Abstract

Alcohol Use and Self-Control in Adults Living with HIV

Introduction

Alcohol use among people living with HIV (PLWH) is related to a range of devastating disease-specific health consequences. In general population samples, alcohol use is linked to low trait levels of and depletion of self-control; however, the relationship between alcohol use and self-control in samples of PLWH had not yet been examined. The role of gender in the relationship between alcohol consumption and self-control among PLWH, as well as the psychometrics of the Self-Control Scale administered to PLWH, constituted additional gaps in the literature. The aims of the current study were to examine differences in self-control between PLWH who currently drink alcohol and PLWH who currently abstain from alcohol; to examine associations between self-control and aspects of alcohol use (e.g., frequency and quantity of alcohol use), including gender as a possible moderator; and to examine the internal consistency and component structure of the Self-Control Scale when administered to PLWH. It was hypothesized that PLWH who currently drink alcohol would report lower levels of self-control than would PLWH who currently abstain from alcohol. It was also hypothesized that level of self-control would be negatively related to number of drinking days per week, number of alcoholic drinks consumed per week, engagement in heavy drinking, and engagement in binge drinking.

Method

Two hundred and eighty-seven PLWH (55.4% male) were asked via questionnaire to provide information on their demographics, alcohol use, and self-control.

Results

Overall, the study found no significant relationship between self-control and alcohol use. Additionally, gender did not moderate the relationships between self-control and alcohol use. The Self-Control Scale was found to have high internal consistency and a two-component solution for the present sample. It was also found that *less than high school graduate* education level, female gender, and low BMI were linked to greater drinking behavior.

Conclusions

The preservation of the Self-Control Scale's high level of internal consistency in the current sample of PLWH suggests its appropriateness for use within this population. The findings presented are important to consider in light of both the prevalence and unique consequences of alcohol use in PLWH. Consideration of risk factors for greater drinking behavior may be helpful in identifying and providing intervention for those PLWH who are at greater risk for engaging in heavier drinking.

Alcohol Use and Self-Control in Adults Living with HIV

by

Rachel S. Kashan

Submitted in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

in the Ferkauf Graduate School of Psychology

Yeshiva University

July 2021

The committee for this doctoral dissertation consists of:

Andrea H. Weinberger, Ph.D., Chairperson
Ferkauf Graduate School of Psychology, Yeshiva University
Department of Epidemiology and Population Health, Albert Einstein College of Medicine

Frederick W. Foley, Ph.D.
Ferkauf Graduate School of Psychology, Yeshiva University

Jonathan Shuter, M.D.
AIDS Center and Division of Infectious Diseases, Montefiore Medical Center and Albert Einstein College of Medicine

The readers for this doctoral dissertation consist of:

Daniel J. Coletti, Ph.D.
Division of General Internal Medicine, Northwell Health
Donald and Barbara Zucker School of Medicine at Hofstra/Northwell

Charles Swencionis, Ph.D.
Ferkauf Graduate School of Psychology, Yeshiva University

Acknowledgements

Dr. Andrea Weinberger, I cannot express enough of my appreciation and gratitude for your truly unwavering support, encouragement, and dedication throughout my tenure at Ferkauf. You took a chance on me when you interviewed me for admission to the program, and to your research lab, and the growth of the lab since its inception speaks directly to your personal and professional nature of being kind, responsive, fair, and constructive in your feedback, as well as your exceptional ability to foster a lab environment wherein members are supportive of and collaborative with one another. I could not have made it this far without you. To my fellow students and lab-mates, Drs. Hannah Esan, Kate Segal, and Jennifer Birchwale and Ester Yadgaran, thank you for all of your efforts in collecting and entering the data for this study. Dr. Frederick Foley and Dr. Jonathan Shuter, thank you for your generous contributions as committee members, each bringing your expertise and enthusiasm to move this dissertation project forward. Dr. Daniel Coletti, thank you for always being there for me, as a clinical supervisor, as a mentor and role model, and now as a reader for this dissertation; I have always valued your guidance, genuine nature, and breadth of knowledge. Dr. Charles Swencionis, thank you for agreeing to be a reader as I embark on one of the final steps toward my doctoral degree.

Finally, to my parents, Orly and Steven, and to my brothers, Benjamin and David, words cannot express my love for you all. I am so grateful to have you as my family.

Dedication

To my grandmother, Monavar Kashanian, ז"ל: On the day that I received my acceptance letter to Ferkauf, I dedicated my pursuit of this doctoral degree to you. You were אשת חיל, a woman of great intelligence, warmth, empathy, compassion, and love, and you raised generations of children and grandchildren who value education and seek to help heal others. I cannot overstate the impact that you have had on my life, even without, unfortunately, having had the opportunity to meet you. I can only strive to embody the qualities that you have lived your life through. You are always in my heart.

Table of Contents

List of Tables

List of Figures

List of Appendices

Chapter I: Introduction

Overview of HIV

An estimated 37.6 million people were living with human immunodeficiency virus (HIV) by the end of the year 2020 (World Health Organization, 2020). HIV is a major cause of mortality, and the deaths of 690,000 people across the globe were attributable to HIV in 2020 (World Health Organization, 2020). HIV infection suppresses the immune system via a reduction in the $CD4^+$ cell count, i.e., in the number of T-helper cells, which aid in coordinating immune responses. The $CD4^+$ cell count in persons with a healthy immune system constitutes 800-1,200 cells per cubic millimeter (cells/mm^3) of blood; in contrast, chronic HIV infection can lead to acquired immune deficiency syndrome (AIDS), wherein the $CD4^+$ cell count reduces to fewer than 200 cells/mm^3. While $CD4^+$ cell count maps onto immune functioning or immunosuppression, one's viral load indicates the amount of HIV in the blood; it serves as a marker of disease progression in the body as well as one of the likelihood of transmission of the virus to other individuals (Klimas et al., 2008), with the most common modes of transmission being sexual behaviors and use of syringes, needles, or other substance-injecting equipment (Centers for Disease Control and Prevention, 2021). Importantly, it is possible for individuals to become infected with more than one strain of HIV, a phenomenon that is termed "dual infection" (Smith et al., 2005). Across the globe, 27.4 million people living with HIV (PLWH) were being treated with antiretroviral therapy (ART) in 2020 (World Health Organization, 2020), which constitutes a combination of three

or more drugs from two classes of antiretroviral agents (Klimas et al., 2008), and which carries a risk of side effects such as liver toxicity, or hepatotoxicity (Núñez, 2006). Despite advances made in the treatment of HIV, there is much room for improvement in the healthcare and management of PLWH.

Alcohol Use in PLWH

Alcohol use amongst adults living with HIV in the United States (US) is common, with 40% of those receiving medical care reporting current alcohol use (Chander et al., 2008). Alcohol use carries with it risks and consequences to both the health of the individual and the public. Alcohol use in PLWH has been linked to lowered adherence to the medications used to treat HIV (e.g., ART; Braithwaite et al., 2005; Chander et al., 2006; Samet et al., 2004; Tucker et al., 2003). In addition, alcohol use has been shown to amplify the progression of HIV infection (Asiimwe et al., 2017), including a finding that escalation from abstinence to drinking alcohol was associated with greater risk of HIV viral load non-suppression (Lesko et al., 2021), and to further suppress the immune system of PLWH (Baum et al., 2010). The toxic effects on the liver brought on by ART may be compounded by similar effects of alcohol abuse (Núñez et al., 2001). Drinking may also increase the likelihood of an individual engaging in risky sexual behavior (Kalichman et al., 2002; Stein et al., 2005), which would put PLWH at increased risk of acquiring one or more additional strains of HIV and/or of transmitting the infection to others, thus increasing risk to the public. While reducing or stopping alcohol use may improve response to HIV treatment and health outcomes in PLWH, it is challenging to abstain from drinking. As such, it is important to consider variables that are connected to abstaining from alcohol use (Bryant et al., 2010), such as self-control.

Overview of Self-Control

"Self-control" can be defined as "the ability to override or change one's inner responses, as well as to interrupt undesired behavioral tendencies and refrain from acting on them" (Tangney et al., 2004, p. 275). Exerting self-control is a way to regulate one's behavior in a manner that is "deliberate, conscious, [and] effortful" (Baumeister et al., 2007, p. 351). According to the self-control strength model (Muraven & Baumeister, 2000), self-control constitutes a limited resource that becomes depleted, in the short-term, through use. This depletion then negatively impacts one's performance on subsequent tasks that require the use of self-control. Although exerting self-control depletes one's resources in the *short-term*, repeatedly practicing small acts of self-control (when alternated with periods of rest) can build up one's self-control strength in the *long-term* (Muraven, 2010).

Alcohol Use and Self-Control

One difficulty that some individuals face when attempting to give up drinking may be connected to their level of *self-control*. Indeed, low levels of self-control have been linked to alcohol use (e.g., Morutwa & Plattner, 2014; Muraven et al., 2002; Muraven et al., 2005; Wills & Stoolmiller, 2002; Wills et al., 2006). Several studies with such findings are highlighted below.

A questionnaire study examined whether trait self-control (measured via the 13-item Brief Self-Control Scale; Tangney et al., 2004) was related to use of alcohol and to the amount of alcohol consumed (Morutwa & Plattner, 2014). The sample consisted of 135 adult participants (57.8% male, 42.2% female) who were undergraduate college students in Botswana, Southern Africa. The authors found group differences in level of self-control by alcohol use status, such that students who reported using alcohol also reported lower levels of

self-control ($t(133) = 2.98$, $p = 0.003$). A moderate, inverse correlation was also found between level of self-control and total alcohol use for the week ($r = -0.38$, $p = 0.002$), such that lower self-control was related to higher quantity of alcohol consumed. Of note, gender differences in self-control were found, such that men reported significantly lower levels of self-control than did women ($t(133) = -3.07$, $p = 0.003$). Additionally, Morutwa and Plattner (2014) conducted a multiple regression analysis, reporting that self-control, gender, and age together explained 32.8% of the variance in the amount of alcohol consumed weekly, and that all three variables made significant contributions.

In an experiment that applied the self-control strength model to the restraint of alcohol consumption, participants were randomly assigned to one of two conditions, requiring either a high level of self-control use during a thought suppression exercise (high depletion), or a low level of self-control use by having participants solve simple arithmetic problems (low depletion; Muraven et al., 2002). In both conditions, participants completed subsequent beer tastings and were made to believe that a driving simulator test would follow. The motivation was presumably high for participants to limit their drinking, given that drinking is generally known to affect driving performance and that participants were told that they could win a prize if they performed well on the driving test. Thus, conceptually, drinking more would reflect a greater depletion of participants' self-control. The sample included 58 adult men (91% European-American) who drank socially (i.e., drank two or more alcoholic beverages a day, three or more times per week). Participants in the high depletion condition drank more beer of a preferred brand (high depletion, $M = 520$ mL, $SD = 181$; low depletion, $M = 428$ mL, $SD = 153$, $p < .05$) and reached a higher blood alcohol concentration (BAC) level (high depletion, $M = .048$, $SD = .018$; low depletion, $M = .037$, SD

= .023, $p < .05$) than those in the low depletion condition. Participants' depletion of self-control strength is important to consider, given that restricting alcohol consumption is a task that requires self-control. Together, trait temptation to drink and self-control strength accounted for the amount of beer consumed (Muraven et al., 2002).

In another study by Muraven and colleagues that was framed within the self-control strength model of Muraven and Baumeister (2000), self-control exertion was examined in relation to alcohol use (Muraven et al., 2005). Specifically, the researchers studied the relationship between daily self-control demands and likelihood of drinking more than planned. The sample was composed of 106 participants (57 women and 49 men) who were identified as underage individuals who drank socially (i.e., those 18-20 years old who consumed three or more drinks per week). Most participants (86%) identified as European-American, with the rest of the sample identifying mostly as Asian-American or African-American. On days for which individuals' self-control demands were higher than average, participants were more likely to drink in excess of the amount of alcohol that they had set out to limit themselves to ($B = 0.02$, $SE = 0.01$, $t(102) = 2.47$, $p < .025$), and trait self-control served as a moderator of this relationship ($B = 4.06 \times 10^{-4}$, $SE = 2.06 \times 10^{-4}$, $t(102) = 1.94$, $p < .05$, pseudo $R^2 = .01$, χ^2 (1, $N = 106$) = 2.95, $p < .07$), such that those low in trait self-control were even more likely than those high in trait self-control to exceed their imposed drinking limits when self-control demands were higher than average. Gender was not found to have a main or interaction effect on the reported relationship (Muraven et al., 2005).

Taken together, some studies have found that lower self-control (trait and state) relates to greater drinking behavior (Morutwa & Plattner, 2014), including in specific situations in which alcohol consumption is expected to be limited (Muraven et al., 2002;

Muraven et al., 2005). Further, some studies have examined the role that gender plays in the relationship of self-control and alcohol use (e.g., Morutwa & Plattner, 2014; Muraven et al., 2005), with mixed results. While these studies have included largely European-American community samples (e.g., undergraduate college students and individuals who drink socially), a gap in the literature remains regarding our knowledge of self-control and alcohol use for PLWH.

Self-Control Scale for PLWH

The psychometrics of the Self-Control Scale (Tangney et al., 2004), such as internal consistency and component structure, have not yet been examined in a sample of PLWH, constituting a gap in the literature regarding the appropriateness of the use of this scale for PLWH as well as whether the content of the scale for PLWH approximates that of the sample that it was validated on (i.e., undergraduate college students; Tangney et al., 2004).

Summary

Research has demonstrated that alcohol use among PLWH carries with it a host of devastating disease-specific effects on one's health and that alcohol use is linked to low trait levels of and depletion of self-control; however, the relationships between alcohol use and self-control in samples of PLWH had not yet been examined in the literature. Furthermore, the role of gender as a possible moderator of these relationships, as well as the psychometrics of the Self-Control Scale administered to PLWH, constituted additional gaps in the literature. The present study sought to address these gaps by examining differences in self-control between PLWH who currently drink alcohol and PLWH who currently abstain from alcohol; examining associations between self-control and aspects of alcohol use (e.g., frequency and quantity of alcohol use), including gender as a possible moderator; and examining the

internal consistency and component structure of the Self-Control Scale when administered to PLWH.

Study Aims and Hypotheses

Primary Aim 1: Within a sample of adults living with HIV, to determine whether there were differences in level of self-control by alcohol drinking status.

Hypothesis 1: PLWH who currently drink alcohol would report lower self-control than would PLWH who currently abstain from alcohol.

Primary Aim 2: Within a subsample of adults living with HIV who currently drink alcohol, to determine whether level of self-control was related to quantity and frequency of alcohol use. ***Primary Aim 2a:*** To determine whether level of self-control was related to number of drinking days per week. ***Primary Aim 2b:*** To determine whether level of self-control was related to number of alcoholic drinks consumed per week. ***Primary Aim 2c:*** To determine whether level of self-control was related to engagement in heavy drinking. ***Primary Aim 2d:*** To determine whether level of self-control was related to engagement in binge drinking.

Hypothesis 2a: Level of self-control would relate negatively to number of drinking days per week.

Hypothesis 2b: Level of self-control would relate negatively to number of alcoholic drinks consumed per week.

Hypothesis 2c: Level of self-control would relate negatively to engagement in heavy drinking.

Hypothesis 2d: Level of self-control would relate negatively to engagement in binge drinking.

Exploratory Aim 1: Within a subsample of adults living with HIV who currently drink alcohol, to explore whether gender moderated the relationships between self-control and quantity and frequency of alcohol use. ***Exploratory Aim 1a:*** To explore whether gender moderated the relationship between self-control and number of drinking days per week. ***Exploratory Aim 1b:*** To explore whether gender moderated the relationship between self-control and number of alcohol drinks consumed per week. ***Exploratory Aim 1c:*** To explore whether gender moderated the relationship between self-control and engagement in heavy drinking. ***Exploratory Aim 1d:*** To explore whether gender moderated the relationship between self-control and engagement in binge drinking.

Exploratory Aim 2: Within a sample of adults living with HIV, to examine psychometrics of the Self-Control Scale. ***Exploratory Aim 2a:*** To determine the internal consistency of the Self-Control Scale. ***Exploratory Aim 2b:*** To perform variable-reduction on the Self-Control Scale.

Significance

Innovative drinking cessation aids tailored to the current population of PLWH who drink are essential for improving quit attempt outcomes. While achieving abstinence from drinking presents a challenge for those who drink in general, PLWH are particularly vulnerable, due to the multitude of negative effects on their health that they stand to face. When individuals in this population drink alcohol, they pose potential risks to themselves and

to the public at large. Thus, it is imperative to examine potential links to drinking behavior, such as self-control.

Lower levels of self-control may stand in the way of individuals' success at quitting drinking, as this may draw upon self-control resources (Maisto et al., 1988). Those who drink are challenged to overcome these drivers of cessation failure in addition to those of high stress, low social support, and low self-efficacy in their abilities to abstain from or to sustain reduced alcohol use (Noone et al., 1999). Being unable to maintain a high level of self-control may be a key contributor to unsuccessful quit attempts. Indeed, in the body of literature on the relationship between self-control and drinking, it has been found that individuals who exert more self-control, and thereby deplete more self-control strength, drink more and reach higher BACs when in a situation that calls for drinking restraint (Muraven et al., 2002).

Self-control can be built up in the long-term through the practice of small acts of self-control. If lower self-control is related to greater alcohol consumption behaviors, then the practice of self-control may be a promising target for drinking cessation treatments for PLWH, one that could ultimately improve alcohol quit attempt outcomes and, more broadly, improve the state of public health.

Indeed, few interventions have been aimed at reducing alcohol consumption among PLWH, and the few that have been tested show mixed results in terms of effectiveness. One study found that women living with HIV who received a brief alcohol intervention reported a lower frequency of alcohol use compared to women living with HIV who received treatment as usual, while no differences were found between groups on measures of heavy/binge drinking or number of drinks per drinking day (Chander et al., 2015). While a number of

other such studies have supported treatment efficacy findings (e.g., brief motivational interviewing coupled with personalized feedback [Hasin et al., 2013] and culturally adapted, gender-stratified group cognitive-behavioral therapy [Papas et al., 2011]), other studies have shown no benefit of interventions over control conditions in terms of amount of alcohol use (e.g., Parsons et al., 2007; Samet et al., 2005; Velasquez et al., 2009). This pattern of mixed findings suggests the utility and importance of learning more about behaviors related to alcohol consumption among PLWH, to improve outcomes of current alcohol-related treatments.

Innovation

The innovation of this research lies largely in its focus on an understudied population: *PLWH*. PLWH commonly engage in alcohol use (Chander et al., 2008), a modifiable behavior that is linked to lower medication adherence (Braithwaite et al., 2005; Chander et al., 2006; Samet et al., 2004; Tucker et al., 2003), higher likelihood of engaging in risky sexual behavior (Kalichman et al., 2002; Stein et al., 2005), greater progression of HIV infection (Asiimwe et al., 2017), further suppression of the immune system (Baum et al., 2010), and compounding of hepatotoxicity (Núñez et al., 2001). While previous studies have shown that self-control is related to substance use, including alcohol use (e.g., Morutwa & Plattner, 2014; Muraven et al., 2002; Muraven et al., 2005; Wills & Stoolmiller, 2002; Wills et al., 2006), *none of these studies has examined outcomes in PLWH*.

In addition to examining whether there were differences in level of self-control by drinking status and whether level of self-control related to alcohol use, within an adult sample of PLWH, the present study was the first to examine (1) whether gender moderated

the relationships between self-control and alcohol use within this sample, and (2) the psychometrics of the Self-Control Scale in an HIV sample.

Chapter II: Research Methods and Design

Overview of the Research Methods and Design

The present study employed a cross-sectional survey design, which allowed for the examination of differences in level of self-control by drinking status as well as examination of the relationships between level of self-control and each of four alcohol use variables (i.e., number of drinking days per week, number of drinks consumed per week, engagement in heavy drinking, and engagement in binge drinking). The present study constituted a secondary analysis of a larger research project (i.e., parent study) on self-control and cigarette smoking in PLWH, entitled "Self-Control and Adults Living with HIV", which was approved with verbal consent procedures by the Albert Einstein College of Medicine Institutional Review Board (IRB Protocol #2016-7308; PI: Weinberger), for which data collection is complete.

Participants

The participant sample consisted of 287 adults who were patients at the Montefiore Center for Positive Living (CPL) and had a diagnosis of HIV, at the time of recruitment. The site of recruitment and data collection was the CPL, located on the Moses Campus of Montefiore Hospital in the Bronx, New York. Study participation was open to patients of any gender, race, and ethnicity, as well as any alcohol drinking status (current, former, and never drinking).

Inclusion criteria. In order to meet eligibility requirements, a participant had to be an adult (i.e., ≥ 18 years of age), had to report a diagnosis of HIV, had the capacity to provide verbal informed consent, and spoke English.

Exclusion criteria. Exclusion criteria constituted nonfulfillment of inclusion criteria, such that: Individuals who were < 18 years of age, did not report a diagnosis of HIV, did not have the capacity to give consent, and/or were non-English speakers were deemed ineligible to participate.

Procedures

Each participant was recruited and screened prior to/on the same day as participating in the study appointment (if deemed to be eligible).

Recruitment procedure. Potential participants were approached and recruited from the waiting room of the CPL, by study personnel, with the intention of trying to include everyone without bias. At that time, potential participants were given a brief description of the study and were screened for eligibility, based on the established criteria mentioned above. Based on the aims of the parent study, participants were recruited so that there would be a generally equal number of individuals who currently smoke cigarettes and individuals who do not currently smoke cigarettes, as well as equal numbers of men and women in the sample.

Consent procedure. Prior to participation, potential participants were escorted to a private room wherein study personnel could obtain verbal informed consent. Potential participants were given the opportunity to ask questions and to decide whether to participate. They were also informed of their right to end their participation at any time and to decline to

respond to any given questions. Following completion of the study, participants were given a copy of the consent form. No names or contact information were recorded in an effort to maintain the anonymity of participants.

Study procedure. The time to completion for each participant's study appointment was approximately 25-35 minutes, depending on direction of responding to certain questions (i.e., if a participant reported smoking cigarettes, that participant would then be directed to answer questions regarding smoking behavior that others did not have to answer). As a primary independent variable of interest in the parent study was smoking status, an expired carbon monoxide (CO) breath sample was obtained in a private room, using a CO monitor to biochemically confirm current cigarette smoking. Participants were then handed a questionnaire to complete in the waiting room of the CPL, while research personnel maintained their availability to participants for any questions that arose. Following indication by the participant of questionnaire completion, study personnel proceeded to check for items unintentionally left blank or responded to in a manner other than that intended by the principal investigator. At the conclusion of the study appointment, each participant was given a handout that included information on the CPL as well as resources for substance use treatment (e.g., smoking and drinking cessation) and other mental health issues. Each participant was compensated for their time and participation with a $20.00 Target gift card.

Risks and Ethical Considerations

Potential risk of breach of confidentiality was minimized in this study by the decision to not collect identifying information such as participant names and contact information, so as to maintain anonymity. Furthermore, the completed surveys are kept in a locked file cabinet in the PI's office. The nature of particular questionnaire items (e.g., those related to

HIV) may have given rise to uncomfortable feelings or emotional distress in participants. In the event of participants reportedly feeling disturbed, there were mental health resources available to them at the CPL. The PI, a licensed clinical psychologist, was also available for contact by telephone. Furthermore, all participants were provided with a handout at the conclusion of their study participation, outlining some available mental health resources, including a resource for substance use treatment.

Benefits

Participants were each compensated for their time and participation with a $20.00 Target gift card. Additionally, as mentioned above, participants were informed of the availability of mental health and substance use treatment resources.

Measures

Following is a description of the variables of interest for the present study; refer to Figure 1.

Demographics. Participants reported on demographic information, including age, gender, marital status, ethnicity, race, sexual orientation, educational attainment, height, and weight. Body mass index (BMI) was calculated using self-reported height (in feet and inches) and weight (in pounds) as follows: [weight (lb.) / height (in.) / height (in.)] x 703 (Centers for Disease Control and Prevention, 2007).

Cigarette smoking status. Cigarette smoking status was assessed via one questionnaire item: “What is your smoking status?”. Participants reported whether they (1) currently smoke cigarettes, (2) used to smoke cigarettes but do not smoke now, or (3) never smoked cigarettes. Participants were classified categorically into groups of Current Smoking, Former Smoking, or Never Smoking, respectively.

Self-control. Level of trait self-control was measured as a continuous variable using the total score of the Self-Control Scale (Tangney et al., 2004), a 36-item self-report measure whose scores can range from 36-180, with higher scores indicating higher levels of self-control. The scale assesses being disciplined, resisting temptation, and breaking habits as elements demonstrative of self-control (Tangney et al., 2004). Amongst samples of undergraduate students, the scale has been found to have high internal consistency ($\alpha = 0.89$) and good test-retest reliability ($r = .89$; Tangney et al., 2004). To the investigator's knowledge, this was the first study to administer the scale to a sample of PLWH. Self-control score was mean-centered for Primary Aim 2 and Exploratory Aim 1 (wherein moderation was included), in order to make the gender comparison more informative and useful; by mean-centering, the lower-order effect of gender was made more interpretable, such that individuals were compared at an average level of self-control rather than at a true zero score, which is outside the range of the Self-Control Scale (Tangney et al., 2004).

Alcohol use.

Drinking status. Drinking status was assessed via two questionnaire items; participants reported (1) whether they have ever used alcohol in their life (Yes/No) and (2) whether they currently use alcohol (Yes/No). Participants were classified categorically into groups of Current Drinking (i.e., responded "yes" to both questions) or Current Abstinence, with the latter group including subgroups of Never Drinking and Former Drinking (i.e., responded "no" to the first question, or responded "yes" to the first question and "no" to the second question, respectively).

Number of drinking days per week. Participants reported on how many days per week they use alcohol, originally intended to be a continuous variable with a possible range of 1-7, but was dichotomized for analysis into 1-2 or 3-7.

Number of drinks consumed per week. Participants reported on how many days per week they use alcohol (same question as above) and on how many drinks they consume each time. These two questionnaire items were originally intended to be combined (i.e., multiplied) to produce one continuous variable of number of drinks consumed per week, but the variable was dichotomized for analysis, using a median split, into 1-3 or ≥ 4.

Excessive alcohol use.

Heavy drinking. Engagement in heavy drinking was defined dichotomously by the number of drinks consumed per week, by gender, using the CDC criteria for heavy drinking (Centers for Disease Control and Prevention, 2016). Number of drinks consumed per week was calculated as above, using the same two questionnaire items. Heavy drinking in female participants constituted the consumption of ≥ 8 alcoholic beverages per week, and heavy drinking in male participants constituted the consumption of ≥ 15 alcoholic beverages per week.

Binge drinking. Engagement in binge drinking was defined dichotomously by the number of drinks consumed on one occasion, by gender, using the questionnaire item asking participants to report on the number of drinks that they consume each time that they drink. Binge drinking in female participants constituted the consumption of ≥ 4 alcoholic beverages on one occasion, and in male participants, ≥ 5 alcoholic beverages on one occasion, using the USDHHS criteria for binge drinking (US Department of Health and Human Services, 2004).

Recency of alcohol use. Participants reported on when they last drank alcohol, in one questionnaire item. This measure was used in reporting sample characteristics.

Data Analysis

Power analysis. Power calculations were based on the hypotheses for the primary aims, i.e., that individuals who currently drink would report lower self-control than would those who currently abstain (*Hypothesis 1*), and that level of self-control would relate negatively to: number of drinking days per week (*Hypothesis 2a*), number of drinks consumed per week (*Hypothesis 2b*), engagement in heavy drinking (*Hypothesis 2c*), and engagement in binge drinking (*Hypothesis 2d*).

Each power analysis estimated medium effects based on past research that has demonstrated a moderate correlation between self-control and alcohol use (e.g., amount consumed per week; $r = -0.38$, $p = 0.002$; Morutwa & Plattner, 2014). In anticipation of conducting an independent samples one-way analysis of variance (ANOVA) with an α of .05 to test *Hypothesis 1*, it was calculated that a total sample size of 128 participants (64 per drinking status group) would provide > 80% (i.e., approximately 98.8%) power to detect medium effects ($f = .25$). In anticipation of conducting linear regression analyses, consistent with the original plan for data analysis, each with an α of .05, to test *Hypotheses 2a and 2b,* it was calculated that a total sample size of 55 participants would provide > 80% (i.e., approximately 96.8%) power to detect medium effects ($f^2 = .15$). Power analyses for the binomial logistic regressions to test *Hypotheses 2c and 2d*, each with an α of .05 with > 80% power to detect medium effects, could not be run prior to data analysis, as data analysis would have been required in order to procure values for some of the input parameters.

The present sample consisted of approximately 124% more participants than the calculated total sample size (i.e., 287 rather than 128) and of approximately 60% more participants who currently drink alcohol than the calculated subsample size (i.e., 88 rather than 55), intended to buffer against possible unusable data, such as missing values and extreme outliers. The actual number of participants per drinking status group also exceeded that of the power analysis conducted for *Hypothesis 1* (i.e., 88 individuals who currently drink and 188 individuals who currently abstain, in contrast to 64 participants per drinking status group). The power analyses above were performed using G*Power 3.1.9.2 (Faul et al., 2007).

Statistical analysis.

Preliminary analyses. For Primary Aim 1: The self-control variable was checked for significant outliers and tested for approximate normality using the Shapiro-Wilk test. Homogeneity of variances was tested using Levene's test.

For Primary Aim 2a, Primary Aim 2b, Exploratory Aim 1a, and Exploratory Aim 1b: The relationships between the dependent variable in each regression analysis (i.e., number of drinking days per week and number of drinks consumed per week) and each independent variable (i.e., self-control and demographic variables) were checked for linearity by visual inspection of scatterplots and partial regression plots. Independence of observations was checked using the Durbin-Watson statistic. Data were tested for homoscedasticity and checked for significant outliers. Lastly, residuals were checked for approximate normal distribution, by use of a histogram with a superimposed normal curve.

For Primary Aim 2c, Primary Aim 2d, Exploratory Aim 1c, and Exploratory Aim 1d: The relationship between continuous independent variables (e.g., self-control) and the logit

transformation of each dependent variable (i.e., heavy drinking and binge drinking) were tested for linearity using the Box-Tidwell procedure.

The drinking status groups (i.e., Current Drinking and Current Abstinence) were compared on measures of demographics using *t* tests and chi-square tests as appropriate for continuous and categorical variables, respectively. The gender groups (who currently drink alcohol) and the subgroups that constitute the current abstinence group (i.e., former drinking and never drinking) were subjected to similar comparisons.

Associations between demographic variables and dependent variables were examined, using either a point-biserial correlation (between one continuous and one dichotomous variable) or chi-square test of independence (between two categorical variables). Demographic variables were included as covariates when a significant association was found.

For Exploratory Aim 2 (specifically Exploratory Aim 2b): Variables were tested for linearity, outliers, and sufficient sample size.

Primary Aim 1. The outcome variable in the first primary aim was the difference in level of self-control between individuals who currently drink and those who currently abstain from alcohol. This difference in self-control between drinking status groups was determined using an independent samples one-way ANOVA. As deemed appropriate by preliminary analyses, analysis of covariance (ANCOVA) was also used.

Primary Aim 2. The outcome variables in the second primary aim included the relationships between level of self-control and each of the following: number of drinking days per week (Primary Aim 2a), number of drinks consumed per week (Primary Aim 2b), heavy drinking (Primary Aim 2c), and binge drinking (Primary Aim 2d). While Primary

Aims 2a and 2b originally included continuous dependent variables to be evaluated using linear regression analysis, these data were found to be inappropriate for linear regression; thus, the dependent variables were dichotomized, and binomial logistic regression analyses were used instead. Primary Aims 2c and 2d (whose dependent variables were dichotomous) were each evaluated using binomial logistic regression analysis.

Exploratory Aim 1. The outcomes of the first exploratory aim included the relationships between level of self-control and each of the following, when moderated by gender: number of drinking days per week (Exploratory Aim 1a), number of drinks consumed per week (Exploratory Aim 1b), heavy drinking (Exploratory Aim 1c), and binge drinking (Exploratory Aim 1d). The relationships were determined using hierarchical regressions with gender added as an interaction term to each.

Exploratory Aim 2. Given that the present study was the first to administer the Self-Control Scale (Tangney et al., 2004) to a sample of adults living with HIV, psychometrics of the scale for this sample were examined, using Cronbach's alpha as a measure of internal consistency (Exploratory Aim 2a) and principal components analysis (PCA) as a method of variable-reduction (Exploratory Aim 2b).

Chapter III: Results

Sample Recruitment and Characteristics

Sample recruitment. See Figure 2 for a flowchart of the recruitment process culminating in a final analytic sample. Recruitment took place over the course of a 13-month period, from March 22, 2017 to April 19, 2018, during which study personnel approached 445 individuals in the waiting room of the CPL to screen for eligibility and to gauge interest in participation. Of these 445 individuals, 147 did not complete the study for one or more reasons (i.e., the reasons cited are not mutually exclusive; for details, see Figure 2), and 298 individuals completed the study. Eleven of these 298 individuals were then excluded from analysis post hoc due to reporting-related issues (see Figure 2), leaving a final analytic sample of 287 individuals.

Characteristics of the full sample. See Table 1 for demographic, self-control, and alcohol drinking status characteristics of the full sample (n = 287). The sample had a mean age of almost 51, with over half of the participants identifying as male, as single, as Latino/a ethnicity and as Black/African-American race. Nearly three-quarters of the sample identified as heterosexual, and approximately half (with nearly equal division) of the sample reported their level of educational attainment as either *9th-11th grade* or *some college*. The mean BMI was classified in the overweight designation (Centers for Disease Control and Prevention, 2020), and the level of self-control ranged from 72-169, with a mean score of approximately 122.

Sample characteristics by alcohol drinking status. There were more than twice as many individuals reporting that they do not currently drink alcohol (Current Abstinence group, *n* = 188) than those reporting that they currently drink alcohol (Current Drinking group, *n* = 88). Among those currently abstaining from alcohol use, there was a larger percentage of those reporting that they formerly drank (i.e., Former Drinking subgroup, *n* = 106) than that they have never drunk alcohol (Never Drinking subgroup, *n* = 82). See Table 2 for a comparison of demographic and cigarette smoking status characteristics between those who reported current drinking and those who reported current abstinence from alcohol use. The Current Abstinence group was significantly older than the Current Drinking group, and there were significant differences in the representation of gender and sexual orientation categories between groups, such that: (a) there were more women than men in the Current Drinking group and more men than women in the Current Abstinence group (note that there were no transgender women in the Current Drinking group and 2 transgender women in the Current Abstinence group), and (b) there was a greater proportion of heterosexual individuals in the Current Abstinence group than in the Current Drinking group.

Sample characteristics by drinking status subgroup. See Table 3 for a comparison of demographic characteristics between the Never Drinking and Former Drinking subgroups. The Former Drinking subgroup was significantly older than the Never Drinking subgroup, and there was a significant difference in the representation of ethnic categories between subgroups, such that there were more than twice as many non-Latino/a individuals in the Former Drinking group than in the Never Drinking group.

Sample characteristics for the Current Drinking group. See Table 4 for alcohol use characteristics of the Current Drinking group. The mean number of drinking days per week was approximately 2, and the mean number of drinks consumed per week was 7. Heavy drinking was present in approximately one-quarter of this subsample, while binge drinking was present in almost 19% of the subsample. The mean number of days since last alcohol use was approximately 18.

Sample characteristics by gender for the Current Drinking group. See Table 5 for a comparison of demographic characteristics between women and men within the Current Drinking group. Men had a significantly higher BMI than did women, and there was a significant difference in the representation of sexual orientation categories between groups such that more women than men identified as homosexual or bisexual/other.

Primary Analyses

Primary Aim 1: Within a sample of adults living with HIV, to determine whether there were differences in level of self-control by alcohol drinking status. Preliminary analysis (including inspection of a boxplot of the data; see Appendix A) elucidated three possible outliers in self-control score when examined by alcohol drinking status (2 outliers in the Current Abstinence group, 1 outlier in the Current Drinking group); however, given that the suggested outliers were neither outside of the valid range nor truly distant from other values of the self-control variable, the identified values were not deemed to be true outliers, and the ANOVA was run as planned. No significant difference was found in level of self-reported self-control between the Current Drinking group and the Current Abstinence group (see Table 6).

Preliminary analysis revealed that one demographic variable (i.e., ethnicity) was related to self-control (see Table 7) and met the assumption of homogeneity of slopes (i.e., the interaction term was not statistically significant, $F(1, 182) = .45$, $p = .503$, such that there was no significant interaction between ethnicity and drinking status in relation to self-control) and thus, ethnicity was included as a covariate in the following ANCOVA. The ethnicity covariate included only Latino/a and non-Latino/a individuals, excluding 9 participants who responded, "don't know/not sure" to the questionnaire item, "What is your ethnicity?", because of the small group size and reasoning that inclusion of this group would not provide a conceptually meaningful unit for comparison, akin to a refusal to respond to the given questionnaire item. After adjusting for ethnicity, there was still no significant difference in level of self-reported self-control between the Current Drinking group and the Current Abstinence group (see Table 8).

Primary Aim 2: Within a subsample of adults living with HIV who currently drink alcohol, to examine whether level of self-control was related to quantity and frequency of alcohol use.

Primary Aim 2a: To examine whether level of self-control was related to number of drinking days per week, within a subsample of adults living with HIV who currently drink alcohol. When the assumptions for a linear regression were tested, it was found that the residuals were not normally distributed (i.e., there was skew, as assessed by visual inspection of a frequency histogram of number of drinking days per week), so an attempt was made to address the shape of the dependent variable (i.e., number of drinking days per week), by trying to transform the dependent variable using log transformation, to determine whether the data could fit a linear model. Number of drinking days per week had extreme positive skew (such

that n = 38 at 1 day per week, with decreasing frequencies and a bump in number of participants at 7 days per week; see Supplemental Figure 1). Due to that extreme skew, parametric testing, including an ordinary least squared regression, could not be used (as the assumptions would not be met). As these data were not appropriate for linear regression, the decision was made to run a binomial logistic regression instead, dichotomizing responses for number of drinking days per week into 1-2 days (n = 50) or 3-7 days (n = 24).

Preliminary analyses for Primary Aim 2a included running point-biserial correlations and chi-square tests of independence, between continuous (i.e., age, BMI), multinomial (i.e., marital status, race, sexual orientation, educational attainment), and dichotomous (i.e., gender, ethnicity) demographic variables, respectively, and the number of drinking days per week variable. For these analyses within the Current Drinking group, the gender variable was included as a dichotomous – rather than multinomial – variable, as all individuals in this group identified as either male or female, and the ethnicity variable was also included as dichotomous (Latino/a, non-Latino/a) after excluding 3 participants who responded, "don't know/not sure" to the questionnaire item, "What is your ethnicity?" (see Table 2). No significant association was found between any demographic variable and the number of drinking days per week variable (see Table 9); therefore, no covariates were included in the binomial logistic regression analysis used for Primary Aim 2a.

Using the Box-Tidwell procedure, self-control was found to be linearly related to the logit transformation of number of drinking days per week (i.e., the linearity assumption was met). Using casewise diagnostics, no outliers were found. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 8.40$, $p = .396$.

The model that examined number of drinking days per week based on self-control overall was significant, $\chi^2(1) = 4.04$, $p = .044$, explaining 8.7% (Nagelkerke R^2) of the variance in number of drinking days per week; however, self-control was not a significant predictor of number of drinking days per week in this model (see Table 10). As a follow-up to the finding that the model was significant but that self-control was not a significant predictor, frequency histograms of self-control by number of drinking days per week were examined (see Supplemental Figure 2).

Primary Aim 2b: To examine whether level of self-control was related to number of alcoholic drinks consumed per week, within a subsample of adults living with HIV who currently drink alcohol. When the assumptions for a linear regression were tested, it was found that, as in Primary Aim 2a, the residuals were not normally distributed (i.e., there was extreme positive skew, as assessed by visual inspection of a frequency histogram of number of alcoholic drinks consumed per week; see Supplemental Figure 3), so an attempt was made to address the shape of the dependent variable (i.e., number of alcoholic drinks consumed per week), by trying to transform the dependent variable using log transformation, to determine whether the data could fit a linear model. Trying a log transformation produced residuals that were still positively skewed, however not as extreme. An inverse transformation was also attempted, without much improvement. Taken together, even with log and inverse transformations, the data did not meet the assumptions, indicating that the number of alcoholic drinks consumed per week data were not appropriate for a linear regression. Therefore, the decision was made to run binomial logistic regressions instead, using a median split that dichotomized responses for number of alcoholic drinks consumed per week into 1-3 drinks ($n = 37$) or ≥ 4 drinks ($n = 33$).

Preliminary analyses for Primary Aim 2b included running point-biserial correlations and chi-square tests of independence, between continuous (i.e., age, BMI), multinomial (i.e., marital status, race, sexual orientation, educational attainment), and dichotomous (i.e., gender, ethnicity) demographic variables, respectively, and the number of alcoholic drinks consumed per week variable. For these analyses within the Current Drinking group, the gender variable was included as a dichotomous – rather than multinomial – variable, as all individuals in this group identified as either male or female. The ethnicity variable was also included as dichotomous (Latino/a, non-Latino/a) after excluding 3 participants who responded, "don't know/not sure" to the questionnaire item, "What is your ethnicity?" (see Table 2).

There was a significant association between educational attainment and number of alcoholic drinks consumed per week (see Table 11); through analysis of adjusted standardized residuals (an approach that uses cell-by-cell comparison), it was found that educational attainment of (1) *less than high school graduate* was associated with consuming ≥ 4 drinks per week, (2) *some college or more* was associated with consuming 1-3 drinks per week, and (3) *high school graduate/GED* was not associated with number of drinks consumed per week. Thus, two binomial logistic regression analyses were run for Primary Aim 2b: one without covariates and one including educational attainment as a covariate.

For the unadjusted regression: Using the Box-Tidwell procedure, self-control was found to be linearly related to the logit transformation of number of alcoholic drinks consumed per week (i.e., the linearity assumption was met). Using casewise diagnostics, no outliers were found. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 5.77$, $p = .673$.

The model that examined number of alcoholic drinks consumed per week based on self-control overall was not significant, $\chi^2(1) = .63$, $p = .428$, explaining 1.4% (Nagelkerke R^2) of the variance in number of alcoholic drinks consumed per week. Self-control was not a significant predictor of number of alcoholic drinks consumed per week in this model (see Table 12).

Educational attainment was included as a covariate in the model that examined the relationship between self-control and number of alcoholic drinks consumed per week. Educational attainment was dummy-coded, using *less than high school graduate* and *high school graduate/GED* as the indicator groups and *some college or more* as the reference group. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 4.37$, $p = .823$.

The model that examined number of alcoholic drinks consumed per week based on self-control and educational attainment overall was significant, $\chi^2(3) = 9.80$, $p = .020$, explaining 20.7% (Nagelkerke R^2) of the variance in number of alcoholic drinks consumed per week; however, self-control was not a significant predictor of number of alcoholic drinks consumed per week in this model: only the covariate of educational attainment was a significant predictor, such that *less than high school graduate* educational attainment was associated with greater odds of a larger number of alcoholic drinks consumed per week (see Table 13).

Primary Aim 2c: To examine whether level of self-control was related to engagement in heavy drinking, within a subsample of adults living with HIV who currently drink alcohol. Preliminary analyses for Primary Aim 2c included running point-biserial correlations and chi-square tests of independence, between continuous (i.e., age, BMI), multinomial (i.e.,

marital status, race, sexual orientation, educational attainment), and dichotomous (i.e., gender, ethnicity) demographic variables, respectively, and the engagement in heavy drinking variable. For these analyses within the Current Drinking group, the gender variable was included as a dichotomous – rather than multinomial – variable, as all individuals in this group identified as either male or female. The ethnicity variable was also included as dichotomous (Latino/a, non-Latino/a) after excluding 3 participants who responded, "don't know/not sure" to the questionnaire item, "What is your ethnicity?" (see Table 2). Significant associations were found between (1) gender and heavy drinking, and (2) BMI and heavy drinking (see Table 14), such that (1) female gender was associated with heavy drinking, and (2) lower BMI was associated with heavy drinking. Therefore, two binomial logistic regression analyses were run for Primary Aim 2c: one without covariates and one including gender and BMI as covariates.

For the unadjusted regression: Using the Box-Tidwell procedure, self-control was found to be linearly related to the logit transformation of heavy drinking (i.e., the linearity assumption was met). Using casewise diagnostics, no outliers were found. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 4.35$, $p = .824$.

The model examining engagement in heavy drinking based on self-control overall was not significant, $\chi^2(1) = 1.39$, $p = .239$, explaining 3.4% (Nagelkerke R^2) of the variance in heavy drinking. Self-control was not a significant predictor of heavy drinking in this model (see Table 15).

Gender and BMI were included as covariates in the model that examined the relationship between self-control and heavy drinking. Gender was dummy-coded, using

male as the indicator group and female as the reference group. Using the Box-Tidwell procedure, BMI was found to be linearly related to the logit transformation of heavy drinking (i.e., the linearity assumption was met). Using casewise diagnostics, one standardized residual with a value of 2.58 standard deviations was found and kept in the analysis. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 6.46$, $p = .596$.

The model overall was found to be significant, $\chi^2(3) = 14.41$, $p = .002$, explaining 32.6% (Nagelkerke R^2) of the variance in heavy drinking; however, self-control was not a significant predictor of heavy drinking in this model: only the covariate of gender was a significant predictor, such that male gender was associated with lower odds of heavy drinking (see Table 16).

Primary Aim 2d: To examine whether level of self-control was related to engagement in binge drinking, within a subsample of adults living with HIV who currently drink alcohol. Preliminary analyses for Primary Aim 2d included running point-biserial correlations and chi-square tests of independence, between continuous (i.e., age, BMI), multinomial (i.e., marital status, race, sexual orientation, educational attainment), and dichotomous (i.e., gender, ethnicity) demographic variables, respectively, and the engagement in binge drinking variable. For these analyses within the Current Drinking group, the gender variable was included as a dichotomous – rather than multinomial – variable, as all individuals in this group identified as either male or female, and the ethnicity variable was also included as dichotomous (Latino/a, non-Latino/a) after excluding 3 participants who responded, “don’t know/not sure” to the questionnaire item, “What is your ethnicity?” (see Table 2).

Significant associations were found between (1) gender and binge drinking, (2) sexual orientation and binge drinking, and (3) BMI and binge drinking (see Table 17), such that (1) female gender was associated with the presence of binge drinking; (2) heterosexual orientation was associated with the absence of binge drinking, homosexual orientation was not associated with binge drinking, and bisexual/other orientation was associated with the presence of binge drinking; and (3) lower BMI was associated with the presence of binge drinking. Therefore, two binomial logistic regression analyses were run for Primary Aim 2d: one without covariates and one including gender, sexual orientation, and BMI as covariates.

For the unadjusted regression: Using the Box-Tidwell procedure, self-control was found to be linearly related to the logit transformation of binge drinking (i.e., the linearity assumption was met). Using casewise diagnostics, no outliers were found. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(7) = 5.07$, $p = .652$.

The model examining binge drinking based on self-control overall was not significant, $\chi^2(1) = .62$, $p = .430$, explaining 1.5% (Nagelkerke R^2) of the variance in binge drinking. Self-control was not a significant predictor of binge drinking in this model (see Table 18).

Gender, sexual orientation, and BMI were included as covariates in the model that examined the relationship between self-control and binge drinking. Gender was dummy-coded, using male as the indicator group and female as the reference group. Using the Box-Tidwell procedure, BMI was found to be linearly related to the logit transformation of binge drinking (i.e., the linearity assumption was met). Using casewise diagnostics, three standardized residuals with a value greater than 2.5 standard deviations (i.e., 6.549, 2.543,

and 2.677) were found and kept in the analysis. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 9.89$, $p = .273$.

The model examining engagement in binge drinking based on self-control, gender, sexual orientation, and BMI overall was significant, $\chi^2(5) = 13.07$, $p = .023$, explaining 31.0% (Nagelkerke R^2) of the variance in binge drinking; however, self-control, gender, sexual orientation, and BMI were not significant predictors of binge drinking in this model (see Table 19). As a follow-up to the finding that the model was significant but that there were no significant predictors, frequency histograms of BMI by binge drinking were examined (see Supplemental Figure 4).

Exploratory Analyses

Exploratory Aim 1: Within a subsample of adults living with HIV who currently drink alcohol, to explore whether gender moderated the relationships between self-control and quantity and frequency of alcohol use.

Exploratory Aim 1a: To explore whether gender moderated the relationship between self-control and number of drinking days per week, within a subsample of adults living with HIV who currently drink alcohol. To address Exploratory Aim 1a, hierarchical regression was used, building on the model in Primary Aim 2a, which examined the relationship between self-control and number of drinking days per week. In the second step, gender was added into the model with self-control, to examine whether either had main effects adjusting for each other, and in a third step, an interaction term (self-control by gender) was added to test whether gender moderated the relationship between self-control and number of drinking days per week. To make the interaction model more interpretable, self-control was centered

at its mean. Gender was dummy-coded, using male as the indicator group and female as the reference group.

In the second step, when gender was added into the model with self-control, the Hosmer and Lemeshow Test indicated that the model was not equivalent across subgroups, $\chi^2(8) = 17.25$, $p = .028$. Gender did not significantly improve the model, $\chi^2(1) = .01$, $p = .910$. The model that examined drinking days per week by self-control and gender was overall not significant, $\chi^2(2) = 4.05$, $p = .132$, explaining 8.8% (Nagelkerke R^2) of the variance in number of drinking days per week. When adjusting for each other, neither self-control nor gender individually was a significant predictor of number of drinking days per week (see Table 20).

In the third step, the interaction of self-control by gender was then added into the model. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 14.77$, $p = .064$. The interaction of self-control by gender did not significantly improve the model, $\chi^2(1) = 1.10$, $p = .294$. The model that examined drinking days per week by self-control, gender, and their interaction was overall not significant, $\chi^2(3) = 5.15$, $p = .161$, explaining 11% (Nagelkerke R^2) of the variance in number of drinking days per week. The interaction term (self-control by gender) was not significant; thus, gender did not moderate the relationship between self-control and number of drinking days per week (see Table 21).

Exploratory Aim 1b: To explore whether gender moderated the relationship between self-control and number of alcohol drinks consumed per week, within a subsample of adults living with HIV who currently drink alcohol. To address Exploratory Aim 1b, hierarchical regression was used, building on the model in Primary Aim 2b, which examined the

relationship of self-control and educational attainment predicting the number of alcoholic drinks consumed per week. In the second step, gender was added into the model to assess main effects. In the third step, the interaction of self-control by gender was added to test whether gender moderated the relationship of self-control predicting the number of alcoholic drinks consumed per week. To make the interaction model more interpretable, self-control was centered at its mean. Gender was dummy-coded, using male as the indicator group and female as the reference group, and educational attainment was dummy-coded, using *less than high school graduate* and *high school graduate/GED* as two different indicator groups and *some college or more* as the reference group.

In the second step, when gender was added into the model with self-control and educational attainment, the Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 3.68$, $p = .884$. Gender did not significantly improve the model, $\chi^2(1) = .96$, $p = .327$. The model that examined number of alcoholic drinks consumed per week by self-control, educational attainment, and gender was overall significant, $\chi^2(4) = 10.76$, $p = .029$, explaining 22.6% (Nagelkerke R^2) of the variance in number of alcoholic drinks consumed per week. With each variable adjusted for the others, only educational attainment was a significant predictor of number of alcoholic drinks consumed per week; neither self-control nor gender was a significant predictor of number of alcoholic drinks consumed per week (see Table 22).

In the third step, the interaction of self-control by gender was then added into the model. The Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 2.94$, $p = .938$. The interaction of self-control by gender did not significantly improve the model, $\chi^2(1) = .82$, $p = .366$. The model that examined number of

alcoholic drinks consumed per week by self-control, educational attainment, gender, and the interaction between self-control and gender was overall significant, $\chi^2(5) = 11.58$, $p = .041$, explaining 24.1% (Nagelkerke R^2) of the variance in number of alcoholic drinks consumed per week. The interaction term (self-control by gender) was not significant; thus, gender did not moderate the relationship between self-control and number of alcoholic drinks consumed per week (see Table 23).

Exploratory Aim 1c: To explore whether gender moderated the relationship between self-control and engagement in heavy drinking, within a subsample of adults living with HIV who currently drink alcohol. To address Exploratory Aim 1c, hierarchical regression was used, building on the model in Primary Aim 2c, which examined the relationship of self-control, gender, and BMI predicting heavy drinking. In the second step, the interaction of self-control by gender was added to test whether gender moderated the relationship of self-control predicting heavy drinking. To make the interaction model more interpretable, self-control was centered at its mean. Gender was dummy-coded, using male as the indicator group and female as the reference group.

In the second step, when the interaction of self-control by gender was added into the model, the Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 8.01$, $p = .432$. The interaction of self-control by gender did not significantly improve the model, $\chi^2(1) = .18$, $p = .674$. The model that examined heavy drinking by self-control, gender, BMI, and the interaction between self-control and gender was overall significant, $\chi^2(4) = 14.59$, $p = .006$, explaining 33.0% (Nagelkerke R^2) of the variance in heavy drinking. The interaction term (self-control by gender) was not significant;

thus, gender did not moderate the relationship between self-control and heavy drinking (see Table 24).

Exploratory Aim 1d: To explore whether gender moderated the relationship between self-control and engagement in binge drinking, within a subsample of adults living with HIV who currently drink alcohol. To address Exploratory Aim 1d, hierarchical regression was used, building on the model in Primary Aim 2d, which examined the relationship of self-control, gender, sexual orientation, and BMI predicting binge drinking. In the second step, the interaction of self-control by gender was added to test whether gender moderated the relationship of self-control predicting binge drinking. To make the interaction model more interpretable, self-control was centered at its mean. Gender was dummy-coded, using male as the indicator group and female as the reference group, and sexual orientation was dummy-coded, using heterosexual and homosexual as the indicator groups and bisexual/other as the reference group.

In the second step, when the interaction of self-control by gender was added into the model, the Hosmer and Lemeshow Test indicated that the model was equivalent across subgroups, $\chi^2(8) = 9.47$, $p = .304$. The interaction of self-control by gender did not significantly improve the model, $\chi^2(1) = .02$, $p = .903$. The model that examined binge drinking by self-control, gender, sexual orientation, BMI, and the interaction between self-control and gender was overall significant, $\chi^2(6) = 13.09$, $p = .042$, explaining 31.1% (Nagelkerke R^2) of the variance in binge drinking. The interaction term (self-control by gender) was not significant; thus, gender did not moderate the relationship between self-control and binge drinking (see Table 25).

Exploratory Aim 2: Within a sample of adults living with HIV, to examine psychometrics of the Self-Control Scale. A total of 223 participants (i.e., 77.7% of the full sample) were included in the following analyses (i.e., Cronbach's alpha and PCA), with the remaining 64 cases excluded due to missing values.

Exploratory Aim 2a: To determine the internal consistency of the Self-Control Scale. The Self-Control Scale administered to this sample of adults living with HIV was found to have a Cronbach's alpha of 0.84, indicating a high level of internal consistency.

Exploratory Aim 2b: To perform variable-reduction on the Self-Control Scale. Prior to running a PCA, the suitability of this analysis for the present dataset was assessed. The correlation matrix was inspected, showing that all variables had at least one correlation coefficient whose absolute value was greater than 0.3. The overall Kaiser-Meyer-Olkin (KMO) measure was classified as "meritorious" at 0.86, and individual KMO measures were all greater than 0.74, with classifications ranging from "middling" to "marvelous" (Kaiser, 1974). The data were determined to be likely to factorize, as indicated by a significant Bartlett's Test of Sphericity ($p < .001$).

To assist with interpretability, a Varimax orthogonal rotation was used. The PCA revealed eight components with eigenvalues > 1, explaining 23.4%, 12.8%, 5.5%, 4.2%, 3.8%, 3.6%, 3.4%, and 3.1% of the total variance, respectively. Given that visual inspection of the scree plot (see Figure 3) suggested a retention of two components (Cattell, 1966) and a two-component solution approximated a simple structure, the decision was made to retain two components. See Table 26 for the component loadings and communalities of the rotated solution. The two-component solution explained 36.3% of the total variance. To confirm the appropriateness of using an orthogonal rotation, the component correlation matrix was

inspected post hoc, revealing that the two components were uncorrelated (r = -.04), indicating that this assumption was met.

Chapter IV: Discussion

The present study examined alcohol use (e.g., drinking status, number of drinking days per week, number of drinks consumed per week, heavy drinking, binge drinking) and level of self-reported self-control in a sample of adults living with HIV. Overall, the study found no significant relationship between self-control and alcohol use. Additionally, gender did not moderate the relationships between self-control and alcohol use. The Self-Control Scale (Tangney et al., 2004) was found to have high internal consistency and a two-component solution for the present sample. General findings as well as those specific to study aims will be discussed further below.

Regarding characteristics of the present sample, it should be noted that 31.9% of the sample reported current alcohol use, so fewer individuals reported alcohol consumption as compared to 40% of adults living with HIV in the US receiving medical care (Chander et al., 2008) and to 54.9% of adults in the general US adult population (Substance Abuse and Mental Health Services Administration, 2020). Within the present sample, more women than men reported current drinking (i.e., 59.1% versus 40.9%, respectively), which is in contrast to findings that men living with HIV in the US receiving medical care had greater odds of drinking than did women living with HIV [AOR 1.52 (95% CI, 1.07–2.16)] (Chander et al., 2008) and that, in the general US adult population, more men than women reported past-month alcohol use (i.e., 59.1% versus 51%, respectively) (Substance Abuse and Mental

Health Services Administration, 2020). Additionally, the mean self-control score of the present sample (i.e., 122.1) is noted to be higher than that of the undergraduate samples on which the Self-Control Scale was validated on: means of 114.47 and 102.66 were found in each of two samples by Tangney et al. (2004).

The first primary aim of the present study was to examine, within a sample of adults living with HIV, whether there were differences in level of self-control by alcohol drinking status. While it was hypothesized that PLWH who currently drink alcohol would report lower self-control than would PLWH who currently abstain from alcohol, the study found no significant difference in level of self-reported self-control between the Current Drinking group and the Current Abstinence group, both before and after adjusting for ethnicity (i.e., the only demographic variable examined that was significantly associated with self-control). This finding was counter to that of past literature, e.g., Morutwa and Plattner (2014), who found that trait self-control was related to alcohol use status, specifically within an undergraduate college student sample. While men and women did not differ on level of self-control within the present sample, future studies should examine gender differences in other aspects of self-control, such as self-control related to risky sexual behavior, as sexual behavior is a common mode of HIV transmission (Centers for Disease Control and Prevention, 2021). It may be particularly important to develop an understanding of the role of gender in sex-related self-control, given the context that women are at a greater risk of contracting HIV than are their male counterparts (Nicolosi et al., 1994).

This inconsistency in findings relative to past literature may point to there being factors or experiences specific to PLWH, rather than low self-control, that drive drinking behavior in many individuals within this population. For example, Wardell et al. (2018)

found that experiencing higher levels of HIV-related stigma was associated with alcohol use, potentially to self-medicate distress related to stigma, in PLWH. In a qualitative study that examined motivations for alcohol use within men living with HIV, Sileo et al. (2019) found that factors such as experiencing stress specific to HIV (including HIV-related stigma, receiving the diagnosis of HIV, and grieving the loss of close others whose cause of death was HIV) related to alcohol use, in addition to some more general factors such as stressors of relationship discord and financial concerns, as well as peer pressure. Future studies could use a quantitative research design to build upon and extend the findings of Sileo et al.'s (2019) qualitative study.

Another consideration is the way in which drinking status was determined within the present study's questionnaire. Participants were asked to respond "yes" or "no" to the question of whether they currently use alcohol; however, "current use" was not carefully defined, due to the fact that alcohol use was not a primary variable of interest within the parent study and the items were meant to be a broad assessment of alcohol use. For this reason, the Current Drinking group may have represented a more heterogeneous subsample of individuals who drink alcohol, perhaps making it more difficult for significant findings to emerge. Future studies may benefit from providing participants with a more operationalized definition of current drinking and/or collecting more detailed information about alcohol use and drinking history. Relatedly, future studies could collect data on participants' liver enzymes, to gain a better understanding of how different amounts or patterns of drinking are linked to liver functioning and PLWH's behavior, particularly risky behavior.

The second primary aim of the present study was to examine, within a subsample of adults living with HIV who currently drink alcohol, whether level of self-control was related

to quantity and frequency of alcohol use. While it was hypothesized that level of self-control would relate negatively to number of drinking days per week, number of alcoholic drinks consumed per week, engagement in heavy drinking, and engagement in binge drinking, self-control was not found to relate to any of these facets of alcohol use in this sample.

Responses for number of drinking days per week were dichotomized into 1-2 days or 3-7 days, which could theoretically represent and separate individuals whose drinking is limited to weekend days versus those who drink alcohol more often. While the model that examined number of drinking days per week based on self-control overall was significant, self-control was not a significant predictor of number of drinking days per week; this finding is likely because there were not data points at high levels of self-control for the group of participants who reported drinking 3-7 days per week, i.e., there was a restricted range of level of self-control.

It is interesting to note that within the model that examined number of alcoholic drinks consumed per week based on self-control and educational attainment, which was overall found to be significant, only the covariate of educational attainment was significantly associated with number of alcoholic drinks consumed per week (i.e., self-control was not significantly associated). Individuals with a *less than high school graduate* educational attainment were at greater odds of drinking more, as compared to those with *some college or more* education; individuals with *high school graduate/GED* educational attainment did not significantly differ from those with *some college or more* education on number of drinks. The finding here may suggest that attainment of *less than high school graduate* education represents an associate of number of drinks consumed for PLWH. Indeed, in a study aimed at identifying risk factors for alcohol abuse in PLWH, da Silva et al. (2017) found that low

education (i.e., fewer than 8 years of education) was one such associated risk factor. Similarly, Galvan et al. (2002) found that among PLWH, the odds of heavy drinking were higher for individuals with lower educational attainment, i.e., for those with some or completed college education, as compared to those without a high school diploma. In another study that examined alcohol use in PLWH, it was found that individuals with lower educational attainment (i.e., high school graduate/GED or less) were at increased likelihood for drinking more per week, when compared to those with more than high school graduate attainment (Shacham et al., 2011). Future studies, including longitudinal and qualitative studies, could further clarify the role of educational attainment in drinking behavior among PLWH, e.g., directionality of this relationship, addressing research questions related to whether alcohol use precedes and contributes to lower educational attainment or follows lower educational attainment.

In the process of identifying covariates for the model that examined engagement in heavy drinking, female gender was associated with greater likelihood of heavy drinking (male gender was associated with lower odds of heavy drinking), and lower BMI was associated with greater likelihood of heavy drinking. In a qualitative study that examined reasons for drinking alcohol among women living with HIV, Cook et al. (2016) noted that participants engaged in alcohol use for reasons such as to manage physical and/or emotional pain, feel a sense of control over their environment, cope with stressors, and conceal low self-esteem. Interestingly, the finding that participants drank as a way of asserting control may run counter to the hypothesized relationship between low self-control and alcohol use. Other reasons for drinking included “addiction” (described as difficulty stopping after initiation of drinking) and being influenced by others. One study that examined the

association between sex-related alcohol expectancies (i.e., beliefs about drinking as they relate to resultant sexual behavior) among PLWH found that expecting to be sexually disinhibited as a result of drinking (e.g., to engage in sexual behavior that the individual would not otherwise, if sober) was linked to hazardous drinking, dependence on alcohol, and problems due to alcohol use (Rogers et al., 2020). While alcohol expectancies have been demonstrated to be important variables related to drinking behavior within community samples (Aarons et al., 2003; Darkes & Goldman, 1993; Oei & Baldwin, 1994; Reich & Goldman, 2015; Scott-Sheldon et al., 2012; Wiers et al., 2003), there appears to be little research on this topic in samples of PLWH, apart from the Rogers et al. (2020) study described above. The authors' findings further support the idea that future studies should inquire about participants' reasons for drinking and alcohol expectancies, as well as measure the compulsion to drink, as responses may be quite heterogeneous, with perhaps only a particular subset of participants' drinking behavior being driven by low self-control in PLWH.

The finding that lower BMI was associated with heavy drinking in this sample is consistent with past literature (Boodram et al., 2009) that demonstrated that among women living with HIV, lower BMI was related to moderate-to-heavy drinking, which could at least in part be explained by the phenomenon of individuals consuming alcohol in place of nourishment of higher caloric value (Boodram et al., 2009). Additionally, having a lower BMI may relate to food insecurity among PLWH who consume alcohol (Kalichman et al., 2014).

Interestingly, while the model that examined engagement in binge drinking based on self-control, gender, sexual orientation, and BMI overall was significant, none of these

variables was significantly associated with binge drinking; this finding is likely because there were not data points at low and high levels of BMI for the group of participants who reported engaging in binge drinking, i.e., there was a restricted range of BMI.

The finding of nonsignificant relationships between level of self-control and quantity and frequency of alcohol use again differed from Morutwa and Plattner's (2014) finding, which demonstrated a moderate, inverse relationship between level of self-control and total amount of alcohol consumed within a week, such that lower self-control related to higher quantity of alcohol consumed. As discussed within the context of the first primary aim, it is possible that population-specific factors (e.g., HIV-related stigma) drive drinking behavior more so than low levels of self-control. Given that financial stressors were elucidated by Sileo et al. (2019) to motivate alcohol use among men with HIV, future studies should consider collecting and analyzing more data related to participants' socioeconomic status (e.g., income), as this may be particularly relevant for understanding drinking behavior in PLWH, a population that often has limited financial resources (Pellowski et al., 2013).

Additionally, the questionnaire items used to develop the variables of number of drinking days per week, number of alcoholic drinks consumed per week, engagement in heavy drinking, and engagement in binge drinking were limited in scope and relied solely upon participant self-report. To clarify and standardize responding amongst participants, future studies should consider including information related to standard alcoholic drink conversions within their questionnaires and/or having participants use an alcohol timeline follow-back method (Carney et al., 1998) to track their drinking behavior over a set period of time, perhaps with verification by an instrument that would provide objective, corroborative data (Madhombiro et al., 2019), such as a breathalyzer, to measure BAC levels. However,

the potential strengths of using a measure such as a breathalyzer should be weighed against its potential pitfalls, e.g., how readily it is accepted by participants, the associated financial costs in terms of equipment, and its perception of being more invasive, as well as the finding that self-report measures of alcohol use are generally accepted to be valid and reliable (Del Boca & Darkes, 2003). Carney et al. (1998) used a timeline follow-back method as a way to measure alcohol use by guided self-report, wherein participants were shown a calendar, asked to notate any recent special events as well as to use their own calendars (to aid recall), and asked to recall types and amounts of alcoholic drinks consumed. When compared to other measures of alcohol use, i.e., daily diaries and "electronic interviews" that involved recording alcohol use in real time, the timeline follow-back method approximated the measurements provided by the other two methods, however with slightly less reported alcohol use (Carney et al., 1998). Future studies could use these methodologies (e.g., timeline follow-back method, daily diaries, and/or real-time recordings of alcohol use) to aid in accuracy of reporting. Another important consideration in using a timeline follow-back method is reducing the number of days for which participants are asked to recall drinking behavior at one time, as the demands of an increased length of time of recall has corresponded to lower accuracy of recall (Hoeppner et al., 2010).

The first exploratory aim of the present study expanded on the second primary aim, by examining, within a subsample of adults living with HIV who currently drink alcohol, whether gender moderated the relationships between self-control and quantity and frequency of alcohol use. The study found that gender did not moderate any of these relationships, such that the relationships between self-control and alcohol use (i.e., number of drinking days per week, number of drinks consumed per week, heavy drinking, and binge drinking) did not

differ by gender. This finding is presented in the context of past mixed results regarding the role of gender in the relationship between self-control and alcohol use (e.g., Morutwa & Plattner, 2014; Muraven et al., 2005), and is consistent with the study by Muraven et al. (2005) wherein gender was not found to have an interaction effect on the relationship between self-control exertion and alcohol use.

While it may be the case that the relationship between self-control and alcohol use is similar between men and women, it is also possible that such gender differences exist but were not detected within the context of the present study due to some of the limitations listed above (e.g., no detailed assessments of alcohol use or measures of cognitive aspects of alcohol use). Notably, if there are other, more pertinent variables, specific and/or common to PLWH (e.g., stigma and other stressors related to HIV) that are important for understanding drinking behavior in this population, it would be useful for future studies to continue examining gender differences in such variables. Examination of possible gender differences in variables related to alcohol consumption among PLWH could guide clinical intervention, supporting either an approach that is tailored to gender (i.e., based on variables that differ by gender) or, alternatively, an approach that applies to all PLWH, regardless of gender.

The second exploratory aim of the present study examined, within a sample of adults living with HIV, psychometrics of the Self-Control Scale (Tangney et al., 2004). The Self-Control Scale, whose reliability had not heretofore been examined in a sample of PLWH, was found to have high internal consistency for this study sample, indicating agreement among items of what the scale measures, comparable to what has been demonstrated by Tangney et al. (2004) (i.e., Cronbach's alpha of 0.84 versus 0.89). The scale was found to have two meaningful components that its items loaded highly onto, unlike what was found by

Tangney et al. (2004), who demonstrated having five meaningful factors. In comparing the two components that emerged in the present study to the five factors found by Tangney et al. (2004), it appeared to be that, within the present study, Component 1 was mostly consistent with an "inclination toward Deliberate/Nonimpulsive action" (i.e., Factor 2 of Tangney et al., 2004), and that Component 2 reflected conscientiousness, largely consistent with a combined "range of Healthy Habits" and "Reliability" (i.e., Factors 3 and 5, respectively, of Tangney et al., 2004). The component structure of the Self-Control Scale was different for PLWH in the present sample than for the community sample that it was validated on. The content of the scale (e.g., how items are seen as "hanging together") may be different for PLWH, and further research could examine more closely the types of self-control that are relevant to PLWH and how these aspects of self-control relate to important behaviors. A possible limitation of the two-component solution used in the present study is that it explained only 36.3% of the total variance. Overall, the finding that a difference emerged in the component structure between samples points to the importance of examining the psychometrics of scales when administered to novel populations.

Clinical Implications

Alcohol use has important clinical implications for PLWH, including reduced antiretroviral medication adherence (Braithwaite et al., 2005; Chander et al., 2006; Samet et al., 2004; Tucker et al., 2003), progression of HIV infection (Asiimwe et al., 2017; Lesko et al., 2021), further immunosuppression (Baum et al., 2010), compounded hepatotoxicity (Núñez et al., 2001), and increased likelihood of engagement in risky sexual behaviors (Kalichman et al., 2002; Stein et al., 2005), wherein risks include acquisition of additional strains of HIV and transmission of the infection to others. Given the known consequences of

drinking for individuals with HIV, it is particularly imperative for clinicians working with this patient population to address alcohol use (Agabio & Leggio, 2019). Screening for and assessing alcohol use would inform treatment planning, particularly as it relates to providing – or referring patients so that they may engage in – interventions that target alcohol use in PLWH.

Clinicians should be aware of current interventions that exist for alcohol use in PLWH and seek to integrate them into clinical care when possible. One such intervention is integrated stepped alcohol treatment, an approach that builds upon itself based on patient response. It may include a first step of medication management targeting alcohol use; a second step, for individuals not meeting drinking goals, of Motivational Enhancement Therapy (targeting motivation to alter drinking behavior); and a third step of referring patients to a higher level of care, as indicated depending on the patient's alcohol use (Edelman et al., 2019). A similar integrated stepped alcohol treatment used by Edelman et al. (2020) included a first step of the Brief Negotiated Interview, a manualized treatment that draws upon motivational interviewing and the stages of change model of behavior change; a second step of Motivational Enhancement Therapy (targeting motivation to drink less alcohol); and a third step of medication management targeting alcohol use (Edelman et al., 2020).

Another intervention approach described by Sanchez and Finnell (2017) is Screening, Brief Intervention, and Referral to Treatment (SBIRT), wherein a measure is used to screen for alcohol use, a discussion aimed at providing education on the consequences of alcohol use and increasing motivation to alter drinking behavior takes place, and referral to specialized care is made (Sanchez & Finnell, 2017). A computerized brief intervention

informed by motivational interviewing strategies (e.g., weighing pros and cons of alcohol use, setting goals related to one's use) has also shown promise for reducing drinking behavior in PLWH (McCaul et al., 2021).

The present study's demonstrations that individuals with *less than high school graduate* education drank more alcohol than those with at least *high school graduate/GED* educational attainment, and that women and individuals with lower BMI were more likely to engage in heavy drinking point to possible risk factors and/or important correlates of drinking in PLWH that clinicians should consider while treating such individuals. Clinicians treating PLWH should be aware of the associations found between alcohol use and (a) lower educational attainment, (b) female gender, and (c) lower BMI, and perhaps be particularly sensitive toward screening for and addressing alcohol use in these subsets of PLWH.

Research Implications

Considering the gravity of the clinical implications of alcohol use within PLWH (discussed above), this proves to be an important area of study that has not yet received due attention in the literature. A number of research implications have been described above and are summarized here. Overall, more research is needed to better understand and address alcohol use among PLWH.

Gaining a better understanding of the factors associated with drinking behavior in this population is crucial to promoting the health of these individuals and that of the public at large. The findings of the present study, couched within findings of past literature conducted both with samples of PLWH and with other samples, may suggest that PLWH have factors particular to their lived experience that may be linked to their alcohol use. While self-control was not associated with alcohol use in the present study, future research should examine

other variables (e.g., alcohol expectancies) that may be related to alcohol use among PLWH, especially variables that have related to alcohol consumption in community samples and that are targetable and modifiable through intervention. Further, while there were no differences found by gender in the relationship between self-control and alcohol use within the present study, future research on variables related to alcohol use should continue to examine demographic differences (as discussed above and as suggested by Wechsberg et al., 2021); such findings may be useful in guiding targeted interventions for specific subgroups of PLWH.

Findings of the present study regarding psychometrics of the Self-Control Scale point to its retained internal consistency for PLWH compared to other samples where the measure has been used in the past, suggesting its appropriateness for administration to PLWH in future studies examining self-control in PLWH. Future research could also examine other psychometric properties of the Self-Control Scale among samples of PLWH (e.g., analyses related to validity, as these were not performed in the present study).

Limitations

The present study had a number of limitations in addition to those discussed above (e.g., lacking an operationalized definition of current drinking, having a restricted range in level of self-control amongst participants drinking 3-7 days per week and in BMI for those engaging in binge drinking). As the CPL treats patients in one community in the Bronx, New York, and demographics (e.g., race, ethnicity) were different in this sample compared to other studies that have examined self-control and alcohol use, findings from the present study may lack generalizability to other communities in the US and worldwide. The data collected on all variables of interest for the present study (i.e., demographics, self-control, and alcohol

use) were based on self-report and therefore subject to response bias, e.g., due to errors in memory and/or as a result of social desirability bias. Additionally, as there was no assessment (by self-report or breathalyzer) of recent alcohol use, there is a possibility that some patients who completed the study were under the influence of alcohol at the time, which could impact their judgment and accuracy in responding to questionnaire items.

Furthermore, the present study could not account for health literacy or education specifically as it pertains to alcohol use by those living with HIV; this may confound the variable of self-control, such that if PLWH are unaware of the risks of drinking, their engagement in drinking may not be truly reflective of lower levels of self-control. Notably, however, a recent qualitative study conducted with a sample of PLWH demonstrated that these individuals possess a fair amount of knowledge about the consequences of alcohol use while being treated for HIV (Madhombiro et al., 2018). Data were not collected on motivation to quit or cut down on drinking or on trait temptation to drink, so the role of each could not be assessed in the relationships studied. Additionally, the decision to not collect identifying information (e.g., participant names, contact information) raises the possibility that participants completed the questionnaire more than once each, which would constitute an unintended, undesired consequence.

Regarding the excessive alcohol use measures that were administered in the present study, each one was composed of two to three questionnaire items (including the item on gender), given the data that were available, rather than by use of a more detailed assessment of this information (e.g., the Alcohol Use Disorders Identification Test [AUDIT]; Saunders et al., 1993). Similarly, the variable of "number of drinks consumed per week" was composed of two questionnaire items, given the data that were available, rather than by use of a more

detailed assessment of this information (e.g., the timeline follow-back method; Carney et al., 1998). Regarding the variable of "binge drinking", while it has been specified elsewhere that a drinking "occasion" constitutes approximately 2 hours (US Department of Health and Human Services, 2004), the questionnaire in the present study did not make this specification; however, this type of variable has been defined similarly (i.e., as number of drinks without specification of a time period) in past research (e.g., Weinberger et al., 2017). No measure of participants' religious affiliation/identification or adherence to religiously sanctioned restrictions on alcohol use was included in the present study, a variable that may impact one's drinking behavior; as such, this variable could not be included in the relationships studied.

Conclusions

The present study found no significant relationships between self-control and alcohol use, as well as that gender did not moderate such relationships. It was found, however, that *less than high school graduate* education level, female gender, and low BMI were linked to greater drinking behavior. The Self-Control Scale was also found to preserve its high level of internal consistency found in community samples when administered to the current sample of PLWH, suggesting its appropriateness for use within this population. The findings presented are important to consider in light of both the prevalence and unique consequences of alcohol use in PLWH. Consideration of the risk factors for greater drinking behavior may be helpful in identifying and providing intervention for those PLWH who are at greater risk for engaging in heavier drinking.

References

Aarons, G. A., Goldman, M. S., Greenbaum, P. E., & Coovert, M. D. (2003). Alcohol expectancies: Integrating cognitive science and psychometric approaches. *Addictive Behaviors*, *28*(5), 947-961.

Agabio, R., & Leggio, L. (2019). HIV and alcohol use disorder: We cannot ignore the elephant in the room. *The Lancet HIV*, *6*(8), e485-e486.

Asiimwe, S. B., Fatch, R., Patts, G., Winter, M., Lloyd-Travaglini, C., Emenyonu, N., Muyindike, W., Kekibiina, A., Blokhina, E., Gnatienko, N., Kruptisky, E., Cheng, D. M., Samet, J. H., & Hahn, J. A. (2017). Alcohol types and HIV disease progression among HIV-infected drinkers not yet on antiretroviral therapy in Russia and Uganda. *AIDS and Behavior*, *21*(2), 204-215.

Baum, M. K., Rafie, C., Lai, S., Sales, S., Page, J. B., & Campa, A. (2010). Alcohol use accelerates HIV disease progression. *AIDS Research and Human Retroviruses*, *26*(5), 511-518.

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science*, *16*(6), 351-355.

Boodram, B., Plankey, M. W., Cox, C., Tien, P. C., Cohen, M. H., Anastos, K., Karim, R., Hyman, C., & Hershow, R. C. (2009). Prevalence and correlates of elevated body

mass index among HIV-positive and HIV-negative women in the Women's Interagency HIV Study. *AIDS Patient Care and STDs*, *23*(12), 1009-1016.

Braithwaite, R. S., McGinnis, K. A., Conigliaro, J., Maisto, S. A., Crystal, S., Day, N., Cook, R. L., Gordon, A., Bridges, M. W., Seiler, J. F. S., & Justice, A. C. (2005). A temporal and dose-response association between alcohol consumption and medication adherence among veterans in care. *Alcoholism: Clinical and Experimental Research*, *29*(7), 1190-1197.

Bryant, K. J., Nelson, S., Braithwaite, R. S., & Roach, D. (2010). Integrating HIV/AIDS and alcohol research. *Alcohol Research & Health: The Journal of the National Institute on Alcohol Abuse and Alcoholism*, *33*(3), 167–178.

Carney, M. A., Tennen, H., Affleck, G., Del Boca, F. K., & Kranzler, H. R. (1998). Levels and patterns of alcohol consumption using timeline follow-back, daily diaries and real-time "electronic interviews". *Journal of Studies on Alcohol*, *59*(4), 447-454.

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, *1*(2), 245-276.

Centers for Disease Control and Prevention (2007). Calculating BMI using the English system. Retrieved from https://www.cdc.gov/nccdphp/dnpao/growthcharts/training/bmiage/page5_2.html

Centers for Disease Control and Prevention (2016). Alcohol use and your health [Fact sheet]. Retrieved from https://www.cdc.gov/alcohol/fact-sheets/alcohol-use.htm

Centers for Disease Control and Prevention (2021). Ways HIV can be transmitted. Retrieved from https://www.cdc.gov/hiv/basics/hiv-transmission/ways-people-get-hiv.html

Centers for Disease Control and Prevention (2020). Assessing your weight. Retrieved from https://www.cdc.gov/healthyweight/assessing/index.html#:~:text=If%20your%20BMI%20is%20less,falls%20within%20the%20obese%20range.

Chander, G., Hutton, H. E., Lau, B., Xu, X., & McCaul, M. E. (2015). Brief intervention decreases drinking frequency in HIV-infected, heavy drinking women: Results of a randomized controlled trial. *Journal of Acquired Immune Deficiency Syndromes*, *70*(2), 137–145.

Chander, G., Josephs, J., Fleishman, J. A., Korthuis, P. T., Gaist, P., Hellinger, J., & Gebo, K. (2008). Alcohol use among HIV-infected persons in care: Results of a multi-site survey. *HIV Medicine*, *9*(4), 196-202.

Chander, G., Lau, B., & Moore, R. D. (2006). Hazardous alcohol use: A risk factor for non-adherence and lack of suppression in HIV infection. *Journal of Acquired Immune Deficiency Syndromes*, *43*(4), 411-417.

Cook, R. L., Cook, C. L., Karki, M., Weber, K. M., Thoma, K. A., Loy, C. M., Goparaju, L., & Rahim-Williams, B. (2016). Perceived benefits and negative consequences of alcohol consumption in women living with HIV: A qualitative study. *BMC Public Health*, *16*(1), 1-8.

da Silva, C. M., Mendoza-Sassi, R. A., da Mota, L. D., Nader, M. M., & de Martinez, A. M. B. (2017). Alcohol use disorders among people living with HIV/AIDS in Southern Brazil: Prevalence, risk factors and biological markers outcomes. *BMC Infectious Diseases*, *17*(1), 1-8.

Darkes, J., & Goldman, M. S. (1993). Expectancy challenge and drinking reduction: Experimental evidence for a mediational process. *Journal of Consulting and Clinical Psychology*, *61*(2), 344-353.

Del Boca, F. K., & Darkes, J. (2003). The validity of self-reports of alcohol consumption: State of the science and challenges for research. *Addiction*, *98*, 1-12.

Edelman, E. J., Maisto, S. A., Hansen, N. B., Cutter, C. J., Dziura, J., Deng, Y., Fiellin, L. E., O'Connor, P. G., Bedimo, R., Gibert, C. L., Marconi, V. C., Rimland, D., Rodriguez-Barradas, M. C., Simberkoff, M. S., Tate, J. P., Justice, A. C., Bryant, K. J., & Fiellin, D. A. (2019). Integrated stepped alcohol treatment for patients with HIV and alcohol use disorder: A randomised controlled trial. *Lancet HIV*, *6*(8), e509–e517.

Edelman, E. J., Maisto, S. A., Hansen, N. B., Cutter, C. J., Dziura, J., Deng, Y., Fiellin, L. E., O'Connor, P. G., Bedimo, R., Gibert, C. L., Marconi, V. C., Rimland, D., Rodriguez-Barradas, M. C., Simberkoff, M. S., Tate, J. P., Justice, A. C., Bryant, K. J., & Fiellin, D. A. (2020). Integrated stepped alcohol treatment for patients with HIV and at-risk alcohol use: A randomized trial. *Addiction Science & Clinical Practice*, *15*(1), 1-12.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191.

Galvan, F. H., Bing, E. G., Fleishman, J. A., London, A. S., Caetano, R., Burnam, M. A., Longshore, D., Morton, S. C., Orlando, M., & Shapiro, M. (2002). The prevalence of alcohol consumption and heavy drinking among people with HIV in the United States: Results from the HIV Cost and Services Utilization Study. *Journal of Studies on Alcohol*, *63*(2), 179-186.

Hasin, D. S., Aharonovich, E., O'Leary, A., Greenstein, E., Pavlicova, M., Arunajadai, S., Waxman, R., Wainberg, M., Helzer, J., & Johnston, B. (2013). Reducing heavy drinking in HIV primary care: A randomized trial of brief intervention, with and without technological enhancement. *Addiction*, *108*(7), 1230–1240.

Hoeppner, B. B., Stout, R. L., Jackson, K. M., & Barnett, N. P. (2010). How good is fine-grained timeline follow-back data? Comparing 30-day TLFB and repeated 7-day TLFB alcohol consumption reports on the person and daily level. *Addictive Behaviors*, *35*(12), 1138–1143.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31-36.

Kalichman, S. C., Grebler, T., Amaral, C. M., McKerney, M., White, D., Kalichman, M. O., Cherry, C., & Eaton, L. (2014). Food insecurity and antiretroviral adherence among HIV positive adults who drink alcohol. *Journal of Behavioral Medicine*, *37*(5), 1009-1018.

Kalichman, S. C., Weinhardt, L., DiFonzo, K., Austin, J., & Luke, W. (2002). Sensation seeking and alcohol use as markers of sexual transmission risk behavior in HIV-positive men. *Annals of Behavioral Medicine*, *24*(3), 229-235.

Klimas, N., Koneru, A. O. B., & Fletcher, M. A. (2008). Overview of HIV. *Psychosomatic Medicine*, *70*(5), 523-530.

Lesko, C. R., Nance, R. M., Lau, B., Fojo, A. T., Hutton, H. E., Delaney, J. A., Crane, H. M., Cropsey, K. L., Mayer, K. H., Napravnik, S., Geng, E., Mathews, W. C., McCaul, M. E., & Chander, G. (2021). Changing patterns of alcohol use and probability of

unsuppressed viral load among treated patients with HIV engaged in routine care in the United States. *AIDS and Behavior*, *25*(4), 1072-1082.

Madhombiro, M., Marimbe-Dube, B., Dube, M., Kaiyo-Utete, M., Paradzai, A., Chibanda, D., Rusakaniko, S., van der Watt, A. S. J., & Seedat, S. (2018). Perceptions of alcohol use in the context of HIV treatment: A qualitative study. *HIV/AIDS*, *10*, 47–55.

Madhombiro, M., Musekiwa, A., January, J., Chingono, A., Abas, M., & Seedat, S. (2019). Psychological interventions for alcohol use disorders in people living with HIV/AIDS: A systematic review. *Systematic Reviews*, *8*(1), 1-16.

Maisto, S. A., O'Farrell, T. J., Connors, G. J., McKay, J. R., & Pelcovits, M. (1988). Alcoholics' attributions of factors affecting their relapse to drinking and reasons for terminating relapse episodes. *Addictive Behaviors*, *13*(1), 79-82.

McCaul, M. E., Hutton, H. E., Cropsey, K. L., Crane, H. M., Lesko, C. R., Chander, G., Mugavero, M. J., Kitahata, M. M., Lau, B., & Saag, M. S. (2021). Decreased alcohol consumption in an implementation study of computerized brief intervention among HIV patients in clinical care. *AIDS and Behavior*. Advance online publication. https://doi.org/10.1007/s10461-021-03295-9

Morutwa, G., & Plattner, I. E. (2014). Self-control and alcohol consumption among university students in Botswana. *African Journal of Drug and Alcohol Studies*, *13*(2), 69-78.

Muraven, M. (2010). Building self-control strength: Practicing self-control leads to improved self-control performance. *Journal of Experimental Social Psychology*, *46*(2), 465-468.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, *126*(2), 247-259.

Muraven, M., Collins, R. L., & Neinhaus, K. (2002). Self-control and alcohol restraint: An initial application of the self-control strength model. *Psychology of Addictive Behaviors*, *16*(2), 113-120.

Muraven, M., Collins, R. L., Shiffman, S., & Paty, J. A. (2005). Daily fluctuations in self-control demands and alcohol intake. *Psychology of Addictive Behaviors*, *19*(2), 140-147.

Nicolosi, A., Leite, M. L. C., Musicco, M., Arici, C., Gavazzeni, G., & Lazzarin, A. (1994). The efficiency of male-to-female and female-to-male sexual transmission of the human immunodeficiency virus: A study of 730 stable couples. *Epidemiology*, 570-575.

Noone, M., Dua, J., & Markham, R. (1999). Stress, cognitive factors, and coping resources as predictors of relapse in alcoholics. *Addictive Behaviors*, *24*(5), 687-693.

Núñez, M. (2006). Hepatotoxicity of antiretrovirals: Incidence, mechanisms and management. *Journal of Hepatology*, *44*, S132-S139.

Núñez, M., Lana, R., Mendoza, J. L., Martín-Carbonero, L. & Soriano, V. (2001). Risk factors for severe hepatic injury after introduction of highly active antiretroviral therapy. *Journal of Acquired Immune Deficiency Syndromes*, *27*(5), 426–431.

Oei, T. P., & Baldwin, A. R. (1994). Expectancy theory: A two-process model of alcohol use and abuse. *Journal of Studies on Alcohol*, *55*(5), 525-534.

Papas, R. K., Sidle, J. E., Gakinya, B. N., Baliddawa, J. B., Martino, S., Mwaniki, M. M., Songole, R., Omolo, O. E., Kamanda, A. M., Ayuku, D. O., Ojwang, C., Owino-

Ong'or, W. D., Harrington, M., Bryant, K. J., Carroll, K. M., Justice, A. C., Hogan, J. W., & Maisto, S. A. (2011). Treatment outcomes of a stage 1 cognitive-behavioral trial to reduce alcohol use among human immunodeficiency virus-infected outpatients in western Kenya. *Addiction*, *106*(12), 2156–2166.

Parsons, J. T., Golub, S. A., Rosof, E., & Holder, C. (2007). Motivational interviewing and cognitive-behavioral intervention to improve HIV medication adherence among hazardous drinkers: A randomized controlled trial. *Journal of Acquired Immune Deficiency Syndromes*, *46*(4), 443-450.

Pellowski, J. A., Kalichman, S. C., Matthews, K. A., & Adler, N. (2013). A pandemic of the poor: Social disadvantage and the US HIV epidemic. *American Psychologist*, *68*(4), 197-209.

Quade, D. (1967). Rank analysis of covariance. *Journal of the American Statistical Association*, *62*(320), 1187-1200.Reich, R. R., & Goldman, M. S. (2015). Decision making about alcohol use: The case for scientific convergence. *Addictive Behaviors*, *44*, 23-28.

Rogers, A. H., Neighbors, C., Sharp, C., Giordano, T. P., Woods, S. P., & Zvolensky, M. J. (2020). The relationship between sex-related alcohol expectancies and hazardous drinking among persons with HIV disease. *AIDS Care*. Advance online publication. https://doi.org/10.1080/09540121.2020.1845290.

Samet, J. H., Horton, N. J., Meli, S., Dukes, K., Tripps, T., Sullivan, L., & Freedberg, K. A. (2005). A randomized controlled trial to enhance antiretroviral therapy adherence in patients with a history of alcohol problems. *Antiviral Therapy*, *10*(1), 83-93.

Samet, J. H., Horton, N. J., Meli, S., Freedberg, K. A., & Palepu, A. (2004). Alcohol consumption and antiretroviral adherence among HIV-infected persons with alcohol problems. *Alcoholism: Clinical and Experimental Research*, *28*(4), 572-577.

Substance Abuse and Mental Health Services Administration (2020). National Survey on Drug Use and Health. Retrieved from https://www.samhsa.gov/data/sites/default/files/reports/rpt29394/NSDUHDetailedTabs2019/NSDUHDetTabsSect2pe2019.htm#tab2-19b

Sanchez, M., & Finnell, D. (2017). Alcohol screening and brief intervention for persons living with HIV. *Journal of the Association of Nurses in AIDS Care*, *28*(2), 266-278.

Saunders, J. B., Aasland, O. G., Babor, T. F., De la Fuente, J. R., & Grant, M. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction*, *88*(6), 791-804.

Scott-Sheldon, L. A., Terry, D. L., Carey, K. B., Garey, L., & Carey, M. P. (2012). Efficacy of expectancy challenge interventions to reduce college student drinking: A meta-analytic review. *Psychology of Addictive Behaviors*, *26*(3), 393-405.

Shacham, E., Agbebi, A., Stamm, K., & Overton, E. T. (2011). Alcohol consumption is associated with poor health in HIV clinic patient population: A behavioral surveillance study. *AIDS and Behavior*, *15*(1), 209-213.

Sileo, K. M., Kizito, W., Wanyenze, R. K., Chemusto, H., Musoke, W., Mukasa, B., & Kiene, S. M. (2019). A qualitative study on alcohol consumption and HIV treatment adherence among men living with HIV in Ugandan fishing communities. *AIDS Care*, *31*(1), 35-40.

Smith, D. M., Richman, D. D., & Little, S. J. (2005). HIV superinfection. *The Journal of Infectious Diseases*, *192*(3), 438-444.

Stein, M., Herman, D. S., Trisvan, E., Pirraglia, P., Engler, P., & Anderson, B. J. (2005). Alcohol use and sexual risk behavior among human immunodeficiency virus–positive persons. *Alcoholism: Clinical and Experimental Research*, *29*(5), 837-843.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, *72*(2), 271-324.

Tucker, J. S., Burnam, M. A., Sherbourne, C. D., Kung, F. Y., & Gifford, A. L. (2003). Substance use and mental health correlates of nonadherence to antiretroviral medications in a sample of patients with human immunodeficiency virus infection. *The American Journal of Medicine*, *114*(7), 573-580.

US Department of Health and Human Services. (2004). National Institute of Alcohol Abuse and Alcoholism. NIAAA council approves definition of binge drinking. *NIAAA Newsletter; US Department of Health and Human Services: Washington, DC, USA*.

Velasquez, M. M., von Sternberg, K., Johnson, D. H., Green, C., Carbonari, J. P., & Parsons, J. T. (2009). Reducing sexual risk behaviors and alcohol use among HIV-positive men who have sex with men: A randomized clinical trial. *Journal of Consulting and Clinical Psychology*, *77*(4), 657-667.

Wardell, J. D., Shuper, P. A., Rourke, S. B., & Hendershot, C. S. (2018). Stigma, coping, and alcohol use severity among people living with HIV: A prospective analysis of bidirectional and mediated associations. *Annals of Behavioral Medicine*, *52*(9), 762-772.

Wechsberg, W. M., Browne, F. A., Bonner, C. P., Washio, Y., Howard, B. N., & van der Drift, I. (2021). Current interventions for people living with HIV who use alcohol: Why gender matters. *Current HIV/AIDS Reports*, 1-14.

Weinberger, A. H., Gbedemah, M., & Goodwin, R. D. (2017). Cigarette smoking quit rates among adults with and without alcohol use disorders and heavy alcohol use, 2002–2015: A representative sample of the United States population. *Drug and Alcohol Dependence*, *180*, 204-207.

Wiers, R. W., Wood, M. D., Darkes, J., Corbin, W. R., Jones, B. T., & Sher, K. J. (2003). Changing expectancies: Cognitive mechanisms and context effects. *Alcoholism: Clinical and Experimental Research*, *27*(2), 186-197.

Wills, T. A., & Stoolmiller, M. (2002). The role of self-control in early escalation of substance use: A time-varying analysis. *Journal of Consulting and Clinical Psychology*, *70*(4), 986-997.

Wills, T. A., Walker, C., Mendoza, D., & Ainette, M. G. (2006). Behavioral and emotional self-control: Relations to substance use in samples of middle and high school students. *Psychology of Addictive Behaviors, 20*(3), 265-278.

World Health Organization (2020). HIV/AIDS. Retrieved from https://www.who.int/news-room/fact-sheets/detail/hiv-aids

Tables

Table 1

Demographic, Self-Control, and Alcohol Drinking Status Variables for the Full Sample (*n* = 287)

Variable	*n* (%)	*M* (*SD*)	Range
Age (*n* = 286)		50.6 (11.3)	20-75
Gender			
Female	126 (43.9%)		
Male	159 (55.4%)		
Transgender female	2 (.7%)		
Marital Status (*n* = 286)			
Single	163 (57%)		
Married or living with a partner	68 (23.8%)		
Separated	16 (5.6%)		
Divorced	17 (5.9%)		
Widowed	17 (5.9%)		
Other	5 (1.7%)		
Ethnicity (*n* = 255)			
Latino/a	132 (51.8%)		
Non-Latino/a	108 (42.4%)		
Unknown/Unsure	15 (5.9%)		
Race (*n* = 276)			
Black/African-American	146 (52.9%)		
White	27 (9.8%)		
American Indian/Alaskan Native	9 (3.3%)		
Asian	1 (.4%)		
Native Hawaiian/Other Pacific Islander	1 (.4%)		
Other	92 (33.3%)		
Sexual Orientation (*n* = 283)			
Heterosexual	204 (72.1%)		
Homosexual	51 (18%)		
Bisexual	24 (8.5%)		
Other	4 (1.4%)		
Educational Attainment (*n* = 286)			
1st-8th grade	14 (4.9%)		
9th-11th grade	74 (25.9%)		
High school graduate	39 (13.6%)		
GED	39 (13.6%)		
Some college	72 (25.2%)		
Junior college degree	22 (7.7%)		
College degree	19 (6.6%)		
Some post-college	2 (.7%)		
Advanced degree	5 (1.7%)		

BMI (*n* = 283)		28.6 (6.7)	17.1-55.8
Self-Control[a] (*n* = 223)		122.1 (19.4)	72-169
Alcohol Drinking Status (*n* = 276)			
Current drinking	88 (31.9%)		
Current abstinence from alcohol	188 (68.1%)		
Never drinking	82 (29.7%)		
Former drinking	106 (38.4%)		

Key: *M* = mean; *SD* = standard deviation; BMI = body mass index.

Notes: Samples sizes in the table reflect the number of participants with data on that variable.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control.

Table 2

Demographic and Cigarette Smoking Status Variables by Alcohol Drinking Status (*n* = 276)

Variable	Current Drinking[a] (*n* = 88) *n* (%) or *M* (*SD*)	Current Abstinence[b] (*n* = 188) *n* (%) or *M* (*SD*)	*t* or χ^2	*p*
Age (*n* = 275)	47.2 (11.9)	52.2 (10.8)	*t*(156.505) = 3.328	.001**
Gender			$\chi^2(2) = 11.550$	.003**
Female	52 (59.1%)	71 (37.8%)		
Male	36 (40.9%)	115 (61.2%)		
Transgender female	0 (0%)	2 (1.1%)		
Marital Status (*n* = 275)			$\chi^2(2) = 1.127$	.569
Single	53 (60.9%)	102 (54.3%)		
Married or living with a partner	19 (21.8%)	46 (24.5%)		
Other[c]	15 (17.2%)	40 (21.3%)		
Ethnicity (*n* = 245)			$\chi^2(2) = 3.307$	.191
Latino/a	37 (46.3%)	89 (53.9%)		
Non-Latino/a	40 (50%)	64 (38.8%)		
Unknown/Unsure	3 (3.8%)	12 (7.3%)		
Race (*n* = 266)			$\chi^2(2) = 4.400$	.111
Black/African-American	49 (57.6%)	92 (50.8%)		
White	11 (12.9%)	14 (7.7%)		
Other[d]	25 (29.4%)	75 (41.4%)		
Sexual Orientation (*n* = 272)			$\chi^2(2) = 11.203$	.004**
Heterosexual	52 (59.8%)	145 (78.4%)		
Homosexual	21 (24.1%)	28 (15.1%)		
Bisexual/Other[e]	14 (16.1%)	12 (6.5%)		
Educational Attainment (*n* = 275)			$\chi^2(2) = 2.114$	.347
Less than high school graduate[f]	24 (27.3%)	60 (32.1%)		
High school graduate/GED[g]	21 (23.9%)	53 (28.3%)		
Some college or more[h]	43 (48.9%)	74 (39.6%)		
BMI (*n* = 272)	27.7 (6.1)	28.8 (6.9)	*t*(270) = 1.228	.220
Cigarette Smoking Status (*n* = 274)			$\chi^2(2) = 4.290$	.117

Current smoking	52 (59.1%)	85 (45.7%)		
Never smoking	14 (15.9%)	40 (21.5%)		
Former smoking	22 (25.0%)	61 (32.8%)		

Key: *M* = mean; *SD* = standard deviation; *p* = significance; BMI = body mass index.

Notes: ***p* < .01. Samples sizes in the table reflect the number of participants with data on that variable.

[a]Current Drinking was defined by report of current alcohol use and of ≥ 1 drinking day per week.

[b]Current Abstinence was defined by report of no current alcohol use; *n* = 10 were excluded from assignment to drinking status group for reporting current alcohol use but < 1 drinking day per week.

[c]Other Marital Status category for Current Drinking consisted of *n* = 5 Separated, *n* = 4 Divorced, *n* = 5 Widowed, and *n* = 1 Other; Other marital status category for Current Abstinence consisted of *n* = 11 Separated, *n* = 13 Divorced, *n* = 12 Widowed, and *n* = 4 Other.

[d]Other Race category for Current Drinking consisted of *n* = 1 American Indian/Alaskan Native, and *n* = 24 Other; Other Race category for Current Abstinence consisted of *n* = 8 American Indian/Alaskan Native, *n* = 1 Asian, *n* = 1 Native Hawaiian/Other Pacific Islander, and *n* = 65 Other.

[e]Bisexual/Other Sexual Orientation category for Current Drinking consisted of *n* = 13 Bisexual and *n* = 1 Other; Other Sexual Orientation category for Current Abstinence consisted of *n* = 10 Bisexual and *n* = 2 Other.

[f]Less than high school graduate category for Current Drinking consisted of *n* = 5 1st-8th grade and *n* = 19 9th-11th grade; Less than high school graduate category for Current Abstinence consisted of *n* = 9 1st-8th grade and *n* = 51 9th-11th grade.

[g]High school graduate/GED category for Current Drinking consisted of *n* = 9 High school graduate and *n* = 12 GED; High school graduate/GED category for Current Abstinence consisted of *n* = 28 High school graduate and *n* = 25 GED.

[h]Some college or more category for Current Drinking consisted of *n* = 21 Some college, *n* = 12 Junior college degree, *n* = 9 College degree, and *n* = 1 Advanced degree; Some college or more category for Current Abstinence consisted of *n* = 50 Some college, *n* = 9 Junior college degree, *n* = 9 College degree, *n* = 2 Some post-college, and *n* = 4 Advanced degree.

Table 3

Demographic Variables by Drinking Status Subgroup for Participants who Currently Abstain from Alcohol (*n* = 188)

Variable	Never Drinking[a] (*n* = 82) *n* (%) or *M* (*SD*)	Former Drinking[b] (*n* = 106) *n* (%) or *M* (*SD*)	*t* or χ^2	*p*
Age (*n* = 187)	49.7 (11.9)	54.1 (9.5)	*t*(149.905) = -2.718	.007**
Gender			$\chi^2(2) = 1.456$	.483
Female	27 (32.9%)	44 (41.5%)		
Male	54 (65.9%)	61 (57.5%)		
Transgender female	1 (1.2%)	1 (.9%)		
Marital Status			$\chi^2(2) = .570$	.752
Single	42 (51.2%)	60 (56.6%)		
Married or living with a partner	21 (25.6%)	25 (23.6%)		
Other[c]	19 (23.2%)	21 (19.8%)		
Ethnicity (*n* = 165)			$\chi^2(2) = 6.325$	.042*
Latino/a	44 (63.8%)	45 (46.9%)		
Non-Latino/a	19 (27.5%)	45 (46.9%)		
Unknown/Unsure	6 (8.7%)	6 (6.3%)		
Race (*n* = 181)			$\chi^2(2) = 1.357$	.507
Black/African-American	37 (47.4%)	55 (53.4%)		
White	5 (6.4%)	9 (8.7%)		
Other[d]	36 (46.2%)	39 (37.9%)		
Sexual Orientation (*n* = 185)			$\chi^2(2) = 4.348$	.114
Heterosexual	59 (73.8%)	86 (81.9%)		
Homosexual	17 (21.3%)	11 (10.5%)		
Bisexual/Other[e]	4 (5%)	8 (7.6%)		
Educational Attainment (*n* = 187)			$\chi^2(2) = 5.474$	.065
Less than high school graduate[f]	32 (39%)	28 (26.7%)		
High school graduate/GED[g]	25 (30.5%)	28 (26.7%)		
Some college or more[h]	25 (30.5%)	49 (46.7%)		
BMI	28.5 (6.4)	29.1 (7.3)	*t*(186) = -.629	.530

Key: *M* = mean; *SD* = standard deviation; *p* = significance; BMI = body mass index.

Notes: *$p < .05$, **$p < .01$. Samples sizes in the table reflect the number of participants with data on that variable.

[a]Never Drinking was defined by report of never having used alcohol in their life.

[b]Former Drinking was defined by report of lifetime alcohol use but no current alcohol use.

[c]Other Marital Status category for Never Drinking consisted of $n = 6$ Separated, $n = 4$ Divorced, $n = 7$ Widowed, and $n = 2$ Other; Other marital status category for Former Drinking consisted of $n = 5$ Separated, $n = 9$ Divorced, $n = 5$ Widowed, and $n = 2$ Other.

[d]Other Race category for Never Drinking consisted of $n = 4$ American Indian/Alaskan Native, $n = 1$ Asian, $n = 1$ Native Hawaiian/Other Pacific Islander, and $n = 30$ Other; Other Race category for Former Drinking consisted of $n = 4$ American Indian/Alaskan Native, and $n = 35$ Other.

[e]Bisexual/Other Sexual Orientation category for Never Drinking consisted of $n = 4$ Bisexual; Other Sexual Orientation category for Former Drinking consisted of $n = 6$ Bisexual and $n = 2$ Other.

[f]Less than high school graduate category for Never Drinking consisted of $n = 3$ 1st-8th grade and $n = 29$ 9th-11th grade; Less than high school graduate category for Former Drinking consisted of $n = 6$ 1st-8th grade and $n = 22$ 9th-11th grade.

[g]High school graduate/GED category for Never Drinking consisted of $n = 10$ High school graduate and $n = 15$ GED; High school graduate/GED category for Former Drinking consisted of $n = 18$ High school graduate and $n = 10$ GED.

[h]Some college or more category for Never Drinking consisted of $n = 18$ Some college, $n = 3$ Junior college degree, and $n = 4$ College degree; Some college or more category for Former Drinking consisted of $n = 32$ Some college, $n = 6$ Junior college degree, $n = 5$ College degree, $n = 2$ Some post-college, and $n = 4$ Advanced degree.

Table 4

Alcohol Use Variables for Participants who Currently Drink (*n* = 88)

Variable	*n* (%)	*M* (*SD*)	Range
Number of Drinking Days per Week (*n* = 74)		2.3 (1.8)	1-7
Number of Drinks Consumed per Week (*n* = 70)		7 (10.9)	1-80
Heavy Drinking[a] (*n* = 71)			
Absent	53 (74.6%)		
Present	18 (25.4%)		
Binge Drinking[b] (*n* = 80)			
Absent	65 (81.3%)		
Present	15 (18.8%)		
Recency of Alcohol Use, in Days (*n* = 72)		18.4 (36.1)	1-180

Key: *M* = mean; *SD* = standard deviation.

Notes: Samples sizes in the table reflect the number of participants with data on that variable.

[a]Heavy Drinking was defined dichotomously by the number of drinks consumed per week, by gender, using the CDC criteria for heavy drinking (Centers for Disease Control and Prevention, 2016), i.e., ≥ 8 alcoholic beverages per week for women, and ≥ 15 alcoholic beverages per week for men.

[b]Binge Drinking was defined dichotomously by the number of drinks consumed on one occasion, by gender, using the USDHHS criteria for binge drinking (US Department of Health and Human Services, 2004), i.e., ≥ 4 alcoholic beverages on one occasion for women, and ≥ 5 alcoholic beverages on one occasion for men.

Table 5

Demographic Variables by Gender for Participants who Currently Drink Alcohol (*n* = 88)

Variable	Female (*n* = 52) *n* (%) or *M* (*SD*)	Male (*n* = 36) *n* (%) or *M* (*SD*)	*t* or χ^2	*p*
Age	47.2 (12.8)	47.1 (10.8)	*t*(86) = .028	.978
Marital Status (*n* = 87)			$\chi^2(2) = .744$	.689
Single	33 (64.7%)	20 (55.6%)		
Married or living with a partner	10 (19.6%)	9 (25%)		
Other[a]	8 (15.7%)	7 (19.4%)		
Ethnicity (*n* = 80)			$\chi^2(2) = .232$	.891
Latino/a	23 (47.9%)	14 (43.8%)		
Non-Latino/a	23 (47.9%)	17 (53.1%)		
Unknown/Unsure	2 (4.2%)	1 (3.1%)		
Race (*n* = 85)			$\chi^2(2) = .348$	.840
Black/African-American	27 (55.1%)	22 (61.1%)		
White	7 (14.3%)	4 (11.1%)		
Other[b]	15 (30.6%)	10 (27.8%)		
Sexual Orientation (*n* = 87)			$\chi^2(2) = 8.302$	.016*
Heterosexual	24 (47.1%)	28 (77.8%)		
Homosexual	16 (31.4%)	5 (13.9%)		
Bisexual/Other[c]	11 (21.6%)	3 (8.3%)		
Educational Attainment			$\chi^2(2) = 3.339$	.188
Less than high school graduate[d]	13 (25%)	11 (30.6%)		
High school graduate/GED[e]	16 (30.8%)	5 (13.9%)		
Some college or more[f]	23 (44.2%)	20 (55.6%)		
BMI (*n* = 84)	26.5 (5.8)	29.4 (6.2)	*t*(82) = -2.211	.030*

Key: *M* = mean; *SD* = standard deviation; *p* = significance; BMI = body mass index.

Notes: **p* < .05. Samples sizes in the table reflect the number of participants with data on that variable.

[a]Other Marital Status category for Female participants consisted of *n* = 1 Separated, *n* = 2 Divorced, *n* = 4 Widowed, and *n* = 1 Other; Other marital status category for Male participants consisted of *n* = 4 Separated, *n* = 2 Divorced, and *n* = 1 Widowed.

[b]Other Race category for Female participants consisted of *n* = 1 American Indian/Alaskan Native and *n* = 14 Other; Other Race category for Male participants consisted of *n* = 10 Other.

[c]Bisexual/Other Sexual Orientation category for Female participants consisted of *n* = 11 Bisexual; Other Sexual Orientation category for Male participants consisted of *n* = 2 Bisexual and *n* = 1 Other.

[d]Less than high school graduate category for Female participants consisted of *n* = 2 1st-8th grade and *n* = 11 9th-11th grade; Less than high school graduate category for Male participants consisted of *n* = 3 1st-8th grade and *n* = 8 9th-11th grade.

[e]High school graduate/GED category for Female participants consisted of *n* = 6 High school graduate and *n* = 10 GED; High school graduate/GED category for Male participants consisted of *n* = 3 High school graduate and *n* = 2 GED.

[f]Some college or more category for Female participants consisted of *n* = 13 Some college, *n* = 8 Junior college degree, and *n* = 2 College degree; Some college or more category for Male participants consisted of *n* = 8 Some college, *n* = 4 Junior college degree, *n* = 7 College degree, and *n* = 1 Advanced degree.

Table 6
Self-Control by Alcohol Drinking Status (*n* = 215)

Variable	Current Drinking[a] (*n* = 74) *M* (*SD*)	Current Abstinence[b] (*n* = 141) *M* (*SD*)	*F*	*df*	*p*	η^2	Effect Size Interpretation
Self-Control[c]	119.0 (20.0)	123.0 (19.0)	2.102	1, 213	.149	.010	Small

Key: *M* = mean; *SD* = standard deviation; *F* = F-statistic; *df* = degrees of freedom; *p* = significance; η^2 = effect size.

Notes: Samples sizes in the table reflect the number of participants with data on that variable.

[a]Current Drinking was defined by report of current alcohol use and of ≥ 1 drinking day per week.

[b]Current Abstinence was defined by report of no current alcohol use; *n* = 10 were excluded from assignment to drinking status group for reporting current alcohol use but < 1 drinking day per week.

[c]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control.

Table 7

Relationship between each Demographic Variable and Self-Control for the Full Sample (*n* = 287)

Demographic Variable	*r*	*F*	*df*	*p*
Age (*n* = 223)	.040			.554
Gender (*n* = 223)[a]		.045	2, 220	.956
Marital Status (*n* = 222)		.402	2, 219	.670
Ethnicity (*n* = 203)[b]		3.485	2, 200	.033*
Race (*n* = 217)		2.265	2, 214	.106
Sexual Orientation (*n* = 221)		.335	2, 218	.715
Educational Attainment (*n* = 222)		.287	2, 219	.751
BMI (*n* = 221)	.060			.375

Key: *r* = Pearson correlation coefficient; *F* = F-statistic; *df* = degrees of freedom; *p* = significance; BMI = body mass index.

Notes: **p* < .05. Samples sizes in the table reflect the number of participants with data on both self-control and the given demographic variable.

[a]An independent samples *t*-test was also run to compare only men to women, excluding 2 participants who self-identified as transgender women, which persisted in demonstrating no statistically significant difference between groups, *t*(219) = .233, *p* = .816.

[b]An independent samples *t*-test was also run to compare only Latino/as to non-Latino/as, excluding 9 participants who responded, "don't know/not sure" to the questionnaire item, "What is your ethnicity?", which persisted in demonstrating a statistically significant difference between groups, *t*(167.324) = -2.268, *p* = .025.

Table 8
Self-Control by Alcohol Drinking Status, with Ethnicity as a Covariate (*n* = 186)

Variable	Current Drinking[a] (*n* = 67) *M* (*SD*)	Current Abstinence[b] (*n* = 119) *M* (*SD*)	*F*	*df*	*p*	Partial η^2	Effect Size Interpretation
Self-Control[c]	119.8 (20.5)	122.7 (19.0)	1.587	1, 183	.209	.009	Small

Key: *M* = mean; *SD* = standard deviation; *F* = F-statistic; *df* = degrees of freedom; *p* = significance; Partial η^2 = effect size.

Notes: Samples sizes in the table reflect the number of participants with data on that variable.

[a]Current Drinking was defined by report of current alcohol use and of ≥ 1 drinking day per week.

[b]Current Abstinence was defined by report of no current alcohol use; *n* = 10 were excluded from assignment to drinking status group for reporting current alcohol use but < 1 drinking day per week.

[c]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control.

Table 9

Demographic Variables by Number of Drinking Days per Week, within the Current Drinking Group (n = 74)

Demographic Variable	r_{pb} or χ^2	p
Age (n = 74)	$r_{pb}(72) = .059$	.619
Gender (n = 74)	$\chi^2(1) = .511$	.475
Marital Status (n = 73)	$\chi^2(2) = .085$	.959
Ethnicity (n = 63)	$\chi^2(1) = 1.839$	.175
Race (n = 71)	$\chi^2(2) = 5.876$	.053
Sexual Orientation (n = 73)	$\chi^2(2) = 2.184$	.336
Educational Attainment (n = 74)	$\chi^2(2) = .133$	.936
BMI (n = 70)	$r_{pb}(68) = -.076$	.534

Key: r_{pb} = point-biserial correlation coefficient; χ^2 = chi-square test of independence; p = significance; BMI = body mass index.

Notes: Samples sizes in the table reflect the number of paired observations (i.e., the number of participants included in the correlation).

Table 10

Binomial Logistic Regression Predicting Number of Drinking Days per Week based on Self-Control, within the Current Drinking Group (n = 62)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.030	.016	3.552	1	.059	.970	.940	1.001
Constant	-.754	.287	6.923	1	.009	.470		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and the variable was mean-centered for this analysis.

Table 11

Demographic Variables by Number of Alcoholic Drinks Consumed per Week, within the Current Drinking Group (n = 70)

Demographic Variable	r_{pb} or χ^2	p
Age (n = 70)	$r_{pb}(68) = -.079$	.513
Gender (n = 70)	$\chi^2(1) = .723$	.395
Marital Status (n = 69)	$\chi^2(2) = 2.583$	.275
Ethnicity (n = 59)	$\chi^2(1) = .114$	.735
Race (n = 67)	$\chi^2(2) = 2.159$	.340
Sexual Orientation (n = 69)	$\chi^2(2) = 2.515$	.284
Educational Attainment (n = 70)	$\chi^2(2) = 8.773$	.012*
BMI (n = 66)	$r_{pb}(64) = -.061$	.627

Key: r_{pb} = point-biserial correlation coefficient; χ^2 = chi-square test of independence; p = significance; BMI = body mass index.

Notes: *$p < .05$. Samples sizes in the table reflect the number of paired observations (i.e., the number of participants included in the correlation).

Table 12

Binomial Logistic Regression Predicting Number of Alcoholic Drinks Consumed per Week based on Self-Control, within the Current Drinking Group (n = 58)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.011	.014	.617	1	.432	.989	.962	1.016
Constant	-.073	.264	.076	1	.782	.930		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and the variable was mean-centered for this analysis.

Table 13

Binomial Logistic Regression Predicting Number of Alcoholic Drinks Consumed per Week based on Self-Control and Educational Attainment, within the Current Drinking Group (n = 58)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.007	.015	.234	1	.628	.993	.964	1.023
Overall Effect of Educational Attainment			8.020	2	.018*			
Less than High School Graduate[b]	2.016	.713	8.001	1	.005**	7.506	1.857	30.340
High School Graduate/GED[b]	.812	.690	1.385	1	.239	2.253	.583	8.710
Constant	-.847	.423	4.001	1	.045	.429		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

Notes: *$p < .05$, **$p < .01$.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and the variable was mean-centered for this analysis.

[b]*Some college or more* was the reference group, and *less than high school graduate* and *high school graduate/GED* were the indicator groups for the educational attainment variable.

Table 14

Demographic Variables by Engagement in Heavy Drinking, within *the Current Drinking Group* (*n* = 71)

Demographic Variable	r_{pb} or χ^2	*p*
Age (*n* = 71)	$r_{pb}(69) = .026$	.830
Gender (*n* = 71)	$\chi^2(1) = 10.789$	.001**
Marital Status (*n* = 70)	$\chi^2(2) = .216$	.898
Ethnicity (*n* = 60)	$\chi^2(1) = 1.116$	.291
Race (*n* = 68)	$\chi^2(2) = 4.424$	.109
Sexual Orientation (*n* = 70)	$\chi^2(2) = 3.298$	.192
Educational Attainment (*n* = 71)	$\chi^2(2) = .519$	.771
BMI (*n* = 67)	$r_{pb}(65) = -.266$	.029*

Key: r_{pb} = point-biserial correlation coefficient; χ^2 = chi-square test of independence; *p* = significance; BMI = body mass index.

Notes: *$p < .05$, **$p < .01$. Samples sizes in the table reflect the number of paired observations (i.e., the number of participants included in the correlation).

Table 15

Binomial Logistic Regression Predicting Engagement in Heavy Drinking based on Self-Control, within the Current Drinking Group (n = 59)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.019	.017	1.299	1	.254	.981	.950	1.014
Constant	-1.025	.302	1.538	1	.001	.359		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and the variable was mean-centered for this analysis.

Table 16

Binomial Logistic Regression Predicting Engagement in Heavy Drinking based on Self-Control, Gender, and BMI, within the Current Drinking Group (n = 57)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.015	.020	.558	1	.455	.985	.948	1.024
Gender (Male)[b]	-2.193	1.117	3.859	1	.049*	.112	.013	.995
BMI	-.126	.080	2.501	1	.114	.881	.753	1.031
Constant	2.786	2.036	1.873	1	.171	16.221		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval; BMI = body mass index.

Notes: *$p < .05$.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and the variable was mean-centered for this analysis.

[b]Female was the reference group and male was the indicator group for the gender variable.

Table 17

Demographic Variables by Engagement in Binge Drinking, within the Current Drinking Group (*n* = 80)

Demographic Variable	r_{pb} or χ^2	*p*
Age (*n* = 80)	$r_{pb}(78) = -.171$	.129
Gender (*n* = 80)	$\chi^2(1) = 5.470$	.019*
Marital Status (*n* = 79)	$\chi^2(2) = .275$	.872
Ethnicity (*n* = 69)	$\chi^2(1) = .304$	.581
Race (*n* = 77)	$\chi^2(2) = 2.728$	.256
Sexual Orientation (*n* = 79)	$\chi^2(2) = 8.434$	.015*
Educational Attainment (*n* = 80)	$\chi^2(2) = 5.714$	.057
BMI (*n* = 76)	$r_{pb}(74) = -.257$	.025*

Key: r_{pb} = point-biserial correlation coefficient; χ^2 = chi-square test of independence; *p* = significance; BMI = body mass index.

Notes: *$p < .05$. Samples sizes in the table reflect the number of paired observations (i.e., the number of participants included in the correlation).

Table 18

Binomial Logistic Regression Predicting Engagement in Binge Drinking based on Self-Control, within the Current Drinking Group (n = 66)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.014	.018	.596	1	.440	.987	.953	1.021
Constant	-1.535	.328	21.961	1	.000	.215		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and the variable was mean-centered for this analysis.

Table 19

Binomial Logistic Regression Predicting Engagement in Binge Drinking based on Self-Control, Gender, Sexual Orientation, and BMI, within the Current Drinking Group (n = 63)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.009	.022	.180	1	.671	.991	.950	1.034
Gender (Male)[b]	-1.115	1.207	.854	1	.355	.328	.031	3.491
Overall Effect of Sexual Orientation			2.748	2	.253			
Heterosexual[c]	-1.767	1.077	2.691	1	.101	.171	.021	1.411
Homosexual[c]	-.581	.905	.412	1	.521	.560	.095	3.297
BMI	-.131	.088	2.179	1	.140	.878	.738	1.044
Constant	3.009	2.383	1.595	1	.207	20.263		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval; BMI = body mass index.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and the variable was mean-centered for this analysis.

[b]Female was the reference group and male was the indicator group for the gender variable.

[c]Bisexual/other was the reference group, and heterosexual and homosexual were the indicator groups for the sexual orientation variable.

Table 20

Binomial Logistic Regression Predicting Number of Drinking Days per Week based on Self-Control and Gender, within the Current Drinking Group (n = 62)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.030	.016	3.512	1	.061	.970	.940	1.001
Gender (Male)[b]	-.064	.570	.013	1	.910	.938	.307	2.865
Constant	-.729	.365	3.991	1	.046	.483		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and it was mean-centered for this analysis.

[b]Female was the reference group and male was the indicator group for the gender variable.

Table 21

Binomial Logistic Regression Predicting Number of Drinking Days per Week based on Interaction of Self-Control by Gender, within the Current Drinking Group (n = 62)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.048	.025	3.574	1	.059	.953	.907	1.002
Gender (Male)[b]	.083	.593	.020	1	.888	1.087	.340	3.472
Self-Control[a] by Gender (Male)[b]	.034	.033	1.060	1	.303	1.035	.969	1.105
Constant	-.839	.405	4.297	1	.038	.432		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and it was mean-centered for this analysis.

[b]Female was the reference group and male was the indicator group for the gender variable.

Table 22

Binomial Logistic Regression Predicting Number of Alcoholic Drinks Consumed per Week based on Self-Control, Educational Attainment, and Gender, within the Current Drinking Group (n = 58)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.007	.015	.184	1	.668	.993	.964	1.024
Overall Effect of Educational Attainment			8.391	2	.015*			
Less than High School Graduate[b]	2.142	.740	8.385	1	.004**	8.515	1.998	36.291
High School Graduate/GED[b]	.720	.698	1.063	1	.303	2.055	.523	8.076
Gender (Male)[c]	-.610	.632	.931	1	.335	.544	.158	1.875
Constant	-.622	.478	1.693	1	.193	.537		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

Notes: *$p < .05$, **$p < .01$.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and it was mean-centered for this analysis.

[b]*Some college or more* was the reference group, and *less than high school graduate* and *high school graduate/GED* were the indicator groups for the educational attainment variable.

[c]Female was the reference group and male was the indicator group for the gender variable.

Table 23

Binomial Logistic Regression Predicting Number of Alcoholic Drinks Consumed per Week based on Interaction of Self-Control by Gender, within the Current Drinking Group (n = 58)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.020	.022	.803	1	.370	.981	.940	1.023
Overall Effect of Educational Attainment			8.481	2	.014*			
Less than High School Graduate[b]	2.163	.744	8.455	1	.004**	8.693	2.024	37.345
High School Graduate/GED[b]	.806	.715	1.270	1	.260	2.239	.551	9.098
Gender (Male)[c]	-.591	.636	.864	1	.353	.554	.159	1.926
Self-Control [a] by Gender (Male)	.028	.032	.796	1	.372	1.029	.967	1.094
Constant	-.681	.491	1.925	1	.165	.506		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval.

Notes: *$p < .05$, **$p < .01$.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and it was mean-centered for this analysis.

[b]*Some college or more* was the reference group, and *less than high school graduate* and *high school graduate/GED* were the indicator groups for the educational attainment variable.

[c]Female was the reference group and male was the indicator group for the gender variable.

Table 24

Binomial Logistic Regression Predicting Heavy Drinking based on Interaction of Self-Control by Gender, within the Current Drinking Group (n = 57)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.018	.022	.706	1	.401	.982	.941	1.025
Gender (Male)[b]	-2.146	1.119	3.675	1	.055	.117	.013	1.049
BMI	-.128	.081	2.501	1	.114	.880	.751	1.031
Self-Control[a] by Gender (Male)[b]	.022	.052	.179	1	.114	.880	.751	1.031
Constant	2.808	2.055	1.867	1	.172	16.576		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval; BMI = body mass index.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and it was mean-centered for this analysis.

[b]Female was the reference group and male was the indicator group for the gender variable.

Table 25

Binomial Logistic Regression Predicting Binge Drinking based on Interaction of Self-Control by Gender, within the Current Drinking Group (n = 63)

	B	SE	Wald	*df*	*p*	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Self-Control[a]	-.010	.024	.188	1	.665	.990	.944	1.038
Gender (Male)[b]	-1.121	1.210	.859	1	.354	.326	.030	3.490
Overall Effect of Sexual Orientation			2.687	2	.261			
Heterosexual[c]	-1.754	1.079	2.641	1	.104	.173	.021	1.435
Homosexual[c]	-.586	.908	.417	1	.519	.557	.094	3.297
BMI	-.131	.089	2.181	1	.140	.877	.737	1.044
Self-Control[a] by Gender (Male)[b]	.007	.053	.015	1	.902	1.007	.907	1.117
Constant	3.017	2.389	1.595	1	.207	20.438		

Key: *B* = B coefficient; SE = standard error; Wald = Wald test; *df* = degrees of freedom; *p* = significance; CI = confidence interval; BMI = body mass index.

[a]Self-control was measured as a continuous variable using the Self-Control Scale (Tangney et al., 2004); scores can range from 36-180, with higher scores indicating greater self-control, and it was mean-centered for this analysis.

[b]Female was the reference group and male was the indicator group for the gender variable.

[c]Bisexual/other was the reference group, and heterosexual and homosexual were the indicator groups for the sexual orientation variable.

Table 26

Rotated Component Matrix for Principal Components Analysis with Varimax Rotation of the Self-Control Scale Two-Component Solution ($n = 223$)

Self-Control Scale[a] Item	Rotated Component Coefficient		
	Component 1	Component 2	Communality
10: I change my mind fairly often. (R)	**.724**	-.151	.547
32: I often act without thinking through all the alternatives. (R)	**.715**	.228	.563
20: I do many things on the spur of the moment. (R)	**.702**	-.201	.533
6: I do certain things that are bad for me, if they are fun. (R)	**.695**	.094	.492
12: People would describe me as impulsive. (R)	**.685**	-.073	.474
17: I wish I had more self-discipline. (R)	**.658**	-.043	.435
19: I get carried away by my feelings. (R)	**.655**	-.207	.472
11: I blurt out whatever is on my mind. (R)	**.645**	-.158	.440
9: I have trouble saying no. (R)	**.613**	-.052	.378
31: Sometimes I can't stop myself from doing something, even if I know it is wrong. (R)	**.583**	.161	.366
8: Getting up in the morning is hard for me. (R)	**.575**	.065	.335
4: I say inappropriate things. (R)	**.568**	-.103	.333
29: I have trouble concentrating. (R)	**.562**	.243	.375
33: I lose my temper too easily. (R)	**.543**	.161	.321
34: I often interrupt people. (R)	**.543**	.026	.296
16: I am self-indulgent at times. (R)	**.522**	-.286	.354
2: I have a hard time breaking bad habits. (R)	**.499**	-.036	.250
14: I spend too much money. (R)	**.496**	-.013	.247
5: I never allow myself to lose control.	**-.487**	.185	.271

35: I sometimes drink or use drugs to excess. (R)	**.472**	.214	.269
3: I am lazy. (R)	**.465**	.108	.228
25: I'd be better off if I stopped to think before acting. (R)	**.465**	**-.316**	.316
24: I'm not easily discouraged.	**-.441**	.236	.250
23: I have worked or studied all night at the last minute. (R)	**.349**	**-.328**	.230
28: Pleasure and fun sometimes keep me from getting work done. (R)	**.341**	.180	.149
26: I engage in healthy practices.	.020	**.783**	.614
18: I am reliable.	-.121	**.746**	.571
15: I keep everything neat.	-.138	**.662**	.457
13: I refuse things that are bad for me.	-.080	**.649**	.428
22: People would say that I have iron self-discipline.	-.052	**.626**	.394
7: People can count on me to keep on schedule.	-.110	**.626**	.403
30: I am able to work effectively toward long-term goals.	.178	**.573**	.360
1: I am good at resisting temptation.	.127	**.511**	.278
36: I am always on time.	.037	**.509**	.260
27: I eat healthy foods.	.258	**.425**	.247
21: I don't keep secrets very well. (R)	.240	-.247	.118

Key: (R) = reversed items.

Notes: [a]Tangney et al., 2004. Bolded values indicate components that loaded highly on the given Self-Control Scale item, i.e., whose component coefficient was greater than or equal to the absolute value of 0.3.

Figures

Figure 1

Study Variables, Delineated by Duration of Measurement and Type of Measure Used

Variable(s)	Measure	Duration, in Minutes	Number of Items
Demographics	[a]	6	11
Cigarette Smoking Status	[a]	1	1
Self-Control	Self-Control Scale[b]	5-10	36
Alcohol Use	[a]	1	5
Other (e.g., Mood)[c]	N/A	12-17	N/A

Notes: [a]The variable of interest was measured by investigator-developed questionnaire items rather than by formal scales. [b]Tangney et al., 2004. [c]While relevant to research questions posed by the parent study, these variables were not examined in the present study.

Figure 2

Flowchart of the Recruitment Process Culminating in a Final Analytic Sample

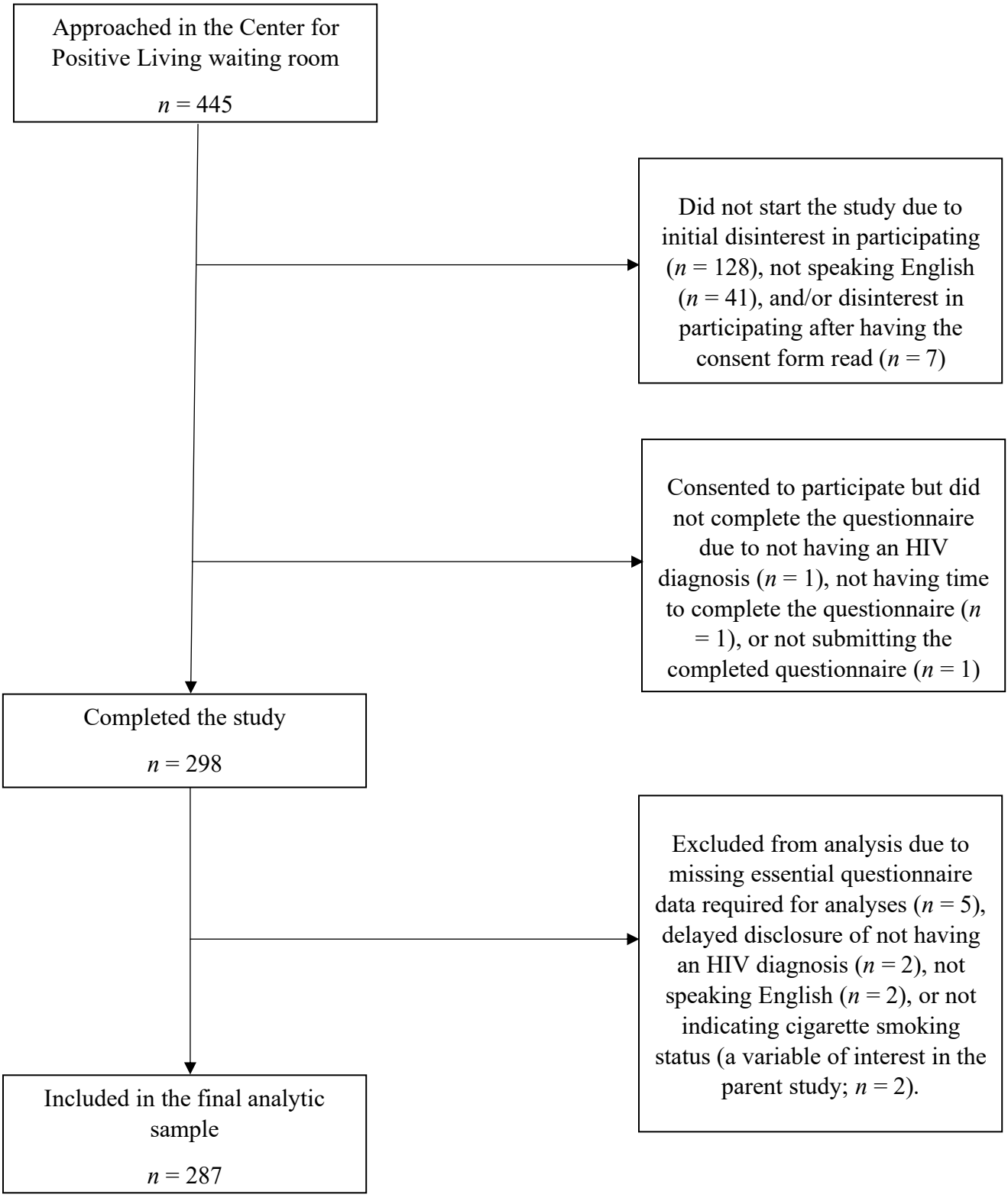
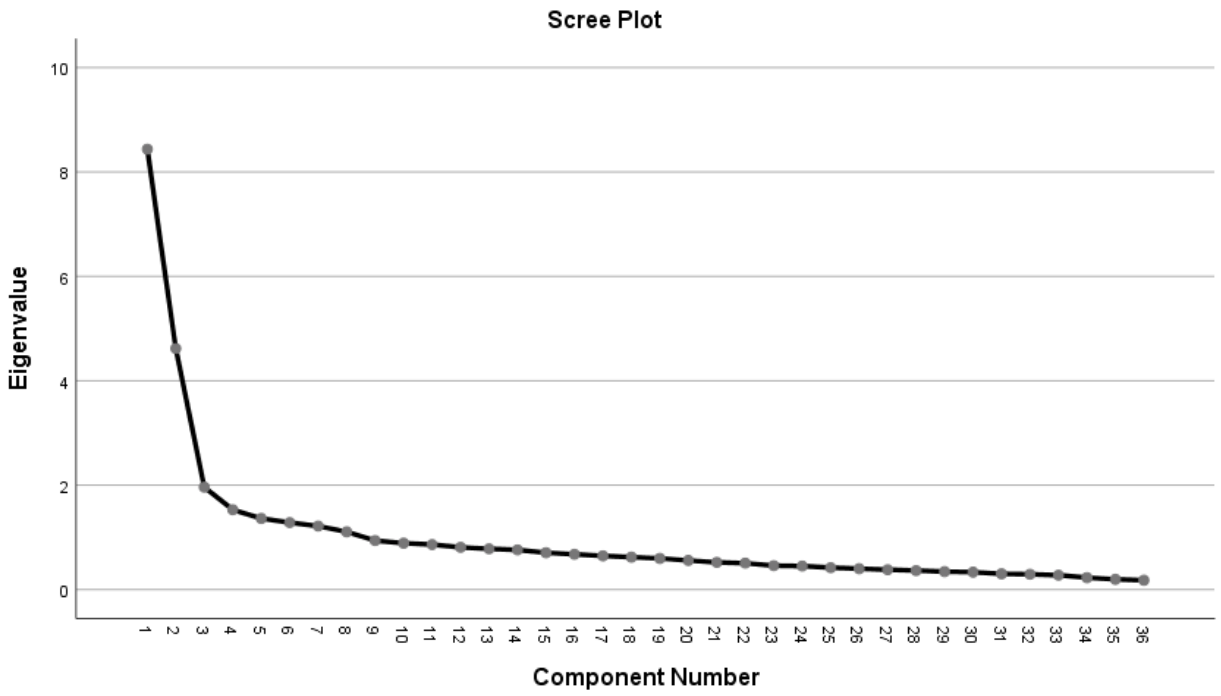


Figure 3

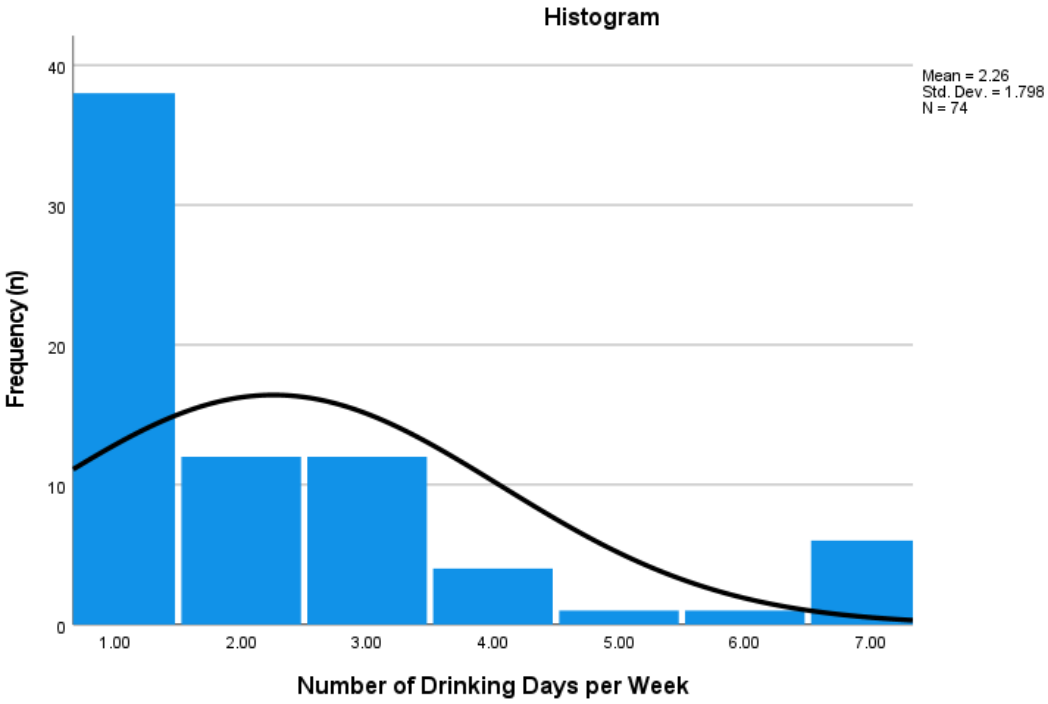
Scree Plot for Principal Components Analysis with Varimax Rotation of the Self-Control Scale



Notes: The inflection point can be observed at Component Number 3.

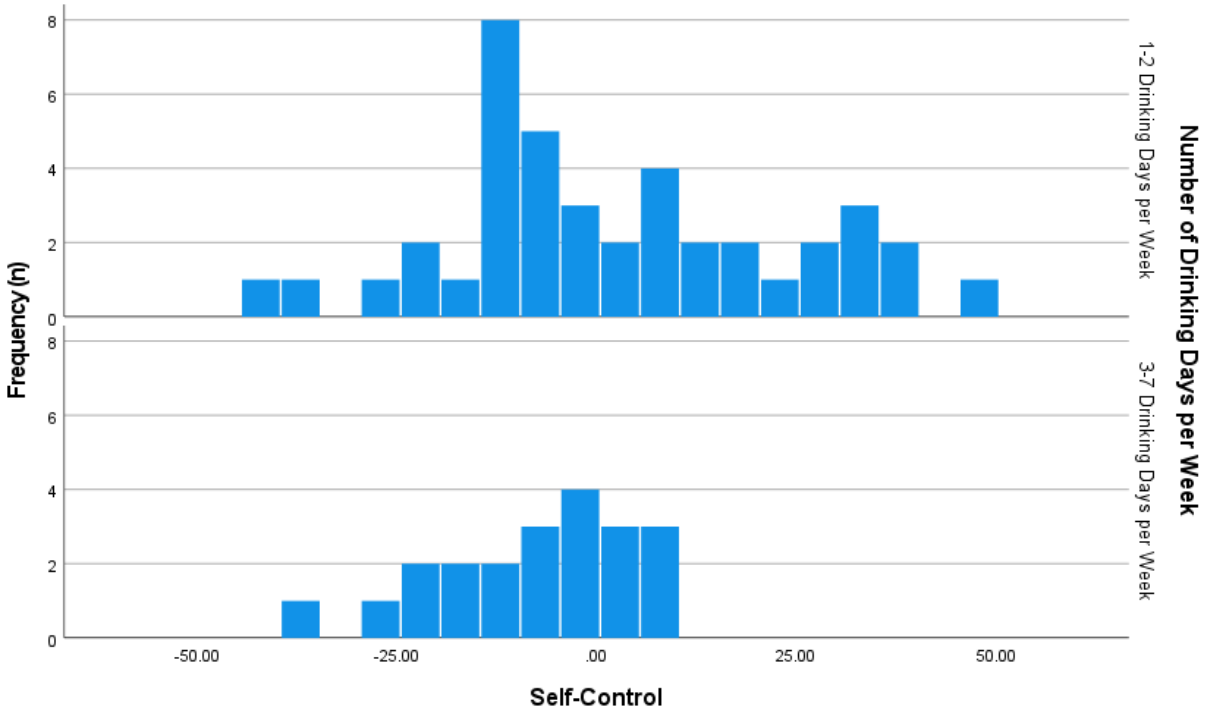
Supplemental Figure 1

Frequency Histogram of Number of Drinking Days per Week, with Normal Curve Shown, within the Current Drinking Group (n = 74)



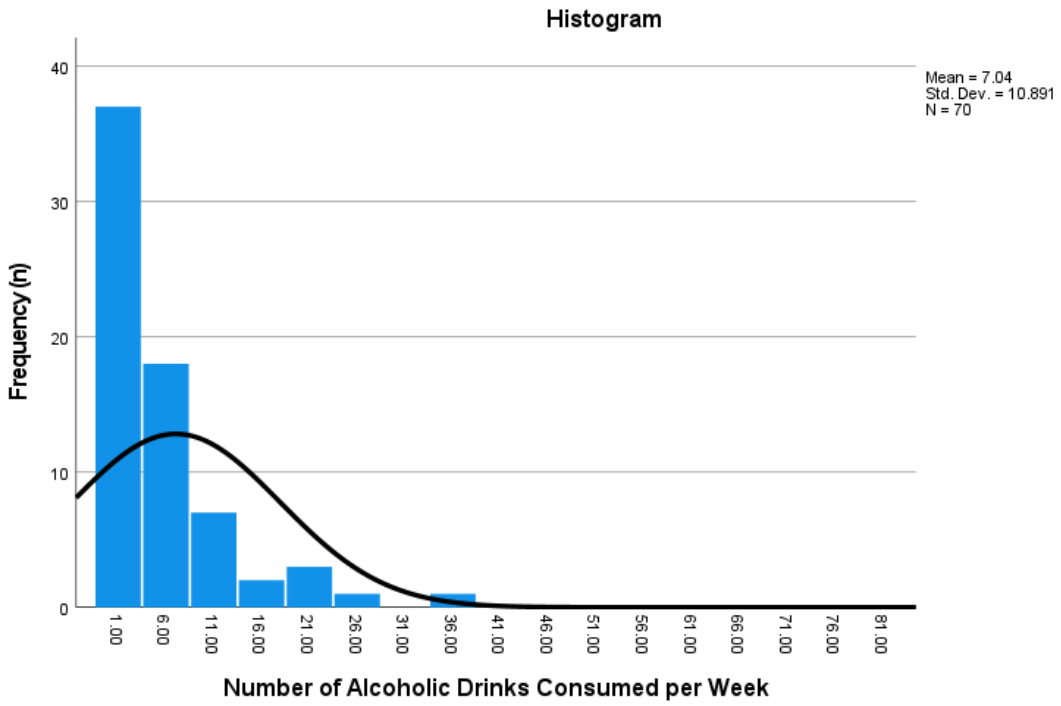
Supplemental Figure 2

Frequency Histograms of Self-Control (Mean-Centered) by Number of Drinking Days per Week, Dichotomized into 1-2 or 3-7 Days, within the Current Drinking Group (n = 62)



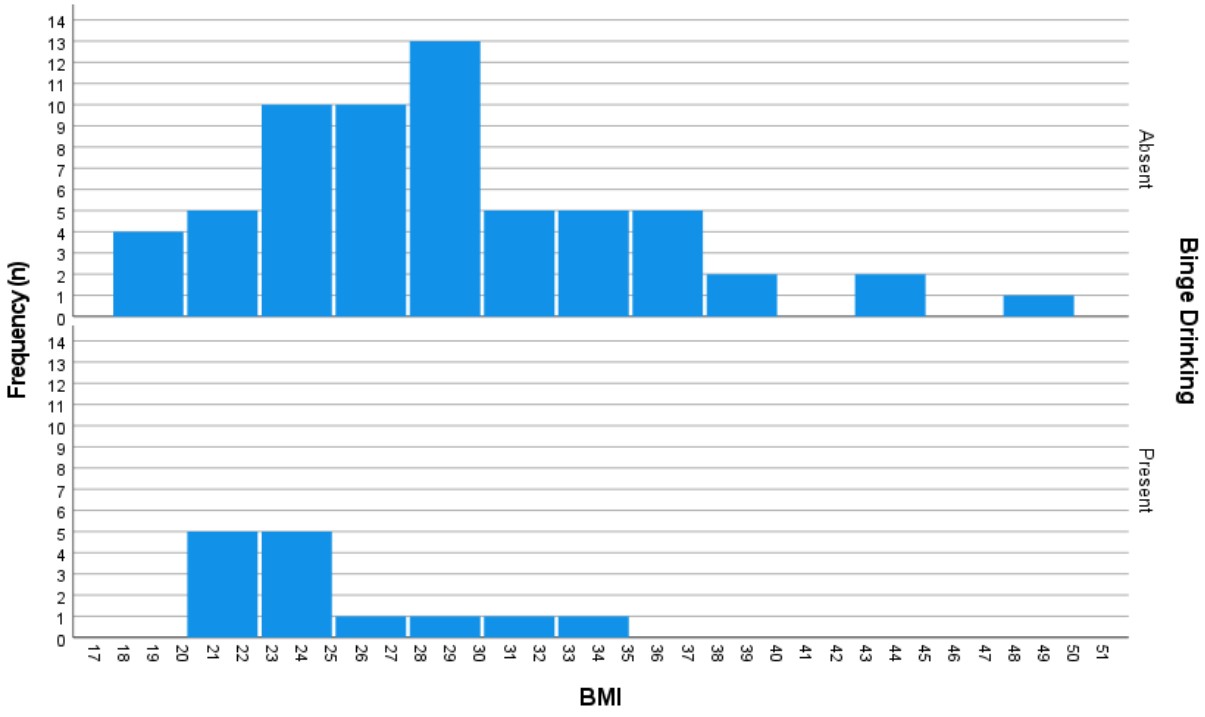
Supplemental Figure 3

Frequency Histogram of Number of Alcoholic Drinks Consumed per Week, with Normal Curve Shown, within the Current Drinking Group (n = 70)



Supplemental Figure 4

Frequency Histograms of BMI by Binge Drinking (Absent or Present), within the Current Drinking Group (n =76)



Appendices

Appendix A

Boxplot of Self-Control by Alcohol Drinking Status