native Hawaiian-Pacific Islander. Residence was asked as "Where are you living this

semester?" Response categories for residence were coded as "missing," "residence hall/dorm," "off-campus apartment, apartment, or house," and "with parents".

Data Analytic Plan

Descriptive statistics were calculated for demographic and background characteristics. Bivariate correlations were computed for the previously discussed covariates (i.e., biological sex, race/ethnicity, age, and place of residence) that were anticipated to potentially influence analytic outcomes. It was specified that if these potential covariates did not adequately relate to AC, (correlate to a degree of approximately $r \geq .3$) they would be deemed insufficient in contribution, and therefore be removed from subsequent analytic procedures.

Multiple regression analyses were performed to address the primary research questions. Therefore, prior to conducting multiple regression analytic procedures, the four regression assumptions (i.e., linearity, homoscedasticity, independence, and normality; see pages 88-91 in Darlington & Hayes (2017) for in depth descriptions of these four assumptions for making proper inferences when using statistical analyses with regression models) were all assessed. Exploratory analytic methods were employed, such as examining histograms and other diagnostic tests incorporated in the SPSS software to evaluate the assumptions. It was decided if assumptions were violated, removing outliers (both univariate and bivariate outliers were examined) and transforming variables to diminish the impact of violations would be considered. Multiple imputation procedures were considered, but there was not a substantial amount of missing data. After preliminary analyses for assumption testing were completed, it was decided an

exploratory factor analysis (EFA) with the 21 items from the CEBRACS measure would be conducted. Rationale and details are further discussed in the results section.

To evaluate the previously stated hypotheses, a moderated moderation model was conducted. The association between PA and AC dependent on the level to which individuals endorse compensatory eating and behaviors related to their AC and exercise motives related to weight management and appearance were examined. Specifically, PROCESS Macro (Darlington & Hayes 2017; Hayes, 2013) was used to examine relations between self-reported PA (independent variable or *X*), one's level of compensatory eating/behaviors (primary moderator or *M*), exercise motives (secondary moderator or *W*), and self-reported AC (dependent variable or *Y*) in a college student population; see Figure 1. Main effects (X → Y), two-way interactions (X*M → Y), and three-way interactions of self-reported PA (*X*), compensatory eating/behaviors (*M*), and exercise motives (*W*) on predicting self-reported AC by college students (*Y*) were tested.

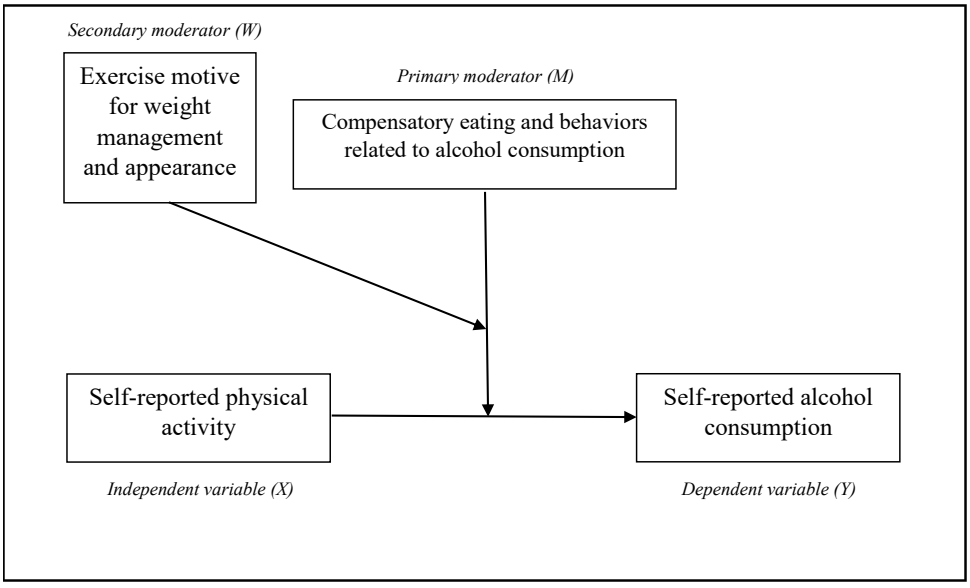

Figure 1. The moderated moderation model illustrated in the form of a conceptual diagram.

CHAPTER III

Results

Preliminary Analyses and Assumption Testing

All the following analyses were completed using SPSS IBM Statistics version 25 and the PROCESS macro add-on developed by Darlington & Hayes (2017). This is a downloadable SPSS add-on regression feature designed to streamline the analyses process when testing for more complex effects between predictors within multiple linear regression models (e.g., mediation, moderation, three-way interactions, etc.). Using the previously mentioned archival data set, a bivariate correlation was conducted to assess the relationship between college students' PA and AC (Hypothesis 1), and seven total multiple linear regression models (e.g., one for each of the four subscales of the CEBRACS and one for each of the three EFA loadings derived from the CEBRACS) to assess the influence compensatory behaviors related to AC may have on the association between PA and AC (Hypothesis 2). Lastly, two more multiple linear regression models were conducted to determine whether or not endorsing exercise motives of weight management and appearance served to affect the influence one's level of compensatory behaviors had on the association between these two health behaviors (Hypothesis 3). Participants who did not report data for any of the predictor variables and/or the AC variable were excluded from all analyses, leaving approximately 1150 participants (depending on the specific hypothesis) to be included in hypothesis testing. Only two models were produced and examined to test Hypothesis 3, because only one of the seven models tested under Hypothesis 2 was statistically significant.

Table 1

Summary of Descriptive Statistics

Measure	*N*	Min	Max	*M*	*SD*
Alcohol Consumption	1666	0	232	21.45	23.14
Physical Activity	1150	0	23220	4179.23	3093.08
CEBRACS 1	1675	4	35	10.57	5.43
CEBRACS 2	1675	1	30	7.20	3.28
CEBRACS 3	1675	1	30	10.25	4.80
CEBRACS 4	1675	1	10	2.76	1.43
Bulimia and Restriction	1654	6	30	7.28	3.35
Alcohol Effects and Restriction	1643	8	40	12.09	6.07
Diet and Exercise	1650	6	30	10.27	4.81
EMI 1	1669	1	6	4.61	1.36
EMI 2	1668	1	6	4.55	1.17

Note. AC = average drinks per month. PA = MET minutes per week for walking, moderate PA, and vigorous PA. CEBRACS 1 = alcohol effects subscale. CEBRACS 2 = bulimia subscale. CEBRACS 3 = diet and exercise subscale. CEBRACS 4 = dietary restriction subscale. The Bulimia and Restriction, Alcohol Effects and Restriction and Diet and Exercise measures are the three factor loadings that emerged from the EFA. EMI 1 = weight management subscale. EMI 2 = appearance subscale.

Preliminary analyses were conducted prior to hypothesis testing to evaluate statistical assumptions, consider covariates to potentially include in the model, and examine descriptive statistics. See Table 1 for a summary of descriptive statistics.

After observing moderate-to-high correlations (ranging from r = .39 - .66) values for associations between the four subscales of the CEBRACS (Rahal et al., 2012), there was reason to believe a simpler solution may be more appropriate for the sample (see Table 2). Therefore, an EFA was conducted with the 21 items from the CEBRACS measure. Figure 2 displays a scree plot from the EFA output. Examination of the plot suggested a three-factor structure based on when the elbow occurred in the plot. Specifically, the elbow occurred at the value of three, which indicated this is where the eigenvalues appeared to taper off, and the three factors to the left of the elbow were therefore retained as meaningful. Table 3 displays the pattern coefficients for the three-factor solution. The factor scores were calculated by summing each of the individual CEBRACS item response scores shown to load on each of the three respective factors (see Appendix B for the specific items comprising these factors). To simplify the results reported below, these factors will be referred to as Bulimia and Restriction, Alcohol Effects and Restriction, and Diet and Exercise respectively. The Bulimia and Restriction factor contained all items from the CEBRACS Bulimia subscale and one of the two Restriction subscale items. The Alcohol Effects and Restriction factor contained all items from the CEBRACS Alcohol Effects subscale and the other one of the two Restriction subscale items. Lastly, the Diet and Exercise factor was identical to the Diet and Exercise subscale of the CEBRACS (Rahal et al., 2012). For the regression analyses reported

below, models for each of the CEBRACS subscales along with the three factors derived from the EFA results were examined.

Table 2

CEBRACS Subscale Correlations

Subscale Name		Alcohol Effects	Bulimia	Diet and Exercise	Dietary Restriction
Alcohol Effects	*r*	1	.578**	.489**	.699**
	p		.000	.000	.000
	N	1675	1675	1675	1675
Bulimia	*r*	.578**	1	.523**	.710**
	p	.000		.000	.000
	N	1675	1675	1675	1675
Diet and Exercise	*r*	.489**	.523**	1	.642**
	p	.000	.000		.000
	N	1675	1675	1675	1675
Dietary Restriction	*r*	.699**	.710**	.642**	1
	p	.000	.000	.000	
	N	1675	1675	1675	1675

Note. *. Correlation is significant at the 0.01 level (2-tailed). **. Correlation is significant at the 0.05 level (2-tailed).

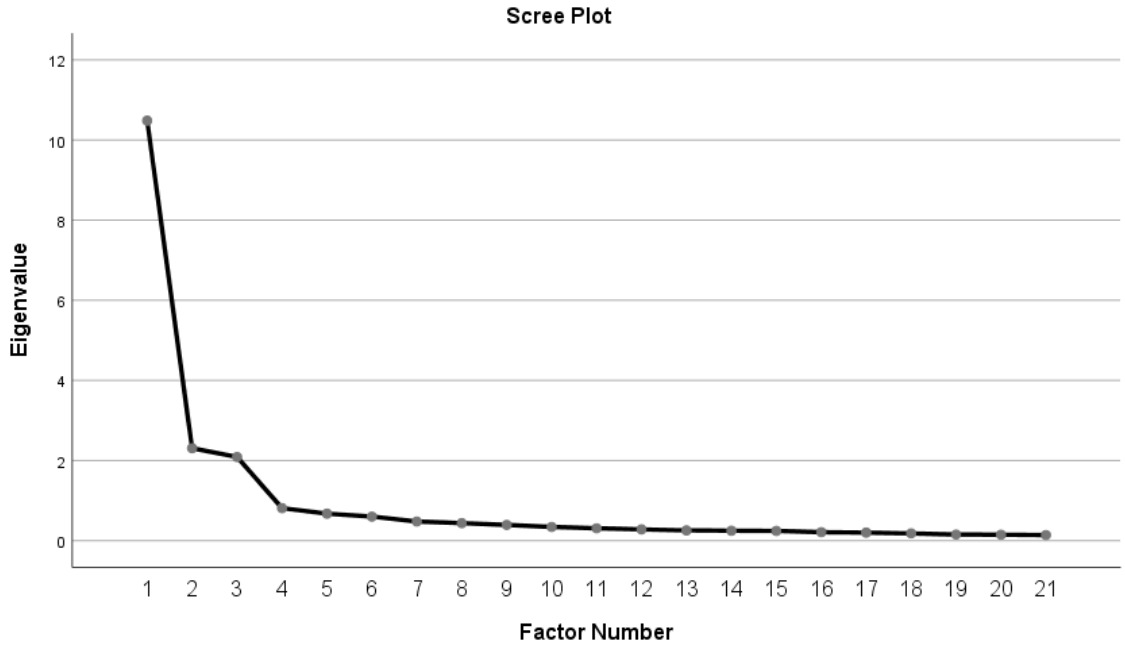

Figure 2. Scree Plot for CEBRACS EFA.

Table 3

Pattern Matrix for CEBRACS EFA

Item Number	Factor		
	Bulimia and Restriction	Alcohol Effects and Restriction	Diet and Exercise
CEBRACS Q 17	**0.94**	0.08	0.01
CEBRACS Q 15	**0.91**	0.07	-0.01
CEBRACS Q 13	**0.90**	-0.01	-0.03
CEBRACS Q 8	**0.86**	-0.03	-0.03
CEBRACS Q 5	**0.80**	-0.04	-0.01

(continued)

Item Number	Factor		
	Bulimia and Restriction	Alcohol Effects and Restriction	Diet and Exercise
CEBRACS Q 21	**0.60**	-0.15	0.17
CEBRACS Q 19	**0.55**	-0.11	0.14
CEBRACS Q 7	-0.06	**-0.91**	0.00
CEBRACS Q 12	0.00	**-0.87**	0.03
CEBRACS Q 3	-0.08	**-0.87**	0.06
CEBRACS Q 6	0.09	**-0.84**	-0.04
CEBRACS Q 1	-0.08	**-0.82**	0.01
CEBRACS Q 9	0.12	**-0.79**	-0.04
CEBRACS Q 14	0.19	**-0.74**	-0.08
CEBRACS Q 4	0.08	**-0.48**	0.34
CEBRACS Q 16	0.02	0.02	**0.83**
CEBRACS Q 18	-0.04	0.10	**0.81**
CEBRACS Q 11	0.00	0.01	**0.68**
CEBRACS Q 10	0.13	-0.09	**0.66**
CEBRACS Q 2	-0.01	-0.05	**0.60**

(continued)

Item Number	Factor		
	Bulimia and Restriction	Alcohol Effects and Restriction	Diet and Exercise
CEBRACS Q 20	0.15	-0.23	**0.56**

Note. See Appendix B for CEBRACS item content. Bold numbers indicate the items comprising each factor.

Frequency tables and boxplots revealed outliers were present for the TLFB AC data. A Winsor correction was performed on the TLFB data, which entails placing an upper limit on the acceptable values for the scale and setting all exceeding values to that threshold (Blaine, 2018). For the upper limit, the same value used in the parent study (e.g., 60 drinks per week; Henderson et al., 2021) was selected and multiplied by four to convert it into the correct metric for the current study (number of drinks consumed in one month). Tests of statistical assumptions indicated that the assumptions of multiple regression were satisfied following the Winsorizing procedure discussed above for AC. The assumptions were mostly satisfied before following the Winsorizing procedures, with the exceptions the nonnormality of the AC distribution, which was corrected through Winsorizing (Blaine, 2018).

Lastly, bivariate correlations between the prospective covariates (age, biological sex, race/ethnicity, and residence type) and AC were conducted in order to test for significant covariates. All correlations between potential covariates and criterion variables suggested negligible to small associations (all were 0.15 or smaller), and therefore none were included when testing the study hypotheses.

Hypotheses Testing

Hypothesis 1 was tested by examining a bivariate correlation between PA and AC. Results indicated a small but statistically significant positive association between PA and AC (r = .095, df = 1143, p = .001).

To test Hypothesis 2, seven multiple linear regression models were produced using the PROCESS Macro add-on feature within SPSS (Darlington & Hayes 2017; Hayes, 2013). The seven models corresponded to the four established CEBRACS subscales (Rahal et al., 2012), and the three Factors described above. Overall, only one of the seven models showed a significant two-way interaction between PA and a type of compensatory behavior. Specifically, results indicated a statistically significant interaction between PA and Alcohol Effects and Restriction scores on AC [b < .-001, t(1120) = -2.15, p = .032]. Figure 3 displays a graph of the significant interaction. As shown in Figure 3, although college students who engaged in more preparatory behaviors designed to enhance alcohol effects (speed up/exacerbate) drank more overall, this relation was dampened by PA. In addition, both main effects comprising the interaction were also statistically significant. PA was positively associated with AC [b = .001, t(1120) = 2.51, p = .01], as were Alcohol Effects and Restriction factor scores [b = .711, t(1120) = 6.30, p < .001]. In other words, students who reported higher levels of PA and/or preparatory behaviors designed to enhance alcohol effects, also reported higher AC. Results for each of the six nonsignificant models are included in Table 4.

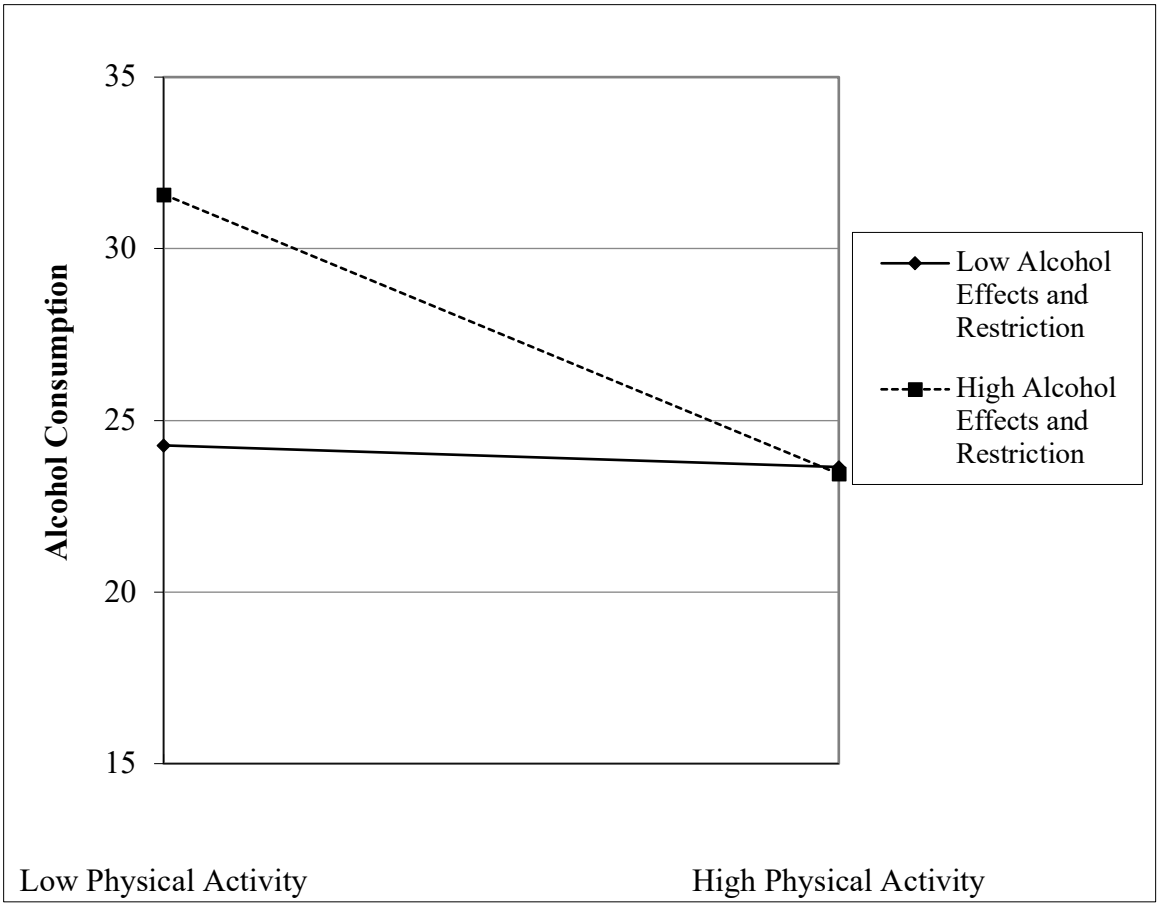

Figure 3. Chart of significant two-way interaction between physical activity and engaging in preparatory food restriction prior to drinking to speed up/exacerbate alcohol effects in predicting college student alcohol consumption levels. Physical activity = total MET minutes per week. Alcohol consumption = average number of drinks per month. Alcohol Effects and Restriction = second subscale derived from CEBRACS EFA.

Table 4

Table of Nonsignificant Findings from Regression Models Used to Test Hypothesis 2

Subscale	*b*	*t*	*df*	*p*
Alcohol Effects	< -.001	-1.88	1139	.06
Bulimia	< .001	.24	1139	.81

(continued)

Subscale	*b*	*t*	*df*	*p*
Diet and Exercise	< .001	.52	1139	.6
Dietary Restriction	< .001	.098	1139	.92
Bulimia and Restriction	< .001	.14	1125	.89
Diet and Exercise	< .001	.511	1125	.61

Note. Statistics in this table include the six multiple regression models from Hypothesis 2 analysis testing that did not produce significant interactions with physical activity.

Lastly, three-way interaction effects between the weight management and appearance subscales of the EMI-2 (Markland & Ingledew, 1997), the Alcohol Effects and Restriction factor, and PA, in their associations with AC were examined. The Alcohol Effects and Restriction subscale was the only subscale included in three-way interaction testing because it was the only measure that significantly moderated the positive correlation between PA/AC during Hypothesis 2 data analyses. Results showed the third confirmatory hypothesis was not supported. Specifically, there was not a significant three-way interaction between weight management related exercise motive scores, engaging in preparatory behaviors to get drunker faster and PA in predicting AC [$b < .001$, $t(1112) = 0.18$, $p = .86$], nor was there between appearance related exercise motive scores, engaging in preparatory behaviors to get drunker faster and PA in predicting AC [$b < .001$, $t(1112) = 0.13$, $p = .89$].

CHAPTER IV

Discussion

This study examined the relationship between college students' self-reported PA and AC; interactions between PA and AC-related compensatory behaviors on AC; and those interactions moderated by exercise motives. The analyses were conducted on previously collected data for a study examining joint motives for exercise and alcohol use among a sample of college student participants (Henderson et al., 2021). Main findings are summarized below.

Consistent with the existing literature (Barry and Piazza, 2010; Barry & Piazza-Gardner, 2012; Dodge et al., 2017; Dodge, & Clarke, 2018; French et al., 2009; Musselman & Rutledge, 2010), results showed a statistically significant positive correlation between PA and AC. Further, there was a statistically significant two-way interaction effect between PA and a factor analytically derived scale indexing preparatory behaviors designed to speed up/exacerbate alcohol effects in predicting AC. Results indicated that levels of PA dampened a generally positive association between eating less/skipping meals prior to drinking and the amount of alcohol consumed. Conversely, those students who endorsed engaging higher rates of these compensatory behaviors prior to AC and lower levels of PA reported higher levels of AC.

The finding that PA diminishes an otherwise positive association between preparatory behaviors designed to speed up/exacerbate alcohol effects and AC suggests important implications for programming for college students. That is, universities may make efforts to curb students' drinking by promoting and encouraging PA more prevalently/effectively on their campuses, particularly among populations that tend to

engage in alcohol-related preparatory/compensatory behaviors such as students with eating disordered beliefs/behaviors, generally heavy/binge drinkers such as members of Greek organizations, and students who are over preoccupied with achieving thin ideals and/or exercising for weight management purposes (Abrantes et al., 2017; Barry et al., 2012; 2013; Buscemi, et al., 2011; Reilly et al. 2016; Wilkerson et al., 2017). Previous research suggests that student exercise behaviors can be increased by incentivizing engagement with contingency management and/or by employing motivational interviewing/motivational enhancement training techniques (Weinstock et al. 2014; 2016; 2019). Finally, Oswald et al. (2020) suggested that educational programming can also be effectively used to decrease "Drunkorexic" behaviors. Such efforts may be employed to diminish the prevalence of preparatory behaviors designed to speed up/exacerbate alcohol effects.

Preparatory behaviors designed to speed up/exacerbate alcohol effects and PA did not further interact with exercise motives in their relation to AC. While this finding was not significant, this may be because previous findings in the literature tend to assess direct influences of weight management motives and desires to be thinner on variation in compensatory behaviors. The current study instead assessed them in the context of their interacting with other variables, specifically PA and preparatory behaviors designed to speed up/exacerbate alcohol effects. For instance, similar studies have linked heavy drinking and strong weight control motives to a high risk for "Drunkorexia" (Eisenberg & Fitz 2014), linked HED to vigorous PA and found weight management motives mediated this relation (Dodge & Clark 2018), and have shown stronger exercise motives for weight loss to correlate with elevated AC rates and alcohol related compensatory

behaviors in both genders (Barry et al. 2013; Reilly et al. 2016; Wilkerson et al., 2017). Therefore, if this study would have examined the relationship between exercise motives (for weight management and appearance purposes) and compensatory behaviors related to AC, rather than examining these motives as mechanisms underlying the PA/AC link, it is possible present findings may have been more similar to those discussed.

There were several limitations in this study that are worth mentioning. Firstly, ideal models for researching the questions in ways the previous literature advised future studies could not be constructed because the parent study used a cross-sectional design, which prevented examination of the temporal sequencing of PA and AC behaviors (i.e., if people tend to exercise before drinking to prepare, or after drinking to compensate). Examining such sequencing would require a longitudinal study design. Secondly, the sample was entirely composed of 18–25-year-old predominantly female college students located in a similar geographic area. Therefore, one should be careful about generalizing these findings to populations other than young/emerging adults, students attending colleges in other regions of the U.S, and biological males. In addition, the parent study did not collect data related to socioeconomic status (SES), which may have influenced the PA/AC relation. Lastly, all measures used were self-report measures, and both the PA and AC measures assessed behavior retrospectively. Therefore, findings are subject to response biases and inaccurate reporting due to difficulty/inability to accurately remember health behaviors certainly may have occurred. While several limitations were present in this study, there were also some strengths. Specifically, the total sample of college students used was large (n = 1691), participants were ethnically diverse, and the

sample comprised students from two universities, one located in an urban environment, and the other in an exurban one.

In conclusion, the present study found a statistically significant positive correlation between PA/AC. It also examined whether several types of compensatory behaviors related to AC and/or exercise motives related to weight management and appearance would help explain the link between these two health behaviors. Overall, engaging in preparatory behaviors designed to speed up/exacerbate alcohol effects interacted with PA, which predicted higher levels of AC. Interestingly, for college students who were higher on these preparatory behaviors, engaging in more PA dampened their AC. Future studies in this area of health behaviors research should further examine engagement in "Drunkorexic" types eating and exercise behaviors as potential underlying and/or explanatory factors of the PA/AC relation for different types of PA (i.e., sedentary, walking, moderate, and vigorous), and attempt to determine the temporal sequencing of these two health behaviors (i.e., if people tend to exercise before drinking to prepare, or after drinking to compensate). Continued investigation aimed at identification of alternative underlying factors and mechanisms contributing to the explanation for the existence and strength of the PA/AC relationship would also serve to advance knowledge within the health behaviors literature.

REFERENCES

Abrantes, A. M., Scalco, M. D., O'Donnell, S., Minami, H., & Read, J. P. (2017). Drinking and exercise behaviors among college students: Between and within-person associations. *Journal of Behavioral Medicine*, *40*(6), 964–977. https://doi-org.ezproxy.shsu.edu/10.1007/s10865-017-9863-x

Baer, J. S., Stacy, A., & Larimer, M. (1991). Biases in the perception of drinking norms among college students. *Journal of Studies on Alcohol*, *52*(6), 580–586.

Barnett, N. P., Ott, M. Q., Rogers, M. L., Loxley, M., Linkletter, C., & Clark, M. A. (2014). Peer associations for substance use and exercise in a college student social network. *Health Psychology*, *33*(10), 1134–1142. https://doi-org.ezproxy.shsu.edu/10.1037/a0034687

Barry, A. E., & Piazza, A. K. (2010). Should exercise be promoted as on effective intervention strategy to off-set excessive college student drinking? *Journal of American College Health*, *59*(3), 139–140. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2010.510164

Barry, A. E., & Piazza-Gardner, A. K. (2012). Drunkorexia: Understanding the co-occurrence of alcohol consumption and eating/exercise weight management behaviors. *Journal of American College Health*, *60*(3), 236–243. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2011.587487

Barry, A. E., Whiteman, S., Piazza-Gardner, A. K., & Jensen, A. C. (2013). Gender differences in the associations among body mass index, weight loss, exercise, and drinking among college students. *Journal of American College Health*, *61*(7), 407–413. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2013.823973

Bedendo, A., & Noto, A. R. (2015). Sports practices related to alcohol and tobacco use among high school students. *Revista Brasileira de Psiquiatria*, *37*(2), 99–105. http://search.ebscohost.com.ezproxy.shsu.edu/login.aspx?direct=true&db=psyh&AN=2016-22013-003&site=ehost-live&scope=site

Bigelow, A., Villarruel, A., & Ronis, D. L. (2014). The relationship of alcohol use and physical activity from an ecologic perspective. *Journal for Specialists in Pediatric Nursing*, *19*(1), 28–38. https://doi-org.ezproxy.shsu.edu/10.1111/jspn.12044

Blaine, B. E. (2018). Winsorizing. *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation*, 1817.

Bouchery, E. E., Harwood, H. J., Sacks, J. J., Simon, C. J., & Brewer, R. D. (2013). Correction: "Economic costs of excessive alcohol consumption in the US, 2006." *American Journal of Preventive Medicine*, *44*(2), 198. https://doi-org.ezproxy.shsu.edu/10.1016/j.amepre.2012.12.003

Bryant, J. B., Darkes, J., & Rahal, C. (2012). College students' compensatory eating and behaviors in response to alcohol consumption. *Journal of American College Health*, *60*(5), 350–356. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2011.630702

Buchholz, L. J., & Crowther, J. H. (2014). Women who use exercise as a compensatory behavior: How do they differ from those who do not? *Psychology of Sport and Exercise*, *15*(6), 668–674. https://doi-org.ezproxy.shsu.edu/10.1016/j.psychsport.2014.06.010

Burke, S. C., Cremeens, J., Vail-Smith, K., & Woolsey, C. (2010). Drunkorexia: Calorie restriction prior to alcohol consumption among college freshman. *Journal of Alcohol and Drug Education*, *54*(2), 17–34.

Buscemi, J., Martens, M. P., Murphy, J. G., Yurasek, A. M., & Smith, A. E. (2011). Moderators of the relationship between physical activity and alcohol consumption in college students. *Journal of American College Health*, *59*(6), 503–509. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2010.518326

Castañeda, G., Colby, S. E., Barnett, T. E., Olfert, M. D., Zhou, W., Leite, W. L., … Mathews, A. E. (2019). Examining the effect of weight conscious drinking on binge drinking frequency among college freshmen. *Journal of American College Health*. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2019.1642204

Centers for Medicare & Medicaid Services. (2013, January 9). NHE fact sheet. Retrieved from http://www.cms.gov/Research-Statistics-Dataand-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/ NHE-Fact-Sheet.html

Choquette, E. M., Ordaz, D. L., Melioli, T., Delage, B., Chabrol, H., Rodgers, R., & Thompson, J. K. (2018). Food and alcohol disturbance (FAD) in the US and France: Nationality and gender effects and relations to drive for thinness and alcohol use. *Eating Behaviors*, *31*, 113–119. https://doi-org.ezproxy.shsu.edu/10.1016/j.eatbeh.2018.09.002

Conroy, D. E., Ram, N., Pincus, A. L., Coffman, D. L., Lorek, A. E., Rebar, A. L., & Roche, M. J. (2015). Daily physical activity and alcohol use across the adult lifespan. *Health Psychology*, *34*(6), 653–660. https://doi-org.ezproxy.shsu.edu/10.1037/hea0000157

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., ... & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine & science in sports & exercise*, *35*(8), 1381-1395.

Darlington, R. B., & Hayes, A. F. (2017). *Regression analysis and linear models: Concepts, applications, and implementation,* 88-91, 581-601. Guilford Publications.

Dodge, T., Clarke, P., & Dwan, R. (2017). The relationship between physical activity and alcohol use among adults in the United States: A systematic review of the literature. *American Journal of Health Promotion*, *31*(2), 97–108. https://doi-org.ezproxy.shsu.edu/10.1177/0890117116664710

Dodge, T., & Clarke, P. (2018). Testing weight motives and guilt/shame as mediators of the relationship between alcohol use and PA. *Addictive Behaviors*, *77*, 131–136. https://doi-org.ezproxy.shsu.edu/10.1016/j.addbeh.2017.09.018

Eisenberg, M. H., & Fitz, C. C. (2014). "Drunkorexia": Exploring the who and why of a disturbing trend in college students' eating and drinking behaviors. *Journal of American College Health*, *62*(8), 570–577. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2014.947991

French, M. T., Popovici, I., & Maclean, J. C. (2009). Do alcohol consumers exercise more? Findings from a national survey. *American Journal of Health Promotion*, *24*(1), 2–10. https://doi-org.ezproxy.shsu.edu/10.4278/ajhp.0801104

Garner, D. M. (1991). *Eating disorder inventory-3: Professional manual.* Odessa, FL: Psychological Assessment Resources

Gorrell, S., Walker, D. C., Anderson, D. A., & Boswell, J. F. (2018). Gender differences in relations between alcohol-related compensatory behavior and eating pathology. *Eating and Weight Disorders*. https://doi-org.ezproxy.shsu.edu/10.1007/s40519-018-0545-7

Hagströmer, M., Oja, P., & Sjöström, M. (2006). The International Physical Activity Questionnaire (IPAQ): a study of concurrent and construct validity. *Public health nutrition*, *9*(6), 755-762.

Hansen, J. (2017). *Drunkorexia: Normative behavior or gateway to alcohol and eating pathology? Dissertation Abstracts International: Section B: The Sciences and Engineering*. ProQuest Information & Learning. Retrieved from http://search.ebscohost.com.ezproxy.shsu.edu/login.aspx?direct=true&db=psyh&AN=2017-16345-101&site=ehost-live&scope=site

Hayes, A. F. (2013). PROCESS SPSS Macro [Computer software and manual]. *Google Scholar*, 59-71.

Henderson, C.E., Young, C., Leasure, L., Najjar, L., Christensen, M., Angosta, J., & Neighbors, C. (2021). Measuring joint drinking and physical activity motives. *Manuscript in preparation*.

Hill, E. M., Martin, J. D., & Lego, J. E. (2019). College students' engagement in drunkorexia: Examining the role of sociocultural attitudes toward appearance, narcissism, and greek affiliation. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*. https://doi-org.ezproxy.shsu.edu/10.1007/s12144-019-00382-y

Hunt, T. K., & Forbush, K. T. (2016). Is "drunkorexia" an eating disorder, substance use disorder, or both? *Eating Behaviors*, *22*, 40–45. https://doi-org.ezproxy.shsu.edu/10.1016/j.eatbeh.2016.03.034

Kim, S. H., & Cho, D. (2020). Validation of exercise motivations inventory–2 (EMI-2) scale for college students. *Journal of American College Health*, 1-8. https://doi.org/10.1080/07448481.2020.1726929

Knight, A., Castelnuovo, G., Pietrabissa, G., Manzoni, G. M., & Simpson, S. (2017). Drunkorexia: An empirical investigation among Australian female university students. *Australian Psychologist*, *52*(6), 414–423. https://doi-org.ezproxy.shsu.edu/10.1111/ap.12212

Kopp, M., Burtscher, M., Kopp-Wilfling, P., Ruedl, G., Kumnig, M., Ledochowski, L., & Rumpold, G. (2015). Is there a link between physical activity and alcohol use? *Substance Use & Misuse*, *50*(5), 546–551. https://doi-org.ezproxy.shsu.edu/10.3109/10826084.2014.980957

Leasure, J. L., & Neighbors, C. (2014). Impulsivity moderates the association between physical activity and alcohol consumption. *Alcohol*, *48*(4), 361–366. https://doi-org.ezproxy.shsu.edu/10.1016/j.alcohol.2013.12.003

Lipkus, I. M. (2001). The construction and preliminary validation of a global belief in a just world scale and the exploratory analysis of a multidimensional belief in a just world scale. *Personality and Individual Differences, 12*, 1171–1178

Lisha, N. E., Martens, M., & Leventhal, A. M. (2011). Age and gender as moderators of the relationship between physical activity and alcohol use. *Addictive*

Behaviors, *36*(9), 933–936. https://doi-org.ezproxy.shsu.edu/10.1016/j.addbeh.2011.04.003

Lupi, M., Martinotti, G., & Di Giannantonio, M. (2017). Drunkorexia: An emerging trend in young adults. *Eating and Weight Disorders*, *22*(4), 619–622. https://doi-org.ezproxy.shsu.edu/10.1007/s40519-017-0429-2

Markland, D., & Ingledew, D. K. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised Exercise Motivations Inventory. *British Journal of Health Psychology*, *2*, 361–376.

Musselman, J. R. B., & Rutledge, P. C. (2010). The incongruous alcohol-activity association: physical activity and alcohol consumption in college students. *Psychology of Sport and Exercise*, *11*(6), 609–618. https://doi-org.ezproxy.shsu.edu/10.1016/j.psychsport.2010.07.005

Nelson, T. F., Xuan, Z., Lee, H., Weitzman, E. R., & Wechsler, H. (2009). Persistence of heavy drinking and ensuing consequences at heavy drinking colleges. *Journal of Studies on Alcohol and Drugs*, *70*(5), 726–734. https://doi-org.ezproxy.shsu.edu/10.15288/jsad.2009.70.726

Niedermeier, M., Frühauf, A., Kopp-Wilfling, P., Rumpold, G., & Kopp, M. (2018). Alcohol consumption and physical activity in Austrian college students—A cross-sectional study. *Substance Use & Misuse*, *53*(10), 1581–1590. https://doi-org.ezproxy.shsu.edu/10.1080/10826084.2017.1416406

Oswald, B. B., Ward, R. M., Glazer, S., Sternasty, K., Day, K., & Speed, S. (2020). Baseline cortisol predicts drunkorexia in female but not male college

students. *Journal of American College Health*. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2019.1705834

Panza, G. A., Weinstock, J., Ash, G. I., & Pescatello, L. S. (2012). Psychometric evaluation of the Timeline Followback for Exercise among college students. *Psychology of Sport and Exercise*, *13*(6), 779–788. https://doi-org.ezproxy.shsu.edu/10.1016/j.psychsport.2012.06.002

Pinna, F., Milia, P., Mereu, A., di Santa Sofia, S. L., Puddu, L., Fatteri, F., ... & Carpiniello, B. (2015). Validation of the Italian version of the compensatory eating and behaviors in response to alcohol consumption scale (CEBRACS). *Eating behaviors*, *19*, 120-126.

Pisetsky, E. M., Crosby, R. D., Cao, L., Fitzsimmons-Craft, E. E., Mitchell, J. E., Engel, S. G., Wonderlich, S. A., & Peterson, C. B. (2016). An examination of affect prior to and following episodes of getting drunk in women with bulimia nervosa. *Psychiatry Research*, *240*, 202–208. https://doi-org.ezproxy.shsu.edu/10.1016/j.psychres.2016.04.044

Pompili, S., & Laghi, F. (2018). Drunkorexia among adolescents: The role of motivations and emotion regulation. *Eating Behaviors*, *29*, 1–7. https://doi-org.ezproxy.shsu.edu/10.1016/j.eatbeh.2018.01.001

Rahal, C. J., Bryant, J. B., Darkes, J., Menzel, J. E., & Thompson, J. K. (2012). Development and validation of the compensatory eating and behaviors in response to alcohol consumption scale (CEBRACS). *Eating behaviors*, *13*(2), 83-87.

Reilly, E. E., Dmochowski, S., Schaumberg, K., Earleywine, M., & Anderson, D. (2016). Gender-moderated links between urgency, binge drinking, and excessive exercise. *Journal of American College Health*, *64*(2), 104–111. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2015.1085056

Roessler, K. K., Bramsen, R. H., Dervisevic, A., & Bilberg, R. (2017). Exercise based interventions for alcohol use disorder: A comment on motivational aspects of participation. *Scandinavian Journal of Psychology*, *58*(1), 23–28. https://doi-org.ezproxy.shsu.edu/10.1111/sjop.12334

Roosen, K. M., & Mills, J. S. (2015). Exploring the motives and mental health correlates of intentional food restriction prior to alcohol use in university students. *Journal of Health Psychology*, *20*(6), 875–886. https://doi-org.ezproxy.shsu.edu/10.1177/1359105315573436

Skinner, H. A., & Allen, B. A. (1982). Alcohol dependence syndrome: measurement and validation. *Journal of abnormal psychology*, *91*(3), 199.

Sobell, L. C., & Sobell, M. B. (1992). Timeline follow-back. In *Measuring Alcohol Consumption* (pp. 41-72). Humana Press, Totowa, NJ.

Sobell, L. C., & Sobell, M. B. (1996). Timeline Followback user's guide: a calendar method for assessing alcohol and drug use. Toronto: addiction Research Foundation.

Soedamah-Muthu, S. S., De Neve, M., Shelton, N. J., Tielemans, S. M., & Stamatakis, E. (2013). Joint associations of alcohol consumption and physical activity with all-cause and cardiovascular mortality. *The American journal of cardiology*, *112*(3), 380-386. https://doi.org/10.1016/j.amjcard.2013.03.040

Thompson-Memmer, C., Glassman, T., & Diehr, A. (2019). Drunkorexia: A new term and diagnostic criteria. Journal of American College Health, 67(7), 620–626. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2018.1500470

Ward, R. M., Galante, M., Trivedi, R., & Kahrs, J. (2015). An examination of drunkorexia, Greek affiliation, and alcohol consumption. *Journal of Alcohol and Drug Education*, *59*(3), 48–66. Retrieved from http://search.ebscohost.com.ezproxy.shsu.edu/login.aspx?direct=true&db=psyh&AN=2016-11911-004&site=ehost-live&scope=site

Weinstock, J., Capizzi, J., Weber, S. M., Pescatello, L. S., & Petry, N. M. (2014). Exercise as an intervention for sedentary hazardous drinking college students: A pilot study. *Mental Health and PA*, *7*(1), 55-62.

Weinstock, J., Petry, N. M., Pescatello, L. S., & Henderson, C. E. (2016). Sedentary college student drinkers can start exercising and reduce drinking after intervention. *Psychology of Addictive Behaviors*, *30*(8), 791–801. https://doi-org.ezproxy.shsu.edu/10.1037/adb0000207.supp

Weinstock, J., Petry, N. M., Pescatello, L. S., Henderson, C. E., & Nelson, C. R. (2019). Randomized clinical trial of exercise for nontreatment seeking adults with alcohol use disorder. *Psychology of Addictive Behaviors*. https://doi-org.ezproxy.shsu.edu/10.1037/adb0000506

White, A., & Hingson, R. (2013). The burden of alcohol use: Excessive alcohol consumption and related consequences among college students. *Alcohol Research: Current Reviews, 35*, 201–218.

Wilkerson, A. H., Hackman, C. L., Rush, S. E., Usdan, S. L., & Smith, C. S. (2017). "Drunkorexia": Understanding eating and physical activity behaviors of weight conscious drinkers in a sample of college students. *Journal of American College Health*, *65*(7), 492–501. https://doi-org.ezproxy.shsu.edu/10.1080/07448481.2017.1344848

Yager, Z., & O'Dea, J. A. (2008). Prevention programs for body image and eating disorders on university campuses: A review of large, controlled interventions. *Health Promotion International*, *23*(2), 173–189. https://doi-org.ezproxy.shsu.edu/10.1093/heapro/dan004

Youre, N. (2015). Binge drinking and restrictive eating in college students [ProQuest Information & Learning]. In *Dissertation Abstracts International: Section B: The Sciences and Engineering* (Vol. 75, Issue 11–B(E)).

APPENDIX A

The International Physical Activity Questionnaire
(IPAQ; Hagströmer et al., 2006)

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise, or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PA

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

Yes

No → **Skip to PART 2: TRANSPORTATION**

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

_____ **days per week**

No vigorous job-related physical activity → **Skip to question 4**

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

_____ **hours per day**

_____ **minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

_____ days per week

No moderate job-related physical activity → **Skip to question 6**

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?

_____ **hours per day**

_____ **minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time as part of your **work**? Please do not count any walking you did to travel to or from work.

_____ **days per week**

No job-related walking → **Skip to PART 2: TRANSPORTATION**

7. How much time did you usually spend on one of those days **walking** as part of your work?

_____ **hours per day**

_____ **minutes per day**

PART 2: TRANSPORTATION PA

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

_____ **days per week**

No traveling in a motor vehicle → **Skip to question 10**

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?

_____ **hours per day**

_____ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

No bicycling from place to place → **Skip to question 12**

11. How much time did you usually spend on one of those days to **bicycle** from place to place?

_____ **hours per day**

_____ **minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

No walking from place to place → **Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY**

13. How much time did you usually spend on one of those days **walking** from place to place?

_____ **hours per day**

_____ **minutes per day**

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time.

During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or **digging in the garden or yard**?

_____ **days per week**

No vigorous activity in garden or yard → **Skip to question 16**

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

_____ **hours per day**

_____ **minutes per day**

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard?**

_____ **days per week**

No moderate activity in garden or yard → **Skip to question 18**

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

_____ **hours per day**

_____ **minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors, and sweeping **inside your home**?

_____ **days per week**

No moderate activity inside home → **Skip to PART 4: RECREATION, SPORT AND LEISURE TIME PA**

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

_____ **hours per day**

_____ **minutes per day**

PART 4: RECREATION, SPORT, AND LEISURE-TIME PA

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise, or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?

_____ **days per week**

No walking in leisure time → **Skip to question 22**

21. How much time did you usually spend on one of those days **walking** in your leisure time?

_____ **hours per day**

_____ **minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

_____ **days per week**

No vigorous activity in leisure time → **Skip to question 24**

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time?

_____ **hours per day**

_____ **minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

_____ **days per week**

No moderate activity in leisure time → **Skip to PART 5: TIME SPENT SITTING**

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?

_____ **hours per day**

_____ **minutes per day**

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?

_____ **hours per day**

_____ **minutes per day**

27. During the last 7 days, how much time did you usually spend **sitting** on a **weekend day**?

_____ **hours per day**

_____ **minutes per day**

This is the end of the questionnaire, thank you for participating.

APPENDIX B

The Compensatory Eating Behaviors Related to Alcohol Consumption Scale (CEBRACS; Rahal et al., 2012)

Instructions:

Please read each of the following statements very carefully and respond accurately and honestly. All of these statements reflect actual behaviors you may have done in the past 3 months. You will be asked whether you have done any of the behaviors before, during, or after drinking alcohol. Please read carefully because many of the statements are closely related to each other. Drinking refers to drinking any alcoholic beverages such as: beer, wine, wine coolers or spirits, hard liquors or mixed drinks.

BEFORE drinking

Instructions:

For the following statements think about behaviors you have engaged in BEFORE you anticipated drinking alcohol. That is, think of situations where you knew you would be drinking alcohol in the future (e.g. planed to go to out drinking with friends, attended a wedding or birthday where you planned to drink, or attended any other event or situation where you knew you would be drinking later).

___1) In the past 3 months, I have eaten less than usual during one or more meals before drinking to get DRUNKER.
___2) In the past 3 months, I have exercised before drinking to make up for the calories in alcohol that I anticipated consuming.
___3) In the past 3 months, I have eaten less than usual during one or more meals before drinking to feel the effects of alcohol FASTER.

(1) Never
(2) Rarely (about 25% of the time)
(3) Sometimes (about 50% of the time)
(4) Often (about 75% of the time)
(5) Almost all the time

___4) In the past 3 months, I have skipped one or more meals before drinking to make up for the number of calories in alcohol that I anticipated consuming.

___5) In the past 3 months, I have taken laxatives before drinking to make up for the calories in alcohol that I anticipated consuming.

___6) In the past 3 months, I have skipped one or more meals before drinking to feel the effects of alcohol FASTER.

WHILE under the effects of alcohol

Instructions:

For each of the following statements, think about behaviors you have engaged in WHILE you were drinking or under the effects of alcohol (e.g., while you were drinking during a wedding reception, party, bar, club, football game). This also includes situations where you may have been done drinking, but the effects of alcohol had not completely worn off. As an example, imagine arriving home from a party where you had been drinking and you could still feel the effects of alcohol even though you had stopped drinking earlier in the night.

___7) In the past 3 months, I have eaten less than usual while I was drinking because I wanted to feel the effects of the alcohol FASTER.
___8) In the past 3 months, I have taken diuretics while I was drinking to make up for the calories in alcohol that I was consuming.
___9) In the past 3 months, I have not eaten at all while I was drinking because I wanted to feel the effects of the alcohol FASTER.

(1) Never
(2) Rarely (about 25% of the time)
(3) Sometimes (about 50% of the time)
(4) Often (about 75% of the time)
(5) Almost all the time

___10) In the past 3 months, I have eaten low-calorie or low-fat foods while I was drinking to make up for the calories in alcohol that I was consuming.
___11) In the past 3 months, I drank low-calorie beer or alcoholic drinks to get fewer of the calories that are in alcohol.
___12) In the past 3 months, I have eaten less than usual while I was drinking because I wanted to get DRUNKER.
___13) In the past 3 months, I have taken laxatives while I was drinking to make up for the calories in alcohol that I was consuming.
___14) In the past 3 months, I have not eaten at all while I was drinking because I wanted to get DRUNKER.

AFTER effects from alcohol have worn off

Instructions:

For each of the following statements, think about behaviors you have engaged in AFTER you had been drinking alcohol and were no longer under the effects of alcohol. This might include your behavior later that same day, the next day, or several days after the effects of alcohol have worn off.

___15) In the past 3 months, I have taken diuretics to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol.
___16) In the past 3 months, I have eaten low-calorie or low-fat foods during one or more meals to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol.

(1) Never
(2) Rarely (about 25% of the time)
(3) Sometimes (about 50% of the time)
(4) Often (about 75% of the time)
(5) Almost all the time

___17) In the past 3 months, I have taken laxatives to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol.
___18) In the past 3 months, I have exercised to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol.
___19) In the past 3 months, I have made myself vomit to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol.
___20) In the past 3 months, I have eaten less than usual during one or more meals to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol.
___21) In the past 3 months, I have skipped an entire day or more of eating to make up for the calories in alcohol that I had consumed previously while I was under the effects of alcohol.

Note. For scoring purposes — Factor 1: Alcohol Effects (Items 1, 3, 6, 7, 9, 12, 14), Factor 2: Bulimia (5, 8, 13, 15, 17, 19), Factor 3: Diet and Exercise (2, 10, 11, 16, 18, 20); Factor 4: Restriction (4, 21).

APPENDIX C

The Exercise Motive Inventory Revised (EMI-2; Markland & Ingledew, 1997)

Response options: (could not find actual scale yet)
0 = not at all true for me, (1) = , (2) = , (3) = , (4) = , (5) = very true for me

Weight Management subscale score of EMI-2 - sum of emi1, emi15, emi29, emi43
Q1 - Personally, I exercise...To stay slim
Q15 - Personally, I exercise...To lose weight
Q29 - Personally, I exercise...To help control my weight
Q43 - Personally, I exercise...Because exercise helps me to burn calories

Appearance subscale score of EMI-2 - sum of emi4, emi18, emi32, emi44
Q4 - Personally, I exercise...To help me look younger
Q18 - Personally, I exercise...To have a good body
Q32 - Personally, I exercise...To improve my appearance
Q44 - Personally, I exercise...To look more attractive

APPENDIX D

The Timeline Followback Method (TLFB; Sobell & Sobell, 1992)

30 Day Timeline Followback

INSTRUCTIONS: To help us evaluate your drinking, Ineed to get an idea of what your alcohol use was like in the
past **30 days**. To do this, Iwould like you to fill out a calendar.

- Filling out the calendar is not hard!
- Try to be as accurate as possible.
- Irecognize that you won't have perfect recall. That's OKAY.

WHAT TO FILL IN

- On days when you did not have any alcohol, not even part of a drink, you should enter a "0."
- On days when you did have alcohol, even part of a drink, you should enter the total number of drinks you had. Also, the smallest number of drinks you can record is "1."

YOUR BEST ESTIMATE

- Irealize it isn't easy to recall things with 100% accuracy.
- If you are not sure whether you drank 3 or 4 drinks or whether you drank on a Thursday or a Friday, **just give it your best guess**!
- What is important is that 3 or 4 drinks is very different from 10 or 12 drinks. The goal is to get a sense of how frequently you drank, how much you drank, and your patterns of use.

HELPFUL HINTS

- If you have an appointment book you can use it to help you recall your drinking.
- Holidays such as Thanksgiving and Christmas are marked on the calendar to help you recall your drinking. Also, think about how much you drank on personal holidays & events such as birthdays, vacations, or parties.
- If you have regular patterns to your drinking, you can use these to help you recall your use. For example, some people may only drink during certain social situations.

ENTERING YOUR RESPONSES

- You will be presented with a calendar for the previous 30 days on the next page.
- You will also be presented with each week separately, starting with yesterday through 7 days ago and will be asked to report on your drinking and number of hours spent drinking for each day of each week over the past 30 days.
- In estimating your drinking, be as accurate as possible.
- Enter in the standard-sized drinks you drank on each day.
- **When you did drink, you would write in the total number of drinks you had using the Drink Conversion Chart you'll find on the next page.**

For example: If you had 6 beers, write the number 6 for that day. If you drank more than one kind of alcoholic beverage in a day such as 2 beers and 3 glasses of wine, you would write the number 5 for that day.

STANDARD DRINK CONVERSION CHART

One Standard Drink Is Equal To:

- 5oz. wine
- 12oz. wine cooler
- 12oz. beer (10oz. of Microbrew; 8-9 oz. Malt Liquor, Canadian beer or Ice beer)
- 1 Cocktail with 1 oz. of 100 proof liquor or 1 ½ oz. (single jigger) of 80 proof liquor.

FOR EXAMPLE:

- Three 12 oz. regular beers equal 3 drinks.
- One mixed drink that contains 3, 1 oz. shots of 100-proof liquor equals 3 drinks.

For all questions, one drink equals:

- 5oz. wine
- 12oz. wine cooler
- 12oz. beer (10oz. of Microbrew; 8-9 oz. Malt Liquor, Canadian beer or Ice beer)
- 1 Cocktail with 1 oz. of 100 proof liquor or 1 ½ oz. (single jigger) of 80 proof liquor.

PLEASE REMEMBER TO ENTER A 0 FOR ANY DAYS YOU DID NOT DRINK.

NOVEMBER 2020						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5

Printable Calendars by Betacalendars.com

Figure 4. Alcoholic Beverage Chart and Timeline Followback Calendar for self-reported alcohol consumption.

VITA

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Manuscripts in Progress

Sze, C. (in-progress). *Examining Drunkorexia in College Students: Does Motivation Moderate the Association Between Physical Activity and Alcohol Consumption?* (Unpublished master's thesis). Sam Houston State University, Huntsville, TX.

Publications

Christensen, M., Anderson-White, E., Ryan, L., Ricardo, M., Krembuszewski, **Sze, C.,** & Henderson, C. E. (Under contract) Substance use disorders. In Venta, A., Sharp, C., Fonagy, P., & Fletcher, J. (Eds.). *Developmental Psychopathology*. (pp. pages of chapter) Hoboken, NJ: Wiley-Blackwell.

Henderson, C. E., Manning, J. M., Davis, C. M., Conroy, D. E., Van Horn, M. L., Henry, K., Schiafo, M., Waldo, J., & **Sze, C.** (2020). Daily physical activity and alcohol use among young adults. *Journal of behavioral medicine*.

Conference Presentations

Anderson-White, E., **Sze, Cody**, & Krembuszewski, B., (2021, February). Deaf Culture and Identity Development. *Oral presentation presented at the Diversity Leadership Conference at Sam Houston State University, Huntsville, TX.*

Henderson, C., Young, C. M., Christensen, M., Anderson-White, E**., Sze, C.**, Krembuszewski, B., Najjar, L., Leasure, J. L., & Neighbors, C. (2020, November). A latent class analysis of correlates of college student alcohol use and physical activity group membership. In J. Holt (Chair), Evidence-Based Interventions for College Student Health Behaviors: Improving Buy-In and Navigating Barriers to Implementation. *Symposium presented at the virtual Annual Meeting of the Association for Behavioral and Cognitive Therapies, Philadelphia, PA.*

Henderson, C., Conroy, D., Van Horn, M. L., Henry, K., *Long, T.*, *Ryan, L.*, *Boland*, *J.*, Schiafo, M., Waldo, J., & ***Sze, C.*** (2020, November). A latent class analysis of correlates of college student alcohol use and physical activity group membership. In C. Henderson & K. E. Shin (Co-Chairs), *Uncovering Dynamic Clinical Processes: Statistical Approaches for Intensive Longitudinal Data*. Symposium presented at the Annual Meeting of the Association for Behavioral and Cognitive Therapies. Virtually presented.

Sze, C., Henderson, S., & Henderson, C., (2020, November). The Psychological and Physical Impact of Race-Related Stress on Asians/Asian-Americans. Presented at *Anti-Asian Discrimination Event at Sam Houston State University*, Huntsville, TX.

Krembuszewski, B., Anderson-White, E., Henderson, C., Lewis, K., Ryan, L., **Sze, C.**, & Trinka, M. (2020, February). Affirmative action: Are we solving or creating a problem?. Presented at *the Diversity Leadership Conference at Sam Houston State University*, Huntsville, TX.

Research Interests

Research interests include risk and resilience in youth; underserved youth populations; motivation; adolescent substance use; exercise-based interventions, eating disorders