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**THE EFFECT OF A COMPUTER-DELIVERED BRIEF INTERVENTION ON HEAVY ALCOHOL USE: A PILOT STUDY**

by

**BENJAMIN VARNER LALIBERTE**

**DISSERTATION**

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

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2017

MAJOR: PSYCHOLOGY (Clinical)

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## CHAPTER 1 INTRODUCTION

Psychopathy is a personality disorder that can be broadly divided into “primary” and “secondary” subtypes (Karpman, 1941; Karpman, 1948a). Primary psychopathy is marked by affective deficits (e.g., fearlessness, lack of empathy) and interpersonal features (e.g., callousness, deceitfulness, manipulativeness), while secondary psychopathy is characterized by impulsivity, antisociality, and negative emotionality (e.g., anger, anxiety, hostility, etc.) (Hare, 2003; Lilienfeld & Widows, 2005).

Secondary (but not primary) psychopathy has been associated with heavy alcohol use across a variety of populations (Smith & Newman, 1990; Magyar, Edens, Lilienfeld, Douglas, & Poythress, 2011; Neumann & Hare, 2008; Sylvers, Landfield, & Lilienfeld, 2011). Moreover, studies suggest that heavy alcohol use may exacerbate impulsivity and aggression among secondary psychopaths (Birkley, Giancola, & Lance, 2013). Thus, interventions aimed at reducing alcohol use in this population may decrease *both* alcohol-specific problems (e.g., tolerance, withdrawal, drinking more than intended), *and* associated antisocial behavior (e.g., criminality, assault, etc.).

Notably, however, very few studies have specifically attempted to decrease heavy alcohol use among individuals high in secondary psychopathy. The current study aims to address this problem by testing the efficacy of a brief, computerized intervention for heavy alcohol use in individuals with varying levels of secondary psychopathy. We hypothesize that (1) exposure to the intervention will reduce both alcohol use and alcohol-related consequences at one-month follow up, and (2) there will be no moderation effects of secondary psychopathy. That is, the intervention will work equally well for individuals with varying levels of secondary psychopathy.



## **Secondary Psychopathy and Alcohol Use**

A consistent association between secondary psychopathy and heavy alcohol use has been demonstrated in both forensic (Smith & Newman, 1990; Reardon, Lang, & Patrick, 2002; Walsh, Allen, & Kosson, 2007; Magyar, Edens, Lilienfeld, Douglas, & Poythress, 2011) and non-forensic (Neumann & Hare, 2008; Sylvers, Landfield, & Lilienfeld, 2011) samples.

### Forensic Samples

Twenty-seven years ago, Smith and Newman (1990) conducted a seminal study on associations between psychopathy and substance pathology in forensic settings. Using semi-structured interviews to assess various forms of psychopathology in male inmates, the authors found that secondary psychopathy was significantly associated with DSM-III drug and alcohol symptoms, whereas primary psychopathy was not. Subsequent studies conducted over the past three decades have yielded consistently similar results. For example, using a sample of 312 male inmates, Reardon et al. (2002) demonstrated that secondary psychopathy significantly predicted alcohol-related problems, whereas primary psychopathy did not. Additionally, the authors found a significant interaction between primary and secondary psychopathy, such that individuals with high levels of both primary and secondary psychopathy reported fewer alcohol problems than individuals with high levels of secondary but low levels of primary psychopathy.

Magyar, Edens, Lilienfeld, Douglas and Poythress (2011) examined self-reported drug and alcohol problems in a sample of 571 males who had been court-ordered to receive substance abuse treatment. The authors used cluster analysis to divide participants into five groups; (a) primary psychopathy, (b) secondary psychopathy, (c) primary psychopathy with fearful traits, (d) non-psychopathic with Antisocial Personality Disorder (ASPD), and (e) non-ASPD but substance abusing. Results revealed that individuals in the secondary psychopathy group

reported significantly higher scores on assessments of drug and alcohol problems than did individuals in the other subgroups.

Walsh, Allen and Kosson (2007) used a four-factor model of psychopathy to examine whether the association between secondary psychopathy and substance pathology would remain significant even after controlling for primary psychopathy and general antisocial/criminal behavior. More specifically, the authors divided both primary and secondary psychopathy into two facets or subgroups; facet 1a - arrogance and manipulateness; facet 1b - deficient affective experiences; facet 2a - impulsivity and irresponsibility; and facet 2b - persistent criminality and antisocial behavior. Using this model, the authors found that facet 2a, which represented the core features of secondary psychopathy, predicted alcohol, cannabis and cocaine dependence in a sample of male inmates, above and beyond the effects of the other three facets (which represented the core features of primary psychopathy and general criminal behavior).

In sum, the literature on psychopathy and substance misuse in forensic settings suggests that (1) secondary psychopathy is consistently related to substance problems, (2) primary psychopathy is unrelated or negatively related to substance problems, and (3) the association between secondary psychopathy and substance pathology remains significant even after controlling for primary psychopathy and persistent criminal behavior.

#### Non-Forensic Samples

The association between secondary psychopathy and substance pathology has also been examined in studies of non-forensic samples. Results from these studies generally mirror those found in forensic populations and suggest that the secondary psychopathy/heavy alcohol use relationship extends to those with less severe pathology.

For example, Neumann and Hare (2008) administered a psychopathy interview to 514 adults in a community sample in order to examine (1) the underlying factor structure of psychopathy, (2) the external correlates of different psychopathy factors, and (3) whether the factor structure of psychopathy was invariant across sex and ethnicity. Results revealed a good fit for a 4-factor model (i.e., an interpersonal factor, a lifestyle factor, an affective factor, and an antisocial factor) that was invariant across sex and ethnicity. Although each of the four factors predicted frequency of alcohol use, the antisocial and lifestyle factors (which were most reflective of secondary psychopathy) were most strongly predictive. Additionally, all four factors loaded onto a superordinate psychopathy factor which also predicted frequency of alcohol use.

In a similar study, Watt and Brooks (2012) administered a psychopathy scale to 327 participants in an Australian community sample. The scale assessed four facets of psychopathy; callous-affect, interpersonally manipulative, erratic life-style, and criminal tendencies. Consistent with the literature, the domains related to secondary psychopathy (erratic life-style and criminal tendencies) were more strongly associated with alcohol use than the domains related to primary psychopathy.

Finally, Sylvers et al. (2011) assessed psychopathy, Antisocial Personality Disorder (ASPD), and heavy drinking in a cross-sectional sample of 159 college students. Analyses revealed that secondary psychopathy was related to heavy drinking and problems associated with heavy drinking, even after controlling for symptoms of ASPD. Additionally, the association between secondary psychopathy and heavy drinking was moderated by primary psychopathy, such that higher primary psychopathy scores diminished the relationship between secondary psychopathy and heavy drinking.

Taken together, the co-occurrence of psychopathy and substance use in community and college student samples are similar to that observed in forensic/offender samples. More specifically, (1) secondary psychopathy has a greater association with alcohol use than does primary psychopathy and (2) secondary psychopathy and alcohol use remain associated above and beyond the influence of ASPD symptoms and persistent criminality.

#### Explanations for the Secondary Psychopathy/Alcohol Use Relationship

There are several factors that may account for the consistent association between secondary psychopathy and alcohol use. First, there may be a common genetic factor that underlies a broad spectrum of externalizing behaviors, including both secondary psychopathy and heavy alcohol use. For example, Patrick, Hicks, Krueger, and Lang (2005) examined differential relationships between primary psychopathy, secondary psychopathy, and a latent externalizing vulnerability factor in 219 male prison inmates. They found that although primary and secondary psychopathy were positively associated with each other, secondary psychopathy was also related to the latent externalizing vulnerability factor, whereas primary psychopathy was not. Similarly, Hicks, Krueger, Iacono, McGue, & Patrick, (2004) examined the familial transmission of externalizing pathology among 542 families participating in the Minnesota Twin Family Study and found both a broad genetic vulnerability to externalizing pathology, as well as more specific genetic vulnerabilities to conduct disorder, alcohol dependence, and drug dependence. These findings are consistent with the notion that both secondary psychopathy and heavy alcohol use (along with other types of substance abuse and conduct disorder) reflect a common, genetically-based tendency toward externalizing behavior.

Second, there may be third variables which help to explain the relationship between secondary psychopathy and heavy alcohol use. Candidates include personality traits, such as

impulsivity (Hopley & Brunelle, 2012) and negative emotionality (Gudonis, Derefinko, & Giancola, 2009), cognitive factors, such as poor working memory (Endres et al., 2011) or executive functioning (Ross, Benning, & Adams, 2007), and environmental factors, such as a history of trauma or neglect (Krischer & Sevecke, 2008). Each of these factors appears to play a causal role in both psychopathy and heavy drinking and may account for the relationship between the two pathologies.

Finally, Cleckley (1941), in his original writings on psychopathy, posited that a causal relationship between psychopathy and alcohol use might exist such that the disinhibiting effects of alcohol cause individuals to act in irresponsible and antisocial ways (i.e., engage in behaviors associated with factor two psychopathy). Although Cleckley did not speculate on which subtype of psychopath was more prone to this, recent empirical studies suggest that alcohol use may be more strongly associated with antisocial behavior in individuals high on measures of secondary psychopathy. For example, Birkley, Giancola, & Lance (2013) conducted a study looking at the role of primary and secondary psychopathy in alcohol-related aggression. Five hundred and sixteen healthy drinkers completed a self-report measure of psychopathy, consumed either alcohol or placebo, and then completed the Taylor Aggression Paradigm (a task in which they were given the opportunity to aggress against [i.e., administer shocks to] a fictional opponent). Birkely and colleagues found that higher scores on both primary and secondary psychopathy were associated with higher levels of aggression on the Taylor Aggression Paradigm. In addition, there was an interaction between alcohol and psychopathy type, such that alcohol (vs. placebo) increased aggression for participants high on secondary psychopathy, but not for participants high on primary psychopathy. Thus, the aggressogenic effects of alcohol may be specific to secondary psychopathy.

## **Interventions in Psychopathic Populations**

### *Therapeutic Communities/Supportive Housing*

Psychopathy has long been considered an intractable disorder that cannot be effectively treated (Cleckley, 1941/1982; Hare, 1991; Harris & Rice, 2007). This perception about the treatability of individuals with psychopathy may stem from anecdotal clinical experiences from influential figures in the field (e.g., Cleckley, 1941/1982), as well as from early empirical studies indicating the immutability of the psychopathic personality. In fact, some early studies actually found that treatment made individuals with psychopathy worse. For example, Rice, Harris, and Cormier (1992) retrospectively examined the effectiveness of a “therapeutic community” (i.e., a milieu therapy meant to foster positive personality change through healthy social connection) as a treatment for psychopathy in an inpatient psychiatric hospital setting. This program ran for more than a decade and was intensive, involuntary, and mostly patient operated (Barker, 1980). Rice et al. (1992) found that compared to treated nonpsychopaths, treated psychopaths actually showed significantly higher rates of violent recidivism at a ten year follow up assessment. Interestingly, this treatment outcome was explained as such: psychopaths used the treatment milieu to better learn about people so that they could subsequently manipulate others more successfully. As Polashek & Daly (2013) pointed out, however, interpretations of these findings seemingly ignored the (a) involuntary nature of the program as well as (b) the fact that treatment resistant patients (who were mostly psychopaths) were secluded and/or given doses of alcohol and drugs (e.g., LSD) in order to weaken their psychological defenses. Therefore, a reasonable alternative hypothesis to the Rice et al. (1992) finding is that treated psychopaths had worse treatment outcomes because they were far more likely to be exposed to the harmful aspects of the treatment (seclusion, forced substance use, etc.) (Polashek, 2014).

Despite their initial ineffectiveness, therapeutic communities have been modified to meet ethical standards and are still commonly used today in prisons and psychiatric hospitals (Harris & Rice, 2007). Notably, however, only one empirical study has specifically assessed psychopathy while examining the treatment effectiveness of the therapeutic community in a substance abusing population. Richards, Casey, & Lucente (2003) randomly assigned 404 incarcerated females in an institutional drug treatment program to one of three conditions: (1) individualized treatment without supportive housing (in this study supportive housing was operationalized as being housed in a unit with others in the same treatment program), (2) individualized treatment with supportive housing, and (3) non individualized treatment in a therapeutic community (the therapeutic community in this study utilized a confrontational cognitive behavioral approach with an emphasis on contingency management). Broadly speaking, higher psychopathy scores (in all treatment conditions) were associated with worse treatment outcomes (e.g., more positive or avoided urinalysis tests, higher rates of treatment noncompliance, fewer days to re-arrest upon release, etc.). However, there were some additional findings of note. First, contrary to the authors' hypotheses, higher psychopathy scores were positively associated with treatment attendance in condition two (i.e., individualized treatment with supportive housing). However, they were negatively associated with therapist ratings of amount and quality of participation. The authors suggested that this was the result of attempted manipulation (i.e., participants would attend the group to appease the program but would not actually engage). Second, prior to and during the course of treatment, higher secondary psychopathy scores were significantly and positively associated with number of institutional infractions. However, when assessed at post treatment, this association was no longer present. Richards et al. (2003) argued that this was due to the fact that individuals were closer to release

from prison and therefore had less of a reason to act in ways that would prolong their stay. A plausible alternative hypothesis is that individuals with higher secondary psychopathy scores actually benefited from treatment (individuals with higher primary psychopathy scores still had significant institutional infractions at the post treatment assessment). Taken in concert, these findings may indicate that individuals high on secondary psychopathy in a supportive environment attended treatment and, despite therapist ratings that they were not engaged, actually benefited from it in the short term (as evidenced by the overall decrease in institutional infractions), but not the long term (there remained a significant positive association between secondary psychopathy scores and recidivism; however, it should be noted that individuals without supportive housing or the therapeutic community recidivated much more quickly).

In total, the literature on therapeutic communities thus far has reported bleak outcomes. However, upon further examination, there appears to at least be some hope for treating individuals with secondary psychopathy.

### Cognitive-Behavioral Therapy

Cognitive-behavioral therapy (CBT) has been found to be efficacious for a myriad of psychological disorders (Butler, Chapman, Forman, & Beck, 2006). As such, it makes sense that intensive CBT has been put forth as a possible treatment option for individuals with psychopathy (Andrews & Bonata, 1994; Wong & Hare, 2005). Several reviews have examined the efficacy of CBT in treating psychopathy. In a 2002 meta-analysis, Salekin reviewed the existing treatment literature on psychopathy and found that CBT had a 62% success rate across five studies, (with 'success rate' being defined as the average improvement of treatment receivers minus the average improvement of non-treatment receivers in a subsample of individuals in control or comparison groups). However, critics have noted that the studies analyzed by Salekin (2002)



contain serious methodological flaws (e.g., small sample sizes, very few control groups, no formal assessment of psychopathy, etc.) and that, as a result, no firm conclusions can be drawn based on this literature (Harris & Rice, 2007).

Reidy, Kearns, & DeGue (2013) reviewed nine longitudinal studies (average follow up time was approximately five years) examining recidivism in sex offending psychopaths after receiving a cognitive-behavioral treatment. Of the nine studies reviewed, eight found that higher levels of psychopathy predicted higher rates of recidivism, despite treatment; however, none of the eight studies utilized comparison groups, which limits the interpretability of findings. The ninth study, conducted by Abracen et al. (2011), examined recidivism rates in psychopaths treated with a CBT model tailored to sex offenders ( $n = 64$ ) and compared them to recidivism rates in a matched (on psychopathy level, type of sexual offender, and age at index offense) comparison group ( $n = 55$ ) that received non sex offender specific treatment. Overall, rates of re-offense were low, and between-group differences (sex offender specific versus non-specific treatment) were non-significant at 10-year follow-up. Abracen et al. (2011) concluded that treatment is indeed effective for psychopathic offenders. Although they acknowledged that sex offender specific treatment did not necessarily out-perform the non-specific treatment, they pointed out that the sex offender specific treatment group demonstrated greater baseline risk of re-offense (since the sex offender specific treatment is often given to higher risk offenders). Therefore, the authors posited that the more specific, intensive treatment helped the higher risk offenders' recidivate at (1) lower rates than expected based on actuarial risk instruments and (2) rates equivalent to lower risk offenders matched on other variables. In a somewhat similar study, Davidson et al. (2009) conducted a randomized controlled trial with an outpatient population of violent men with Antisocial Personality Disorder (ASPD) to determine the efficacy of CBT on

various outcomes such as aggression, alcohol use, and social functioning compared to treatment as usual in the community (type of treatment as usual was unspecified in the study). At 12-month follow up, reductions in verbal and physical aggression were present in both groups. Moreover, the CBT group demonstrated an increase in positive beliefs about others and less harmful alcohol use than the treatment as usual group. Although psychopathy was not specifically assessed in this study, ASPD has significant overlap with secondary psychopathy. Thus, the findings of this study can be seen as relevant and encouraging.

Dialectical Behavior Therapy (DBT) is a variant of CBT that has been shown to be effective in treating borderline personality disorder (BPD), a severe form of psychopathology (Linehan et al., 1991; Linehan, 1993; Linehan, Heard, & Armstrong, 1993). Linehan (1993) posited that emotional dysregulation is at the heart of BPD such that the inability to regulate one's emotions causes problems in other areas of life (e.g., cognitively, interpersonally). Because emotional dysregulation is also a core symptom of secondary psychopathy, DBT has been posited to be effective for individuals with psychopathy as well (McCann, Ball, & Ivanoff 2000). Moreover, variants of DBT have been clinically adopted in several correctional and forensic settings with anecdotal reports of success (Berzins & Trestman, 2004). Recently, Galietta & Rosenfeld (2012) proposed DBT as a possible treatment option for psychopathy and described various ways of tailoring DBT for psychopathy treatment (e.g., ensuring treatment engagement due to the generally mandated nature of treatment with these individuals). They also presented a case example of a successfully treated psychopath. Although seemingly promising, there has been no systematic study of the efficacy of DBT for treating psychopathy.

*Motivational Interviewing*

Motivational interviewing (MI) is an intervention focused on reducing client ambivalence about changing problematic behaviors (e.g., alcohol misuse, antisocial behavior, etc.; Miller & Rollnick, 2002). MI relies on a variety of therapeutic techniques, including providing normed feedback to clients (i.e., how a client's behavior compares to others his/her age), helping clients weigh the pros and cons on their behavior, and helping clients to set realistic change goals. Like CBT, MI has been widely studied and found to be effective in producing behavior change across multiple populations (Miller & Rose, 2009).

Unlike many behavioral change interventions, MI is decidedly non-confrontational and non-directive. MI stresses the autonomy of the client (i.e., clients are encouraged to make their own choices and decisions), and practitioners interact with clients in a collaborative, empathic, non-authoritarian way; a style often referred to as "MI spirit." In fact, some researchers have hypothesized that MI spirit actually mediates the effectiveness of MI (Copeland, McNamara, Kelson, & Simpson, 2015), though research on this issue has been mixed (Apodaca & Longabaugh, 2009).

Notably, the effectiveness of MI has been found to vary with client characteristics. In particular, studies have found that clients who are high on trait anger and/or trait reactance (i.e., resistance to authority/external influence) respond particularly well to the non-directive, non-authoritarian nature of MI. For example, Karno and Longabaugh (2005) used data from Project MATCH (a multisite randomized clinical trial designed to examine various treatments for alcoholism) to assess therapist directiveness, client reactance, and alcohol outcomes among 141 individuals receiving treatment for alcohol abuse or dependence. Findings revealed an interaction between therapist directiveness and client reactance, such that higher levels of therapist directiveness led to worse alcohol use outcomes in patients with medium and high -

versus low - levels of reactance. In 2009, Karno, Longabaugh and Herbeck replicated and extended these findings with a separate Project MATCH sample. Specifically, they examined 247 problem drinkers who were receiving either primary outpatient treatment ( $n = 127$ ; i.e., the first round of treatment) or aftercare ( $n = 122$ ; i.e., continuing care). Results revealed an interaction between therapist structure (a component of directiveness) and client reactance in the aftercare group. More specifically, increased therapist structure predicted fewer days of alcohol abstinence and more heavy drinking days for clients who were high, but not low, in reactance. Notably, there was no interaction between therapy structure and client reactance in the primary outpatient sample. Karno et al. (2009) explained this by positing that early in treatment, patients expect structure, but as treatment progresses (i.e., into aftercare), patients expect more autonomy; thus, higher levels of structure negatively impact patients, particularly those high in reactivity.

Clinically speaking, psychopaths display high levels of both anger and reactance. As a result, they may not be amenable to highly structured, directive treatment modalities. Taylor and Lang (2007) suggested using an MI framework to better engage psychopaths (especially those with substance use problems) in treatment. Despite this recommendation, there do not appear to be any empirical studies specifically examining the effectiveness of MI on comorbid psychopathy and alcohol use disorder. Easton et al. (2012), however, examined treatment outcomes for young, marijuana dependent adults with and without ASPD. Participants were randomly assigned to one of four conditions: (1) Motivational enhancement therapy (MET) and CBT with contingency management (CM), (2) MET and CBT without CM, (3) Drug counseling (DC; i.e., treatment as usual) with CM, and (4) DC without CM. Easton et al. (2012) did not find any differences in outcome based on treatment condition. Additionally, they found that, in all four conditions, marijuana users with ASPD remained in treatment and had similar substance use

outcomes as marijuana users without ASPD (despite the ASPD group having higher rates of alcohol dependence diagnoses and heavier past month marijuana use at baseline). Thus, although the MI-based interventions were not more effective than the non-MI interventions, this study suggests that substance use treatment can be just as beneficial for individuals with ASPD as it is for individuals without ASPD. Additionally, Swogger et al. (2016) enlisted 105 men and women in a pretrial jail diversion program and randomly assigned them to either a three to four session MI-based intervention plus standard care or standard care alone. Psychopathy scores were obtained, as were substance use outcomes (daily use, breathalyzer, urinalysis, and substance use consequences) at six-month follow-up. Although there were no differences in substance use consequences or participation in non-study treatment between intervention groups, individuals with higher levels of primary psychopathy had greater levels of substance use at follow-up; secondary psychopathy was unrelated to treatment outcome. The authors suggested MI-based treatment may be ineffective for individuals with high levels of primary psychopathy and possibly impede their ability to decrease their substance use.

#### *Implications of Findings from the Treatment Literature*

Overall, the psychopathy treatment literature is sparse. Of the studies that have been conducted, very few have used randomized designs, which greatly limits the conclusions that can be drawn. Those that have used randomized designs, however, have produced mixed findings. Though psychopathy does not necessarily indicate worse treatment outcomes, certain psychopathic subtypes may be more resistant to therapeutic change.

The literature on treatment of comorbid secondary psychopathy and alcohol use is virtually nonexistent. That is, few, if any, empirical studies have attempted to initiate change in alcohol use patterns in secondary psychopaths. Of those that have (and, as reviewed, ASPD is

typically measured, rather than secondary psychopathy), favorable treatment outcomes have been demonstrated such that individuals with ASPD (a disorder similar to secondary psychopathy) do at least as well as those without ASPD.

### **Brief Interventions for Alcohol Use**

Although there are few, if any, empirically supported treatments for psychopathy, there are an abundance of promising treatments for alcohol use problems. Many of these treatments are ‘brief interventions,’ or short (often single-session) interventions aimed at reducing alcohol use. Brief interventions for alcohol use have been effective with effect sizes in meta analyses ranging from small ( $OR = 1.91$ ; Wilk et al., 1997) to moderate ( $d = .38$  in Bien et al., 1993;  $d = .67$  in Moyer et al., 2002), though some recent meta-analyses have found that these effects may be somewhat smaller than originally estimated (Huh et al., 2015; Tanner-Smith & Lipsey, 2015). Moreover, brief interventions are thought to be particularly useful for the large percentage of problem drinkers who do not want more traditional, longer-term treatment (SAMHSA, 2012).

Brief alcohol interventions vary in content, and many rely on motivational interviewing techniques (Bertholet et al., 2005). These brief motivational interventions (BMIs) elicit motivation to reduce drinking through a variety of techniques including; decisional balance (i.e., weighing the pros and cons of alcohol use), normative feedback (i.e., feedback about how much one drinks in comparison to peers), assessing confidence in the ability to change, and goal setting in regard to future alcohol use. These techniques are carried out in a collaborative manner by an empathic, nonjudgmental interventionist (Daeppen et al., 2011; Gaume et al., 2011). Brief motivational interventions have been widely used and have been found to be effective in community (Daeppen et al., 2011; Gaume et al., 2011), college student (Carey et al., 2006), and medical (Lundahl et al., 2013) samples. For example, Daeppen et al. (2011) randomized a

community sample of 318 young men to receive either a single BMI session or a no intervention control session. At six-month follow-up, binge drinkers (defined in this study as having had six or more drinks on at least one occasion in the past month) in the BMI condition showed a 20% greater reduction in alcohol consumption than binge drinkers in the control condition. Moreover, binge drinkers in the BMI condition reported drinking 1.5 fewer drinks per week, whereas binge drinkers in the control condition actually increased their alcohol consumption by nearly one full drink per week. Finally, subjects in the BMI condition (regardless of binge drinking status) who reported past year alcohol consequences showed a 19% greater reduction in alcohol use as compared to subjects in the control condition.

Carey et al. (2006) randomly assigned 509 college students to one of six intervention conditions. Each participant either did or did not receive a comprehensive alcohol assessment (i.e., a Timeline Followback interview [TLFB]). All participants were then randomly assigned to one of three intervention types; “basic” BMI, BMI with decisional balance, or no intervention. The “basic” BMI consisted of personalized feedback about the participant’s alcohol use and psychoeducation about alcohol use. The BMI with decisional balance contained all elements of the “basic” BMI plus a decisional balance component in which the participant weighed the pros and cons of consuming alcohol. Results revealed that the “basic” BMI reduced all alcohol consumption variables (drinks per week, drinks per drinking day, heavy drinking frequency, and estimated blood-alcohol content) as well as alcohol consequences above and beyond the effects of assessment alone (i.e., the TLFB) at one-month follow-up. Interestingly, the “basic” BMI also outperformed the BMI with the decisional balance component. Carey et al. (2006) put forth several explanations as to why the decisional balance component of the BMI may not have had the intended effect. First, it may have made the positive aspects of drinking salient, impeding

motivation to change. Second, the decisional balance exercise required participants to evaluate their alcohol consumption relative to their own internal standards (as opposed to the standards of their peers [a technique utilized in the “basic” BMI]). Thus, participants who are more reliant on their peers for guidance may not have weighed their own internal standards as heavily. Finally, it was noted that readiness-to-change was not assessed and therefore individuals not in the appropriate stage of change may have been adversely affected by the procedure (i.e., drink more alcohol instead of less).

Lundahl et al. (2013) conducted a meta-analysis of RCTs looking at the efficacy of BMIs on numerous health behaviors in medical care settings (e.g., primary care, emergency departments). Forty-eight studies were included in the meta-analysis, 13 of which specifically examined alcohol use as a primary outcome. Of these 13 studies, nine focused on reduction of general alcohol use and four focused on reduction of dangerous use. Results of the meta-analysis showed that BMIs were superior to comparison groups in the reduction of both general alcohol use ( $OR = 2.31$ ) and dangerous alcohol use ( $OR = 1.83$ ). Similarly, Tanner-Smith and Lipsey (2015) conducted a meta-analysis of 185 studies examining the effects of brief alcohol interventions for adolescents and young adults. Results showed significant reductions in both alcohol use and consequences for adolescents ( $g = 0.27$  and  $g = 0.19$ ) and young adults ( $g = 0.17$  and  $g = 0.11$ ).

Notably, however, other meta-analyses have found less favorable outcomes. For example, Huh et al. (2015) conducted an individual participant-level data meta-analysis examining 17 RCTs testing the efficacy of BMIs aimed at reducing alcohol use in college students. The findings from this study indicated that, with the exception of in-person interventions with personalized feedback, BMIs did not significantly reduce alcohol consumption or consequences.



The authors noted that the non-significance of their findings might have been due to their methodological approach (e.g., accounting for zero-inflated distributions and controlling for individual-level covariates) and the fact they included unpublished studies whereas other studies only meta-analyzed published data.

Overall, the literature on the magnitude of BMI effectiveness is mixed; still, BMIs have been shown to have at least some positive, significant effects in reducing alcohol use across several population types.

It is important to note that, despite their promise, there are clear barriers to implementing brief interventions into “real world” practice (Hilbink et al., 2012). For example, Aalto, Pekuri, & Seppa (2013) conducted a qualitative study with general health care practitioners examining barriers to utilizing brief alcohol interventions in medical settings. Primary barriers identified included time constraints, as well as a lack of self-efficacy on the part of the provider in understanding heavy alcohol use, identifying heavy alcohol users, and carrying out brief interventions to reduce alcohol use. Additional barriers to implementation include identification and reach of at-risk individuals in settings such as emergency departments (Horn et al., 2008). Furthermore, issues arise (e.g., staff availability, interventionist skill) when attempting to contact individuals for follow-up booster sessions to improve intervention effectiveness (Donvan et al., 2015). Solutions to these barriers need to be addressed in order for BMIs to have an optimal effect on health behaviors such as alcohol use.

### **Computer-delivered Brief Interventions**

One solution that may help to address the aforementioned obstacles of traditional (i.e., face-to-face) BMIs are computer-delivered brief interventions (CDBIs). CDBIs, like traditional BMIs, are generally brief (often single session) and vary in kind (e.g., different theoretical

orientations, techniques, presentations, etc.). Additionally, CDBIs are delivered in various formats (e.g., on the internet, via a tablet in the waiting room of health clinic) and can be used to promote a variety of health behaviors, such as reducing substance use, promoting weight loss, and reducing risky sexual behavior (Rooke et al., 2010; Ondersma et al., 2005; Ondersma, Svikis, & Schuster, 2007; Ondersma et al., 2014; Carcone et al., 2014). CDBIs also have several practical benefits in that they (a) require little training, (b) are easy to administer, (c) can be delivered with 100% fidelity across settings and populations, and (d) avoid therapist bias. In addition to these benefits, CDBIs have been effective with many different populations, including college students (e.g., Chiauzzi et al., 2005; Neighbors, Larimer, & Lewis, 2004), members of the community (e.g., Cunningham et al., 2009), and medical patients (e.g., Ondersma et al., 2005; Ondersma et al., 2014). For example, Chiauzzi et al. (2005) assigned 256 heavy drinking college students to either a CDBI condition or a psychoeducation control group. The CDBI condition involved assessment of alcohol use, normative comparisons of alcohol use to peer use, motivational feedback, and specific strategies to reduce alcohol consumption. Results showed that the CDBI (versus the control condition) was associated with greater reductions in drinking outcomes for women, persistent heavy drinkers, and individuals with low motivation to change at baseline. These findings suggest that CDBIs can be a useful tool in reducing alcohol use, especially for certain difficult-to-treat groups (i.e., persistent heavy drinkers and individuals with low motivation). Cunningham et al. (2009) assigned 185 non-treatment seeking heavy drinkers from a community sample to either an internet-based CDBI or a no intervention control condition. Alcohol use outcomes were assessed at both three- and six-month follow-up, with results showing that those who received the CDBI reduced their weekly alcohol use significantly more than those in the control group (six to seven drinks per week, as opposed to one drink per

week in the control group). Hester, Delaney, & Campbell (2012) conducted two randomized controlled trials to test the efficacy of a CDBI among heavy drinking college students. In the first RCT, participants ( $N = 144$ ) were assigned to either a CDBI or an assessment-only control condition; one- and twelve-month follow-ups showed reductions in alcohol use for both groups. In the second RCT, participants ( $N = 82$ ) were assigned to either the CDBI or a delayed assessment control group. Results showed that the intervention, compared to control, significantly reduced drinks per week, peak BAC in a typical week, average number of drinks during a heavy use episode, and peak BAC during heavy use episodes.

Much like the literature on BMIs, the magnitude of the effectiveness of CDBIs has been called into question. Carey et al. (2009) conducted a meta-analysis investigating the effects of CDBIs on reducing college alcohol use. Across 43 interventions, CDBIs were shown to be efficacious in significantly reducing alcohol use and consequences over short- and long-term follow-ups; however, the reported effects were small ( $d = .09$ -.28). Similarly, Rooke et al. (2010) conducted a meta-analysis of 42 CDBI studies aimed at reducing alcohol and tobacco use. Much like the upper bounds of Carey et al. (2009), results produced small but significant effect sizes ( $d = .26$ ) regarding alcohol use. In a meta-analysis examining alcohol outcomes in CDBI vs. in-person interventions, Carey et al. (2012) found that both types of interventions were beneficial for short term reductions in alcohol use. However, in-person interventions positively impacted a greater variety of alcohol use outcomes, with the effects sustained over longer periods of time compared to CDBIs. A more recent meta-analysis of 15 studies examining the effectiveness of web-based interventions for alcohol use found small reductions in alcohol use but showed no effect on the reduction of alcohol consequences (Leeman et al., 2015); this same study also suggested that effective ingredients in these interventions included personalized,

normed feedback and a multicomponent approach. Overall, the literature suggests that CDBIs, at the very least, are capable of producing small but meaningful reductions in alcohol use. Given the potential severity of alcohol use consequences combined with the cost effectiveness of CDBIs, pursuit of these interventions, even if their effects are small, is warranted.

### **The Current Study**

The goal of the current study was to test the effectiveness of a brief, MI-based CDBI among heavy drinking college students with varying levels of secondary psychopathy. We hypothesized that exposure to the intervention would increase readiness to change and intentions to reduce drinking, and reduce both alcohol use and alcohol-related consequences at one-month follow-up. Additionally, given the previously reviewed literature which suggests that (1) individuals with psychopathy can respond to treatment, (2) MI-based interventions are effective at reducing alcohol use, and (3) MI-based interventions may work better than other types of interventions for individuals who are high in anger and reactance, we hypothesized that there would be no moderation effects of psychopathy level. That is, that the intervention would be equally effective for individuals with varying levels of secondary psychopathy.

## **CHAPTER 2 METHOD**

### **Participants**

One hundred and three participants enrolled in classes at Wayne State University were recruited and randomized for the current study between April and September of 2016. Of the 103 participants recruited, 100 (55% male) completed both the baseline and follow-up sessions. Eighty-five percent of participants were between the ages of 18 to 25, 13% were 26 to 29 years old, and 2% were 30 or older. The sample was 47% “White,” 41% “Asian,” 5% “Black or African-American,” 5% “Multiracial,” and 2% “Unknown or choose not to answer.”

### **Procedure**

#### *Recruitment*

Participants were recruited in one of two ways: (1) the psychology department subject pool (SONA) or (2) flyers posted in campus buildings. Students interested in participating were asked to answer seven eligibility questions assessing current alcohol use. Subject pool (SONA) students answered these questions on the SONA prescreen questionnaire. Students who responded to flyers/advertisements answered the eligibility questions either in an online screener or over the phone with a research assistant (participant's choice).

To meet eligibility requirements, participants had to endorse one of the following four criteria: (1) ‘sometimes’ or ‘frequently’ consuming 3 (women)/4 (men) drinks per day, (2) ‘sometimes’ or ‘frequently’ consuming 7 (women)/14 (men) drinks per week, (3) getting drunk at least once per week over the past 6 months or (4) binge drinking at least once per week over the past 6 months. Students who endorsed these criteria on the SONA prescreen questionnaire were eligible to sign up for a study timeslot through the SONA system. Eligible non-SONA students were contacted by a research assistant and scheduled for a study timeslot.

### *Baseline Session*

Eligible participants came to the lab during their scheduled session and completed baseline measures assessing demographic information, psychopathic traits, past month alcohol use, past month negative alcohol consequences, intentions to reduce drinking, and therapeutic reactance. After completing those measures, participants were randomized to either an intervention or an education-only condition. Following completion of the intervention/education-only tasks, participants filled out the readiness to change and intention to reduce drinking scales again, and rated their satisfaction with the computer program. Before leaving the lab, participants were compensated with a \$20 Amazon gift card, and were reminded that a follow up questionnaire would be e-mailed to them in 30 days.

### *One-Month Follow-Up*

One-month post-baseline, participants were e-mailed a link to a follow-up survey containing questions about alcohol use, consequences, and intentions to reduce drinking. The follow-up survey took approximately 10 minutes to complete. Participants were compensated with a \$30 Amazon gift card. Participants who did not complete the survey were given up to three e-mail, phone call, or text reminders.

### **Measures**

*Demographic information.* Participants reported their age, gender, race, and ethnicity.

*Psychopathy.* The Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005) is considered to be the gold standard (Witt, Donnellan, & Blonigen, 2009) for measuring psychopathic personality traits in non-forensic (i.e., community and college) samples. The PPI-R contains 154 items rated on a four-point scale (1 = false, 2 = mostly false, 3 = mostly true, 4 = true). PPI content covers both the affective and behavioral domains of psychopathy and

yields a total score along with two moderately correlated factor scores (Fearless Dominance [analogous to primary psychopathy] and Self-centered Impulsivity [analogous to secondary psychopathy]). The PPI-R has been found to be reliable, construct valid, and strongly associated with other measures that assess psychopathy (Lilienfeld, & Widows, 2005; Marcus, Fulton, & Edens, 2012; Poythress et al., 2010; Ray, Weir, Poythress, & Rickelm, 2011). Internal reliabilities for Fearless Dominance (FD) and Self-centered Impulsivity (SCI) in the current sample were excellent ( $\alpha = .91$ ).

*Alcohol Use.* Past month alcohol use was measured with the Timeline Follow-Back Interview (TLFB) at baseline, and with the Quantity/Frequency Questionnaire at one-month follow-up. The TLFB is a highly reliable, semi-structured interview, which uses a calendar and “anchor points” (i.e. distinct events such as birthdays or concerts) to help the participant better recall their day-to-day alcohol use. Responses to the TLFB were tabulated to calculate the average number of drinks per day over the 30 days prior to the baseline session. The three-item Quantity/Frequency Questionnaire, developed by the United States Department of Health and Human Services (1995), asks respondents about (1) the number of days per week they drank alcohol during the past month, (2) the number of drinks they typically consumed per drinking occasion and (3) the maximum number of drinks they consumed during the past month (U.S. Dept. of Health and Human Services, 1995). Responses were tabulated by multiplying the number of days per week alcohol was consumed by the number of drinks typically consumed on drinking days.

*Alcohol Consequences.* Alcohol consequences were measured with the Drinker Inventory of Consequences Recent Version (DRINC-2R; Miller, Tonigan, & Longabaugh, 1995)

at baseline, and the Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006) at follow-up.

The Drinker Inventory of Consequences Recent Version (DRINC-2R; Miller, Tonigan, & Longabaugh, 1995) is a 50-item self-report measure that assesses recent negative consequences of alcohol use. The DRINC-2R provides a total score as well as five subscales that include physical, interpersonal, intrapersonal, impulse control, and social responsibility consequences. Participants are asked to respond how often they have experienced these negative consequences over the past 90 days (0 = Never, 1 = Once or a few times, 2 = Once or twice a week, 3 = Daily or almost daily). The DRINC-2R has demonstrated good reliability for the total score and all five subscales; the internal reliability for the DRINC-2R in the current sample was excellent ( $\alpha = .94$ ).

The YAACQ is a well-validated, 24-item measure that assesses the presence vs. absence of harmful alcohol consequences across eight domains. The eight domains include social/interpersonal, academic/occupational, risky behavior, impaired control, poor self-care, diminished self-perception, blackout drinking, and physiological dependence, which all load onto one higher order factor (Read et al., 2006). The internal reliability for the YAACQ in the current sample was good ( $\alpha = .85$ ).

*Reactance.* The Therapeutic Reactance Scale (TRS; Dowd, Milne, & Wise, 1991) is a 28-item, self-report measure that assesses the propensity of an individual to speak and/or act out when the person believes that somebody is infringing upon his or her freedom. Examples of items comprising this scale are, “If I am told what to do, I often do the opposite,” and “I find that I often have to question authority.” Items are rated on a four-point scale that ranges from 1 = Strongly disagree to 4 = Strongly agree. This measure has demonstrated adequate internal



consistency and good convergent and discriminant validity (Dowd et al., 1991); the internal reliability for TRS in the current sample was adequate ( $\alpha = .73$ ).

*Readiness to Change.* The Readiness to Change scale (RCS; Rollnick et al, 1992) is a 12-question measure that assesses motivation to reduce alcohol use. Respondents rate statements that reflect three stages of change, precontemplation, contemplation, and action (Prochaska, DiClemente & Norcross, 1992). In the current study, the four questions which reflect the action stage of change were dropped from the measure, as they are geared towards individuals who have already begun to reduce their drinking. Participants therefore completed a total of eight questions; four that reflected precontemplation (e.g. “There is nothing seriously wrong with my drinking,” “It’s a waste of time thinking about my drinking because I do not have a problem”) and four that reflected contemplation (e.g. “Sometimes I think I should quit or cut down on my drinking,” “My drinking is a problem sometimes”). Response options ranged from 0 = Strongly disagree to 5 = Strongly agree. The RCS demonstrated good internal consistency when given both before ( $\alpha = .79$ ) and after ( $\alpha = .84$ ) the intervention.

*Intentions to Reduce Drinking.* Participants responded to two questions assessing intentions to reduce drinking. The first question asks participants to choose one of the following responses: “I have no interest in reducing my alcohol use right now;” “I may reduce my alcohol use at some point, but I’m not sure when;” “I’m planning on reducing my alcohol use sometime in the next year;” “I’m planning on reducing my alcohol use sometime in the next month;” “I’m planning on reducing my alcohol use sometime in the next week;” “I’m planning on reducing my alcohol use tomorrow;” “I’m planning on reducing my alcohol use today.” The second question asks participants to rate how likely they are to reduce their drinking over the next week, month, and year on a scale ranging from 0 = Not at all likely to 5= Extremely likely. This measure was

developed by the Wayne State College Alcohol lab, and has been used in previous research.

*Software Acceptability.* A 13-question self-report measure was used to gauge various aspects of the participants' experience with both the intervention and the education-only condition (e.g., how easy the technology was to use, how much the individual enjoyed working with the technology, how well they felt the computerized narrator understood them, etc.).

### **Conditions**

*Intervention.* Participants in the intervention condition completed a 15-20 minute interactive computer program based on principles of motivational interviewing (MI; Miller & Rollnick, 2002). The program consisted of 3 components; (1) *decisional balance*, in which participants identified what they liked and didn't like about alcohol use, (2) *normed feedback*, in which participants were given information about how their drinking compared to others their age and gender, and (3) *goal setting*, in which participants were offered the option of setting a behavior change goal (e.g., reducing their alcohol use).

Participants were guided through the intervention by a three-dimensional animated narrator named "Peedy." "Peedy" is capable of performing more than 50 actions, which include talking, waving, and reading messages to the participant. Peedy also has a lifelike personality and is able to interact with participants on a personal level (e.g., he uses their names, reacts to their responses, etc). In accordance with MI principles, "Peedy" shows empathy and positive regard through reflective statements and comments about participants' hard work and cooperation ("It sounds like you've really thought this through" and "Alcohol really helps you relax.") (Miller & Rose, 2009).

This three-component intervention has been used in previous studies and has been shown to be effective in reducing alcohol use and increasing motivation to change (Ondersma et al, 2005; Tzilos et al., 2011; Schwartz et al, 2014).

*Education-only.* Participants in the education-only condition were given non-personalized, factual information about alcohol consumption (e.g., "alcohol is metabolized by the liver"). After reading through a series of short modules about alcohol use, participants were asked to answer questions about the information presented in each module. The education-only condition did not have a voice or a narrator and did not contain empathic reflections or statements of positive regard. The length of this condition was equivalent to the length of the intervention (~15-20 minutes).

### **Analytic Strategy**

After completing data screening procedures (Tabachnick and Fidell, 2007), as well as a series of randomization checks, the following analyses were run:

1) Mixed-design analysis of variance (ANOVA) was used to examine the effects of condition on readiness to change, intentions to reduce drinking, alcohol use, and alcohol use consequences. It was hypothesized that participants in the intervention condition would show greater increases in readiness to change and intentions to reduce alcohol use, and greater decreases in alcohol use and alcohol-related consequences than participants in the education-only condition. Readiness to change was measured at baseline, both before and after the intervention. Intentions to reduce drinking were measured at baseline, both before and after the intervention, and at one-month follow-up. Alcohol use and alcohol-related consequences were measured at baseline, before the intervention, and at one-month follow-up. Analyses took into account all timepoints in which the variable in question was measured.

2) Regression analyses were used to examine whether psychopathy scores predicted differences in alcohol use, alcohol-related consequences, intentions to reduce drinking, and readiness to change as measured at baseline (before the intervention). It was hypothesized that individuals who scored higher on psychopathy would consume more drinks per week, and report more alcohol-related consequences, weaker intentions to reduce alcohol use, and lower levels of readiness to change than individuals who scored lower on psychopathy.

3) Hierarchical regressions were used to examine whether psychopathy scores interacted with treatment condition to predict alcohol outcomes at one-month follow-up. It was hypothesized that there would be no interactions between psychopathy score and treatment condition (i.e., that the intervention would affect individuals with varying levels of psychopathy in the same way) across the following outcomes: (1) baseline intentions to reduce drinking (post – pre-intervention) change score, (2) baseline readiness to change (post – pre-intervention) change score, (3) one-month follow-up intentions to reduce drinking (one-month follow-up – pre-intervention) change score, (4) alcohol use change score (one-month follow-up alcohol use – baseline alcohol use), and (5) alcohol consequences at follow-up.

## **CHAPTER 3 RESULTS**

### **Data Screening**

Data from three participants who did not complete the follow-up questionnaire were not analyzed. Data from the remaining 100 participants were screened for normality and outliers. All variables were examined for out of range values. No values were out of range and all means and standard deviations were plausible. Next, skewness and kurtosis were evaluated in order to assess normality of the primary study variables. Three variables fell outside of acceptable ranges (i.e., between -1 and +1 per Tabachnick and Fidell [2007]): alcohol use at baseline (TLFB), alcohol consequences at baseline (DRINC-2R), and alcohol consequences at follow-up (YAACQ). All three variables were positively skewed and leptokurtic. Square root transformations improved the skew and kurtosis of all three variables (see Table 1). Univariate outliers were then examined by standardizing primary variables into z-scores. Per Tabachnick and Fidell (2007), scores falling three standard deviations above or below the mean were labeled as outliers. Eight outliers were identified, with DRINC-2R, PPI FD, RTC pre-test, and average number of drinks at follow-up each containing one outlier, and TLFB and YAACQ at follow-up each containing two outliers. All outliers were retained, as they did not influence results of subsequent analyses. There were occasional missing data points where participants did not answer a question on one of the questionnaires. Because only a small proportion (<1%) of the data were missing, mean imputation was used and data were assumed to be missing at random.

### **Descriptives, Randomization Check, and Bivariate Associations**

Table 2 shows descriptive statistics for all primary study variables. A series of t-tests was run to determine if participants in the treatment and education-only conditions differed on the following variables at baseline: age, gender, ethnicity, race, alcohol use, alcohol use

consequences, psychopathy scores, intentions to reduce drinking, and readiness to change. No differences were detected and therefore no covariates were utilized in any subsequent analyses. Table 3 shows bivariate correlations of all primary study variables. Correlations between baseline variables were in the expected directions. Being male had a small, significant association with baseline alcohol use (TLFB) and primary psychopathy (PPI FD) scores, and a moderately significant association with the total psychopathy score (PPI total). Baseline alcohol use (TLFB) had a small, significant relationship with alcohol consequences (DRINC-2R), total psychopathy scores (PPI total), and secondary psychopathy scores (PPI SCI). Alcohol consequences (DRINC-2R) had a small, significant relationship with total psychopathy scores (PPI total) and reactance (TRS), and a moderately significant relationship with secondary psychopathy scores (PPI SCI). Finally, reactance (TRS) had a strong, significant association with secondary psychopathy scores (PPI SCI).

Table 4 shows bivariate relationships between baseline pre- and post-intervention variables (intentions to reduce drinking and readiness to change), and one-month follow-up variables, for the education-only group. Baseline alcohol consequences were positively associated with both intentions to reduce drinking (after completing the computer program), and readiness to change, (both before and after completing the program). More specifically, participants who reported more alcohol consequences at baseline also reported more intentions to reduce drinking and more readiness to change. As expected, baseline alcohol use was associated with alcohol use at follow-up, though it was not significantly associated with alcohol consequences at follow-up. In addition, intentions to reduce drinking at follow-up was related to baseline intentions to reduce drinking, baseline readiness to change, and software likability.

Table 5 shows bivariate relationships between baseline pre- and post-intervention

variables and one-month follow-up variables for the intervention condition. Pre-intervention readiness to change was associated with baseline alcohol consequences, secondary psychopathic traits, and therapeutic reactance, indicating that participants who were higher on alcohol consequences, reactance, and secondary psychopathy expressed more readiness to change. Post-intervention readiness to change also had a small, significant relationship with alcohol consequences. Baseline alcohol use was associated with follow-up alcohol use, and baseline intentions to reduce drinking and readiness to change were associated with follow-up intentions to reduce drinking. Finally, alcohol consequences at follow-up were positively related to baseline alcohol consequences, secondary psychopathic traits, therapeutic reactance, and pre- and post-intervention Readiness to Change scores.

**Hypothesis 1:** *After the baseline session and at one-month follow-up, participants in the intervention condition will show greater increases in readiness to change and intentions to reduce alcohol use, and greater decreases in alcohol use and alcohol-related consequences than participants in the education-only condition.*

A mixed-design ANOVA was specified to determine the effects of condition (intervention vs. education-only) and time (pre-intervention, post-intervention) on participants' readiness to change their alcohol use. Assumptions of normality and homogeneity of variance were met; Mauchly's test of sphericity was not generated because there were only two cells for the within-subjects variable. The within-subjects results revealed a main effect of time,  $F(1, 96) = 26.2, p < .001, \eta_p^2 = .21$ , that was not qualified by condition,  $F(1, 96) = .01, p = .98, \eta_p^2 = 0.0$ , indicating that participants in both the intervention and education-only conditions increased their readiness to change from pre- to post-intervention. There was no main effect of condition between-subjects,  $F(1, 96) = .02, p = .89, \eta_p^2 = 0.0$  (see Figure 1), suggesting there were no

differences in readiness to change scores between the intervention and education-only conditions.

Second, a mixed-design ANOVA was specified to determine the effects of condition (intervention vs. education-only) and time (pre-intervention, post-intervention, one-month follow-up) on participants' intentions to reduce drinking. Assumptions of normality and homogeneity of variance were met, though Mauchly's test indicated the assumption of sphericity had been violated ( $\chi^2[2] = 16.69, p = .001$ ), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = .86$ ). The within-subjects results revealed a main effect of time,  $F(1.72, 165.36) = 21.4, p < .001, \eta_p^2 = .18$ , that was not qualified by condition,  $F(1.72, 165.36) = .59, p = .52, \eta_p^2 = .01$ , indicating that participants in both the intervention and education-only conditions increased their intentions to reduce drinking over time. The between-subjects results showed a main effect of condition,  $F(1, 96) = 4.59, p = .035, \eta_p^2 = .05$ , indicating that participants in the intervention condition had significantly higher mean intentions to reduce drinking scores (though they did not have higher increases in intentions to reduce drinking over the course of the study: i.e., there was no time by condition interaction) (see Figure 2).

A third mixed-design ANOVA was run to examine the effects of condition (intervention vs. education-only) and time (baseline vs. one-month follow-up) on participants' alcohol use; this analysis was run twice to inspect outcomes with untransformed and transformed alcohol use scores. Using the untransformed alcohol use scores, the assumption of homogeneity of variance was met, though that of normality was not; Mauchly's test of sphericity was not generated because there were only two cells for the within-subjects variable. Although the within-subjects results approached significance, a main effect of time was not significant,  $F(1, 94) = 3.82, p =$



.054,  $\eta_p^2 = .04$ . There was also no main effect of condition,  $F(1, 94) = .92, p = .34, \eta_p^2 = .01$ . This analysis was run a second time in order to correct for normality. The second analysis revealed a significant main effect of time within-subjects,  $F(1, 94) = 9.34, p = .003, \eta_p^2 = .09$ , that was not qualified by condition,  $F(1, 94) = 6.29, p = .12, \eta_p^2 = .03$ . There was no main effect of condition between-subjects,  $F(1, 94) = .43, p = .51, \eta_p^2 = .001$  (see Figure 3; presented with untransformed scores for ease of interpretation). Overall, this result suggests that both groups significantly reduced their alcohol use from baseline to one-month follow-up.

In order to examine the effect of condition on alcohol use consequences at follow-up, a multiple regression was specified predicting follow-up alcohol consequences from condition, while controlling for baseline alcohol use consequences. This analysis was not run as a mixed-design ANOVA because different measures of alcohol consequences were used at baseline and follow-up. Consequences at baseline and follow-up were significantly related ( $\beta = .42, p < .001$ ), but condition was unrelated to alcohol use consequences at follow-up ( $\beta = -.04, p = .64$ ).

**Hypothesis 2:** *Individuals who score higher on psychopathy will consume more drinks per week, and report more alcohol-related consequences, weaker intentions to reduce alcohol use, and lower levels of readiness to change than individuals who score lower on psychopathy.*

A series of regression analyses were run to test the hypotheses that secondary psychopathy scores (PPI SCI) would predict baseline alcohol use (TLFB), alcohol use consequences, pre-intervention intentions to reduce drinking, and pre-intervention readiness to change. Secondary psychopathy scores were found to significantly predict baseline alcohol use ( $\beta = .21, p = .037$ ) and explained 5% of the variance in alcohol use ( $R^2 = .05, F[1, 95] = 4.46, p = .037$ ). Secondary psychopathy scores also significantly predicted baseline alcohol consequences ( $\beta = .41, p < .001$ ) and explained 19.5% of the variance in alcohol consequences ( $R^2 = .20, F[1,$

98] = 24.9,  $p < .001$ ). Secondary psychopathy was unrelated to baseline intentions to reduce alcohol use ( $\beta = .03$ ,  $p = .75$ ), but significantly and positively associated with baseline readiness to change ( $\beta = .29$ ,  $p = .003$ ;  $R^2 = .09$ ,  $F[1, 98] = 9.10$ ,  $p = .003$ ). In total, psychopathy scores were related to baseline alcohol use and consequences as expected; however, they were unrelated to intentions to reduce alcohol use and positively associated with readiness to change.

**Hypothesis 3:** *There will be no interactions between psychopathy score and treatment condition (i.e., the intervention will affect individuals with varying levels of psychopathy in the same way) across the following outcomes: (1) baseline intentions to reduce drinking (post – pre-intervention) change score, (2) baseline readiness to change (post – pre-intervention) change score, (3) one-month follow-up intentions to reduce drinking (one-month follow-up – pre-intervention) change score, (4) alcohol use change score (one-month follow-up alcohol use – baseline alcohol use), and (5) alcohol consequences at follow-up.*

A series of hierarchical regressions were conducted testing whether secondary psychopathy scores (PPI SCI) moderated relationships between study condition and (1) baseline intentions to reduce drinking (post – pre-intervention) change score, (2) baseline readiness to change (post – pre-intervention) change score, (3) one-month follow-up intentions to reduce drinking (one-month follow-up – pre-intervention) change score, (4) alcohol use change score (one-month follow-up alcohol use – baseline alcohol use), and (5) alcohol consequences at follow-up.; see Tables 6 – 10). In each regression model, condition was entered into Step 1, psychopathy score into Step 2, and the centered interaction term of condition X psychopathy into Step 3; in the analysis involving follow-up alcohol use consequences, baseline alcohol consequences was added as a covariate in Step 2. The criterion variable was varied to test each of the aforementioned outcomes.

There were no main effects of secondary psychopathy on any outcome variable. However, a main effect of secondary psychopathy on alcohol use change score approached significance ( $\beta = .28, p = .08$ ; see Table 9), suggesting a trend for higher psychopathy scores to predict greater reductions in alcohol use across conditions. In order to further examine this trend, we used a median split to classify participants as either high or low in secondary psychopathy. We then examined baseline alcohol use, follow-up alcohol use, and alcohol use change scores for participants high versus low in secondary psychopathy, in both the intervention and education-only conditions. Although participants with high levels of secondary psychopathy reported greater levels of baseline alcohol consumption across conditions, they also reduced their drinking over the course of the study more than participants who were low in psychopathy (i.e., by 16.2 [intervention] and 5.76 drinks [education-only]). See Table 11 for alcohol use at each time point and Figure 4 for the alcohol use change score for each group.

There was also an interaction approaching significance between secondary psychopathy and condition for follow-up alcohol consequences, after controlling for baseline consequences ( $\Delta F = 3.72, \Delta R^2 = .03, p = .057$ ; see Table 10). Results revealed that (1) baseline alcohol consequences predicted follow-up alcohol consequences ( $\beta = .36, p = .001$ ), and (2) the psychopathy X condition interaction term approached statistical significance ( $\beta = .28, p = .057$ ). Follow-up analyses revealed that, in the intervention condition, secondary psychopathy predicted follow-up alcohol consequence at trend level ( $\beta = .29, p = .06$ ), whereas, in the education-only condition, there was no relationship between secondary psychopathy and alcohol consequences ( $\beta = -.13, p = .35$ ). More specifically, in the intervention condition, participants with high levels of secondary psychopathy tended to report more alcohol consequences than participants with low levels of secondary psychopathy. This was not the case in the education-only condition (see

Table 12 and Figures 5-6).

No significant main or interaction effects were found for baseline IRD change scores (post – pre-intervention), baseline RTC change scores (post – pre-intervention), or follow-up IRD change scores (post-intervention – one-month follow-up) (see Tables 6 – 8 for betas and  $R^2$  values, and Tables 13 and 14 for mean IRD and RTC scores for participants high and low in secondary psychopathy; see Figures 7 and 8 for IRD and RTC changes from baseline).

## CHAPTER 4 DISCUSSION

### General Intervention Outcomes

The current study examined the efficacy of a computer-delivered brief intervention versus an education-only program in reducing heavy alcohol use among college students. Contrary to prediction, the intervention and education-only conditions were equally effective in increasing readiness to change (RTC) and intentions to reduce drinking (IRD) over the course of the baseline session (i.e., from pre- to post-program delivery). The conditions were also equally effective in increasing intentions to reduce drinking and in decreasing alcohol use from baseline to one-month follow-up. Neither the intervention nor the education-only group reported reductions in alcohol use consequences from baseline to follow-up.

### Specific Outcomes

*Readiness to Change (RTC).* There were no between-group differences in RTC before the computer program was administered (pre-program intervention:  $M = 12.9$ ,  $SD = 7.2$ ; pre-program education-only:  $M = 12.9$ ,  $SD = 7.9$ ). However, both groups showed significant increases in RTC after administration of the program (post-program intervention:  $M = 15.7$ ,  $SD = 8.0$ ; post-program education-only:  $M = 15.5$ ,  $SD = 8.0$ ). Overall, the delivery of either computer program (i.e., intervention or education-only) accounted for 21% of the within-subjects variance in RTC. This suggests that both conditions were effective in helping individuals recognize the potentially harmful effects of their alcohol use, and become more ready for change.

*Intentions to Reduce Drinking (IRD).* As with readiness to change, there were no between-group differences in IRD before the computer program was administered (intervention:  $M = 7.2$ ,  $SD = 6.1$ ; education-only:  $M = 5.1$ ,  $SD = 5.5$ ). However, following administration of both programs (intervention or education-only), IRD significantly increased (intervention:  $M =$

10.9,  $SD = 6.4$ ; education-only:  $M = 7.6$ ,  $SD = 6.1$ ). These gains in IRD were maintained at one-month follow-up (intervention:  $M = 10.6$ ,  $SD = 7.7$ ; education-only:  $M = 8.5$ ,  $SD = 7.8$ ). The delivery of either computer program accounted for 18% of the within-subjects variance in IRD, with 5% of the between-subjects variance explained by condition (i.e., the intervention condition had higher IRD scores throughout the study). This suggests that both conditions were effective in helping participants increase their IRD immediately after the intervention, and in maintaining those intentions at one-month follow-up.

*Alcohol Use.* At baseline, participants in the intervention condition reported a higher number of past month drinks ( $M = 43.3$ ,  $SD = 33.0$ ) than participants in the education-only condition ( $M = 34.3$ ,  $SD = 24.9$ ), though the difference was not statistically significant. Both groups significantly reduced their alcohol use at one-month follow-up (intervention:  $M = 33.9$ ,  $SD = 32.4$ ; education-only:  $M = 32.8$ ,  $SD = 26.5$ ), with the intervention condition showing greater overall reductions in alcohol (a decrease of 9.4 standard drinks) compared to the education-only group (a decrease of 1.5 standard drinks). In total, the delivery of either condition accounted for 9% of the within-subjects variance in alcohol use. Despite reductions in alcohol use, neither group showed a reduction in alcohol use consequences from baseline to follow-up.

Taken together, these results are promising. Alcohol misuse remains a serious problem on college campuses, with 25% of students reporting past-month binge drinking, and 9% meeting DSM-5 criteria for an alcohol use disorder (National Survey of Drug Use and Health, 2012). Despite these statistics, the majority of problem drinking college students are not interested in receiving treatment (National Survey of Drug Use and Health, 2012), leaving researchers and clinicians with a conundrum. Results from the current study suggest that a brief,

single session, computer program may be effective in significantly reducing alcohol use and increasing both readiness and intentions to change. This type of computerized intervention is cheap, portable, and likely to be acceptable to a subset of students who are unwilling to engage in more intensive, in-person treatments. Results are also consistent with a growing (though somewhat inconsistent) body of literature which suggests that CDBIs have small but significant effects on substance use outcomes (Carey et al., 2009; Rooke et al., 2010; Carey et al., 2012; Leeman et al., 2015).

Contrary to expectation, the intervention and the education-only group reported equally large increases in readiness and intentions to change, and significant decreases in alcohol use (i.e., positive results were not specific to the intervention condition). There are several potential explanations for this. First, it is becoming increasingly clear that pre-study procedures, such as consent, randomization and assessment can have therapeutic effects (Ondersma, Winhusen & Lewis, 2012). These pre-study procedures often involve drawing attention to the problem (e.g., substance use) and eliciting a commitment to participate in research, actions that are conducive to change. It is also clear that common relationship factors, such as empathy, positive regard, and warmth can increase intervention effectiveness, above and beyond the effects of any specific therapeutic technique (Norcross & Wampold, 2011). In the current study, both the intervention and education-only conditions involved substantial pre-study assessment and consent. In particular, the Timeline Follow-back Interview (TLFB) - our baseline measure of alcohol use - is a lengthy interview that involves face-to-face interaction with a warm and empathic research assistant. The TLFB involves focusing intensely on past-month alcohol use and has been shown to produce behavior change in and of itself (Carey et al., 2006). In light of these issues, future studies should include an assessment only condition to control for the effects of pre-study

procedures. Future studies should also use a computerized (vs. in-person) version of the TLFB to eliminate the effects of common factors (i.e., a warm, empathic interviewer) outside the context of an intervention.

Finally, it is worth noting that, while between-group differences were not statistically significant, participants in the intervention condition did report greater reductions in drinking than those in the education-only condition (i.e., a decrease of 9.4 standard drinks (intervention condition) as compared to 1.5 standard drinks (education-only condition) at follow-up). Thus, it is possible that non-significant effects are due to low power and that future studies with larger samples will yield significant findings.

### **Secondary Psychopathic Traits and Intervention Outcomes**

As hypothesized, secondary psychopathic traits were related to higher levels of alcohol use and alcohol-related consequences at baseline. This is consistent with existing literature and reinforces the finding that individuals with secondary psychopathic traits (even those in community or college student samples) often struggle with substance misuse (Smith and Newman, 1990; Walsh, Allen, and Kosson, 2007; Magyar et al., 2011; Watt and Brooks, 2012).

Contrary to prediction, secondary psychopathic traits were positively related to baseline readiness to change (RTC) and unrelated to baseline intentions to reduce drinking (IRD) (it was posited that individuals with higher levels of secondary psychopathic traits would exhibit lower levels of RTC and IRD). Although RTC and IRD are similar, they represent different domains of cognition regarding alcohol use. Whereas changes in RTC represent recognition of the problems alcohol use is causing, changes in IRD represent a decision to reduce alcohol use within a certain time frame. The current findings suggest that individuals with higher levels of secondary psychopathy actually entered the intervention with some level of recognition about



their need to change (i.e., elevated baseline RTC scores), but reported that they did not intend to reduce their alcohol use. It may be that because these individuals reported higher levels of past-month alcohol use consequences, the recognition of need to change (i.e., higher RTC) was salient, but ambivalence about actually making the change (i.e., no IRD) remained.

Regarding the effect of secondary psychopathic traits on intervention outcomes, it was hypothesized that psychopathy would not moderate the relationship between condition and treatment outcomes (i.e., that the intervention would be equally effective for those high vs. low in secondary psychopathy). Historically, individuals with psychopathic traits have been conceptualized as a difficult-to-treat group who either attain no benefit from treatment or exhibit negative outcomes after treatment (Cleckley, 1941/1982; Hare, 1991; Harris & Rice, 2007; Reidy, Kearns, & DeGue, 2013). Recent studies, however, have been more promising and suggest that individuals with secondary psychopathy may indeed benefit from treatment (Salekin, 2002; Polashek and Daly, 2013) – though notably these studies have been heterogeneous and rife with methodological problems. In the current study, we used an intervention based on principles of motivational interviewing (MI), a non-confrontational, collaborative approach to treatment. MI has been shown to be particularly effective for individuals high in anger and reactance (Karno et al., 2009), two clinically salient features of individuals with secondary psychopathy. Thus, given (1) recent studies showing positive therapeutic outcomes for individuals with secondary psychopathic traits, and (2) our use of techniques that are effective for high anger/reactance individuals, we predicted that individuals high in secondary psychopathy would benefit from the intervention just as much as those low in secondary psychopathy (i.e., that there would be no psychopathy by condition interaction).

Overall, analyses revealed that secondary psychopathy predicted alcohol use change

scores at trend level. An examination of median splits of high/low psychopathy scores by condition revealed that all groups reduced their alcohol use, with the exception of individuals low in secondary psychopathy in the education-only condition (see Figure 4). Moreover, participants with high secondary psychopathy scores who were in the intervention condition reduced their drinking more than participants in the other three groups (i.e., high psychopathy/education-only, low psychopathy/intervention, and low psychopathy/education-only). These results suggest that individuals with high levels of secondary psychopathic traits may actually benefit more from MI-based CDBIs for alcohol use than individuals with low levels of secondary psychopathy.

In addition to the main effect described above, there was also a trend level psychopathy by condition interaction. More specifically, in the intervention condition, higher secondary psychopathy scores were related to more alcohol consequences, whereas in the education-only group there was no relationship between psychopathy scores and alcohol consequences. There are several potential explanations for this finding. First, it is possible that MI-based CDBIs are effective in reducing alcohol use, but not alcohol consequences for individuals who are high in secondary psychopathy. Second, although high psychopathy participants in the intervention group reduced their alcohol use more than anyone else (i.e., high psychopathy participants in the education-only group and low psychopathy participants in both groups), they still had the highest levels of alcohol use at follow-up due to their substantially higher baseline levels of use. These comparatively high levels of follow-up alcohol use could account for the larger difference in alcohol consequences between high and low psychopathy participants in the intervention condition versus high and low psychopathy participants in the education-only condition. A final explanation could be that psychopathy as a whole is characterized by disrupted emotional

processing (Rogstad & Rogers, 2008). Specifically, primary psychopathy is related to a lack of emotions (e.g., lack of fear, empathy), whereas secondary psychopathy is associated with heightened negative emotionality, reduced ability to sustain attention and interest (Del Gaizo and Falkenbach, 2008; Burns et al., 2015), and lower trait emotional intelligence (i.e., difficulty identifying and managing emotion; Ali et al., 2009). The confluence of these features, particularly lower trait emotional intelligence, may have made it more difficult for individuals with higher (vs. lower) secondary psychopathy scores to process and benefit from the statements of empathy and positive regard that were embedded throughout the MI-based intervention.

Given these mixed findings, coupled with the divergent views of psychopathy treatment in the literature, much work remains on finding suitable interventions for individuals with psychopathic traits. However, the current study can be interpreted with cautious optimism. That is, brief computer programs, even if they solely contain educational content, are capable of reducing alcohol use, and increasing readiness to change and intentions to reduce drinking among people with varying levels of secondary psychopathy. However, the elevated levels of alcohol consequences for individuals with higher levels of secondary psychopathy assigned to the intervention condition are concerning and warrant further inspection. As mentioned earlier, it is plausible that these individuals simply consumed alcohol at higher rates and therefore experienced greater levels of alcohol consequences at follow-up. It is also possible that due to the brief nature of the intervention and the enduring nature of psychopathic personality traits, CDBIs may not be effective for reducing alcohol consequences in individuals with secondary psychopathic traits. This finding is broadly in line with Swogger et al. (2016) who examined the moderating effect of psychopathy on the effectiveness of a brief (three to four sessions), MI-based substance use intervention compared to standard care. Secondary psychopathic traits

positively predicted alcohol use consequences at follow-up regardless of condition, suggesting alcohol consequences are difficult to reduce with brief interventions. It may be that a higher dose of treatment is necessary to impact alcohol consequence outcomes with personality features known to impede treatment progress. For example, Thylstrup, Schroder, and Hesse (2015) tested a multi-session, psycho-educational intervention with cognitive-behavioral components with a community sample of individuals with ASPD. This intervention served as an adjunct treatment to treatment-as-usual and directly addressed comorbid substance use and ASPD. They found the program was more successful in reducing substance use compared to a treatment-as-usual condition. There were small within-group reductions in drug and alcohol problems at nine-month follow-up, suggesting there may be some benefit to more treatment. Overall, more investigation into interventions for individuals with psychopathic personality traits is warranted.

### **Strengths and Limitations**

The current study adds to the literature by testing a novel intervention aimed at reducing alcohol use among heavy drinking young adults. Additionally, it is one of the first to examine the effects of psychopathic personality traits on CDBI outcomes. The primary strengths of this study include its randomized design and low attrition rate at follow-up. There are, however, several limitations that must be considered. First, given the small effect sizes noted in the literature for CDBIs, the sample in the current study may have lacked sufficient power to detect intervention effects. Second, the one-month follow-up period was relatively short. Longer-term follow-ups would allow investigation into whether gains made in the current study could be sustained. Third, broad alcohol use outcomes (e.g., quantity/frequency) were used at follow-up and we, therefore, do not have information about specific patterns of alcohol use (e.g., binge drinking vs. consistent, heavy use). Fourth, due to experimenter error, different alcohol use

consequence measures were used at baseline and follow-up. This limited the analyses that could be done with this variable. Fifth, the current study lacked an “assessment-only” condition, limiting the ability to speak confidently about the driving force behind the main effects of this study. Finally, this study did not examine individuals with clinical levels of psychopathic personality traits. Although it is useful to examine the continuum of personality traits, it may be more useful to target individuals with clinical levels of those traits in order to better gauge their response to treatment. In the future, it will be important to increase sample sizes, lengthen follow-ups, diversify outcome measures, tease apart assessment effects, and implement this intervention with clinical populations.

### **Implications and Future Directions**

The general implications of the current study are that brief, computerized interventions are able to positively impact alcohol use among heavy drinking young adults. Although the impact is small, it can be seen as beneficial given the cost-effective nature of the intervention (i.e., little training required, can be administered with 100% fidelity). This is especially important given the limited time primary care providers have to address problems such as substance use (Yarnall et al., 2003). Furthermore, when substance use is addressed, primary care providers inconsistently provide treatment and/or referrals (Sahker and Arndt, 2017). The availability of cheap, easy-to-use CDBIs may enable busy clinicians to provide help to individuals with substance use problems.

With regard to individuals with psychopathic traits, cautious optimism is warranted as individuals with higher levels of secondary psychopathic traits were able reduce their alcohol use from baseline to follow-up. This finding provides preliminary evidence that individuals with these types of traits are able to benefit from treatment. However, this cannot be overstated as

this study was done on a non-clinical sample. In the future, CDBIs should be administered to people with clinical levels of psychopathic traits in order to determine whether or not they can benefit from this type of treatment. It could provide an important advancement for the treatment of a set of individuals who have been historically conceptualized as less able or unable to benefit from therapeutic intervention. Regardless, it is an exciting line of research that has not been adequately explored.

Table 1. Skew and kurtosis before and after square root transformations

Variable	<i>N</i>	Skew	Skew Sqrt	Kurtosis	Kurtosis Sqrt
TLFB	97	1.58	0.72	2.68	0.29
DRINC-2R	100	1.50	1.20	2.61	1.69
YAACQ T2	99	4.27	0.02	2.07	-0.16

Note. TLFB = Timeline Followback; DRINC-2R = Drinker Inventory of Consequences;

YAACQ T2 = Young Adult Alcohol Consequences Questionnaire at Follow-up.

Table 2. Demographics and mean baseline scores for intervention and education-only participants

Variable	Full sample	Intervention	Education-only
<i>N</i>	100	49	51
Male (%)	55.0	57.1	52.9
Race (%)			
White	47.0	49.0	45.1
Asian	41.0	36.7	45.1
Black	5.0	4.1	5.9
Other	7.0	10.2	4.0
Age (%)			
18-25	85.0	83.7	86.2
26-29	13.0	14.3	11.8
30+	2.0	2.0	2.0
Baseline Measures: <i>M</i> (SD)			
TLFB	38.8 (29.2)	43.3 (33.0)	34.3 (24.9)
DRINC-2R	74.2 (15.4)	75.2 (16.8)	72.3 (14.1)
PPI-R Total Score	297.1 (36.1)	302.9 (34.4)	291.7 (37.3)
PPI-R SCI	149.6 (23.4)	152.4 (25.8)	146.9 (20.7)
PPI-R FD	115.7 (21.1)	118.6 (16.1)	112.9 (24.9)
TRS	68.9 (7.5)	68.4 (8.1)	69.4 (6.8)
Pre/Post Measures: <i>M</i> (SD)			
IRD Pre	6.2 (5.9)	7.2 (6.1)	5.1 (5.5)
IRD Post	9.2 (6.4)	10.9 (6.4)	7.6 (6.1)
RTC Pre	12.9 (7.6)	12.9 (7.2)	12.9 (7.9)
RTC Post	15.6 (8.2)	15.7 (8.0)	15.5 (8.5)
PSQ	41.2 (8.2)	42.2 (6.9)	40.3 (9.4)
Follow-up Measures: <i>M</i> (SD)			
Alc T2	32.6 (29.3)	33.9 (32.4)	32.8 (26.5)
YAACQ T2	5.1 (4.3)	5.3 (4.9)	4.8 (3.6)
IRD T2	9.65 (7.6)	10.6 (7.2)	8.5 (7.8)

Note. Means and standard deviations for study measures at baseline; *t*-tests revealed no differences between treatment and control participants (all *ps* > .05). TLFB = Timeline Followback; DRINC-2R = Drinker Inventory of Consequences; PPI-R = Psychopathic Personality Inventory-Revised; SCI = Self-centered Impulsivity; FD = Fearless Dominance; TRS



= Therapeutic Reactance Scale; IRD Pre = Intentions to Reduce Drinking Pre-test; IRD Post = Intentions to Reduce Drinking Post-test; RTC Pre = Readiness to Change Pre-test; RTC Post = Readiness to Change Post-test; PSQ = Software Acceptability; Alc T2 = Alcohol Use at Follow-up; YAACQ T2 = Young Adult Alcohol Consequences Questionnaire at Follow-up; IRD T2 = Intentions to Reduce Drinking at Follow-up.

Table 3. Full sample bivariate associations of primary study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Condition	1.00															
2. Gender	-0.03	1.00														
3. TLFB	0.16	-.20*	1.00													
4. DRINC-2R	0.06	-0.06	.25*	1.00												
5. PPI-R Total	0.19	-.35**	.27**	.29**	1.00											
6. PPI-R SCI	0.14	-0.16	.21*	.45**	.78**	1.00										
7. PPI-R FD	0.05	-.29**	0.18	-0.03	.72**	0.16	1.00									
8. TRS	-0.09	0.04	0.09	.29**	.50**	.58**	0.14	1.00								
9. IRD Pre	.20*	-0.05	0.00	0.12	-0.05	0.03	-0.08	-0.01	1.00							
10. IRD Post	.26**	-0.08	0.03	0.13	0.09	0.03	0.12	-0.03	.70**	1.00						
11. RTC Pre	0.00	-0.05	0.20	.58**	.22*	.29**	0.01	.24*	.38**	.40**	1.00					
12. RTC Post	0.01	-0.07	0.12	.44**	.22*	.26*	0.06	.23*	.39**	.54**	.78**	1.00				
13. PSQ	0.11	0.01	-0.18	0.13	0.07	0.02	0.10	-0.08	0.19	.33**	0.18	.32**	1.00			
14. Alc T2	-0.04	-0.11	.57**	0.13	0.10	0.05	0.06	0.09	-0.05	-0.10	0.15	0.11	-0.06	1.00		
15. YAACQ T2	-0.02	-0.01	.22*	.42**	.20*	.27**	-0.03	.22*	0.13	0.08	.46**	.36**	0.15	.30**	1.00	
16. IRD T2	0.16	-0.08	-0.04	0.15	0.13	0.11	0.10	0.10	.56**	.66**	.38**	.49**	.25*	-0.12	.21*	1.00

Note.  $N = 100$ ; Pearson's  $r$  was used for continuous variables and point-biserial correlations were used for dichotomous variables. TLFB = Timeline Followback; DRINC-2R = Drinker Inventory of Consequences; PPI-R Total = Psychopathic Personality Inventory-Revised Total; PPI-R SCI = Self-centered Impulsivity; PPI-R FD = Fearless Dominance; TRS = Therapeutic Reactance Scale; IRD Pre = Intentions to Reduce Drinking Pre-intervention; IRD Post = Intentions to Reduce Drinking Post-intervention; RTC Pre = Readiness to Change Pre-intervention RTC Post = Readiness to Change Post-intervention; PSQ = Software Acceptability; Alc T2 = Alcohol Use at Follow-up; YAACQ T2 = Young Adult Alcohol Consequences Questionnaire at Follow-up; IRD T2 = Intentions to Reduce Drinking at Follow-up; \* =  $p < .05$ , \*\* =  $p < .01$ .

Table 4. Bivariate associations of primary study variables for education-only condition

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender	1.00														
2. TLFB	-0.15	1.00													
3. DRINC-2R	0.02	.32*	1.00												
4. PPI-R Total	-.40**	.32*	0.21	1.00											
5. PPI-R SCI	-0.10	0.23	.34*	.69**	1.00										
6. PPI-R FD	-.29*	0.22	0.02	.81**	0.16	1.00									
7. TRS	0.16	0.05	.30*	.38**	.51**	0.13	1.00								
8. IRD Pre	-0.03	0.08	0.23	0.05	0.22	-0.11	0.04	1.00							
9. IRD Post	-0.12	0.05	.29*	0.24	.29*	0.13	0.05	.77**	1.00						
10. RTC Pre	-0.11	0.17	.65**	0.17	0.24	0.06	0.20	.51**	.61**	1.00					
11. RTC Post	-0.09	0.18	.54**	0.21	0.25	0.10	0.24	.49**	.68**	.83**	1.00				
12. PSQ	-0.03	-0.19	0.08	0.04	-0.02	0.09	-0.19	0.26	.33*	0.22	.36*	1.00			
13. Alc T2	-0.03	.67**	0.25	0.03	-0.09	0.11	-0.04	-0.02	-0.08	0.13	0.14	-0.09	1.00		
14. YAACQ T2	0.01	0.27	.43**	0.07	0.03	0.06	-0.11	0.11	0.11	.30*	.32*	0.24	.47**	1.00	
15. IRD T2	-0.07	-0.16	0.12	0.24	0.28*	0.13	0.11	.45**	.62**	.32*	.43**	.29*	-0.17	0.24	1.00

Note.  $N = 51$ ; Pearson's  $r$  was used for continuous variables and point-biserial correlations were used for dichotomous variables. TLFB = Timeline Followback; DRINC-2R = Drinker Inventory of Consequences; PPI-R Total = Psychopathic Personality Inventory Total; PPI-R SCI = Self-centered Impulsivity; PPI-R FD = Fearless Dominance; TRS = Therapeutic Reactance Scale; IRD Pre = Intentions to Reduce Drinking Pre-intervention; IRD Post = Intentions to Reduce Drinking Post-intervention; RTC Pre = Readiness to Change Pre-intervention RTC Post = Readiness to Change Post-intervention; PSQ = Software Acceptability; Alc T2 = Alcohol Use at Follow-up; YAACQ T2 = Young Adult Alcohol Consequences Questionnaire at Follow-up; IRD T2 = Intentions to Reduce Drinking at Follow-up; \* =  $p < .05$ , \*\* =  $p < .01$ .

Table 5. Bivariate associations of primary study variables for intervention condition

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender	1.00														
2. TLFB	-0.26	1.00													
3. DRINC-2R	-0.12	0.17	1.00												
4. PPI-R Total	-0.27	0.18	.36*	1.00											
5. PPI-R SCI	-0.20	0.17	.52**	.86**	1.00										
6. PPI-R FD	-0.26	0.10	-0.13	.59**	0.15	1.00									
7. TRS	-0.08	0.13	.28*	.65**	.66**	0.21	1.00								
8. IRD Pre	-0.07	-0.12	0.01	-0.21	-0.15	-0.12	-0.03	1.00							
9. IRD Post	-0.03	-0.07	-0.03	-0.16	-0.23	0.02	-0.07	.61**	1.00						
10. RTC Pre	-0.11	0.23	.53**	.29*	.35*	-0.07	.28*	0.26	0.20	1.00					
11. RTC Post	-0.07	0.05	.34*	0.23	0.27	0.00	0.22	.31*	.45**	.72**	1.00				
12. PSQ	0.07	-0.25	0.18	0.06	0.04	0.06	0.06	0.06	.29*	0.13	0.25	1.00			
13. Alc T2	-0.20	.49**	0.08	0.17	0.22	-0.07	0.21	-0.07	-0.14	0.16	0.08	0.04	1.00		
14. YAACQ T2	-0.05	0.19	.42**	.32*	.43**	-0.14	.43**	0.15	0.07	.63**	.41**	0.09	0.24	1.00	
15. IRD T2	-0.12	0.04	0.16	-0.06	-0.08	0.01	0.12	.65**	.68**	.51**	.58**	0.17	-0.08	0.19	1.00

Note.  $N = 49$ ; Pearson's  $r$  was used for continuous variables and point-biserial correlations were used for dichotomous variables. TLFB = Timeline Followback; DRINC-2R = Drinker Inventory of Consequences; PPI-R Total = Psychopathic Personality Inventory Total; PPI-R SCI = Self-centered Impulsivity; PPI-R FD = Fearless Dominance; TRS = Therapeutic Reactance Scale; IRD Pre = Intentions to Reduce Drinking Pre-intervention; IRD Post = Intentions to Reduce Drinking Post-intervention; RTC Pre = Readiness to Change Pre-intervention RTC Post = Readiness to Change Post-intervention; PSQ = Software Acceptability; Alc T2 = Alcohol Use at Follow-up; YAACQ T2 = Young Adult Alcohol Consequences Questionnaire at Follow-up; IRD T2 = Intentions to Reduce Drinking at Follow-up; \* =  $p < .05$ , \*\* =  $p < .01$ .

Table 6. Hierarchical regression testing the interactive effects of condition and secondary psychopathy on the IRD change score from pre- to post-intervention

	Variable	$\beta$	$t$	$R^2$
Step 1				0.03
	Condition	0.16	1.61	
Step 2				0.03
	Condition	0.17	1.62	
	PPI-R SCI	-0.03	-0.25	
Step 3				0.04
	Condition	0.16	1.61	
	PPI-R SCI	0.13	0.82	
	Condition X PPI-R SCI	-0.20	-1.27	

Note.  $N = 99$ ; IRD = Intentions to Reduce Drinking; Condition = intervention or education-only;

PPI-R SCI = Psychopathic Personality Inventory- Revised Self-centered Impulsivity; \* =  $p <$

.05, \*\* =  $p < .01$ .

Table 7. Hierarchical regression testing the interactive effects of condition and secondary psychopathy on the RTC change score from pre- to post-intervention

	Variable	$\beta$	$t$	$R^2$
Step 1				0.00
	Condition	-0.03	-0.29	
Step 2				0.01
	Condition	0.00	0.01	
	PPI-R SCI	-0.03	-0.28	
Step 3				0.03
	Condition	0.00	-0.01	
	PPI-R SCI	0.03	0.18	
	Condition X PPI-R SCI	-0.07	-0.45	

Note.  $N = 98$ ; RTC = Readiness to Change; Condition = intervention or education-only; PPI-R SCI = Psychopathic Personality Inventory- Revised Self-centered Impulsivity; \* =  $p < .05$ , \*\* =  $p < .01$ .

Table 8. Hierarchical regression testing the interactive effects of condition and secondary psychopathy on the IRD change score from pre-intervention to follow-up

	Variable	$\beta$	$t$	$R^2$
Step 1				0.00
	Condition	0.01	0.04	
Step 2				0.01
	Condition	-0.01	-0.09	
	PPI-R SCI	0.10	1.02	
Step 3				0.02
	Condition	-0.01	-0.10	
	PPI-R SCI	0.18	1.09	
	Condition X PPI-R SCI	-0.09	-0.57	

Note.  $N = 98$ ; IRD = Intentions to Reduce Drinking; Condition = intervention or education-only;

PPI-R SCI = Psychopathic Personality Inventory- Revised Self-centered Impulsivity; \* =  $p <$

.05, \*\* =  $p < .01$ .

Table 9. Hierarchical regression testing the interactive effects of condition and secondary psychopathy on the alcohol use change score from baseline to follow-up

	Variable	$\beta$	$t$	$R^2$
Step 1				0.02
	Condition	0.15	1.43	
Step 2				0.05
	Condition	0.13	1.22	
	PPI-R SCI	0.16	1.58	
Step 3				0.06
	Condition	0.13	1.23	
	PPI-R SCI	0.28	1.77	
	Condition X PPI-R SCI	-0.15	-0.98	

Note.  $N = 96$ . Condition = intervention or education-only; PPI-R SCI = Psychopathic Personality Inventory- Revised Self-centered Impulsivity; \* =  $p < .05$ , \*\* =  $p < .01$ .



Table 10. Hierarchical regression testing the interactive effects of condition and secondary psychopathy on alcohol use consequences at follow-up

	Variable	$\beta$	$t$	$R^2$
Step 1				0.00
	Condition	-0.02	-0.16	
Step 2				.18*
	Condition	-0.04	-0.48	
	DRINC-2R	0.42**	4.54**	
Step 3				.19*
	Condition	-0.05	-0.58	
	DRINC-2R	0.37**	3.58**	
	PPI-R SCI	0.11	1.08	
Step 4				.22*
	Condition	-0.05	-0.56	
	DRINC-2R	0.36**	3.46**	
	PPI-R SCI	-0.10	-0.65	
	Condition X PPI-R SCI	0.28	1.92	

Note.  $N = 99$ ; DRINC-2R = Drinker Inventory of Consequences; Condition = intervention or education-only; PPI-R SCI = Psychopathic Personality Inventory- Revised Self-centered Impulsivity; \* =  $p < .05$ , \*\* =  $p < .01$ .

Table 11. Median Split for alcohol use at baseline, one-month follow-up, and change scores for low vs. high secondary psychopathy by condition

Group	<i>N</i>	Baseline	One-month Follow-up	Change Score
Education-only (Low PPI SCI)	25	28.8 (18.8)	31.3 (22.4)	-2.51
Education-only (High PPI SCI)	25	39.6 (29.1)	33.9 (30.3)	5.76
Intervention (Low PPI SCI)	24	35.2 (29.3)	28.8 (31.7)	6.46
Intervention (High PPI SCI)	23	52.6 (34.5)	36.4 (33.2)	16.2

Note. *N* = 97; Means and standard deviations number of past-month standard drinks by group; a negative change score indicates a reduction in the number of standard drinks.

Table 12. Median split for alcohol use consequences at one-month follow-up for low vs. high secondary psychopathy by condition

Group	<i>N</i>	One-month Follow-up
Education-only (Low PPI SCI)	26	4.58 (3.30)
Education-only (High PPI SCI)	25	5.08 (3.89)
Intervention (Low PPI SCI)	24	3.83 (3.52)
Intervention (High PPI SCI)	24	6.75 (5.75)

Note. *N* = 99; Means and standard deviations for past-month number of alcohol consequences.

Table 13. Median split for IRD at baseline, post-CDBI, one-month follow-up, and change scores for low vs. high secondary psychopathy by condition

Group	<i>N</i>	Baseline	Post-CDBI	One-month Follow-up	Change Score
Education-only (Low PPI SCI)	26	4.00 (5.49)	6.00 (6.28)	7.27 (7.63)	3.27 (7.20)
Education-only (High PPI SCI)	25	6.24 (5.38)	9.16 (5.61)	9.80 (7.98)	3.56 (7.45)
Intervention (Low PPI SCI)	24	8.40 (7.07)	12.58 (7.24)	11.71 (8.67)	3.31 (5.79)
Intervention (High PPI SCI)	24	6.04 (4.67)	9.13 (4.93)	10.0 (5.51)	3.96 (5.55)

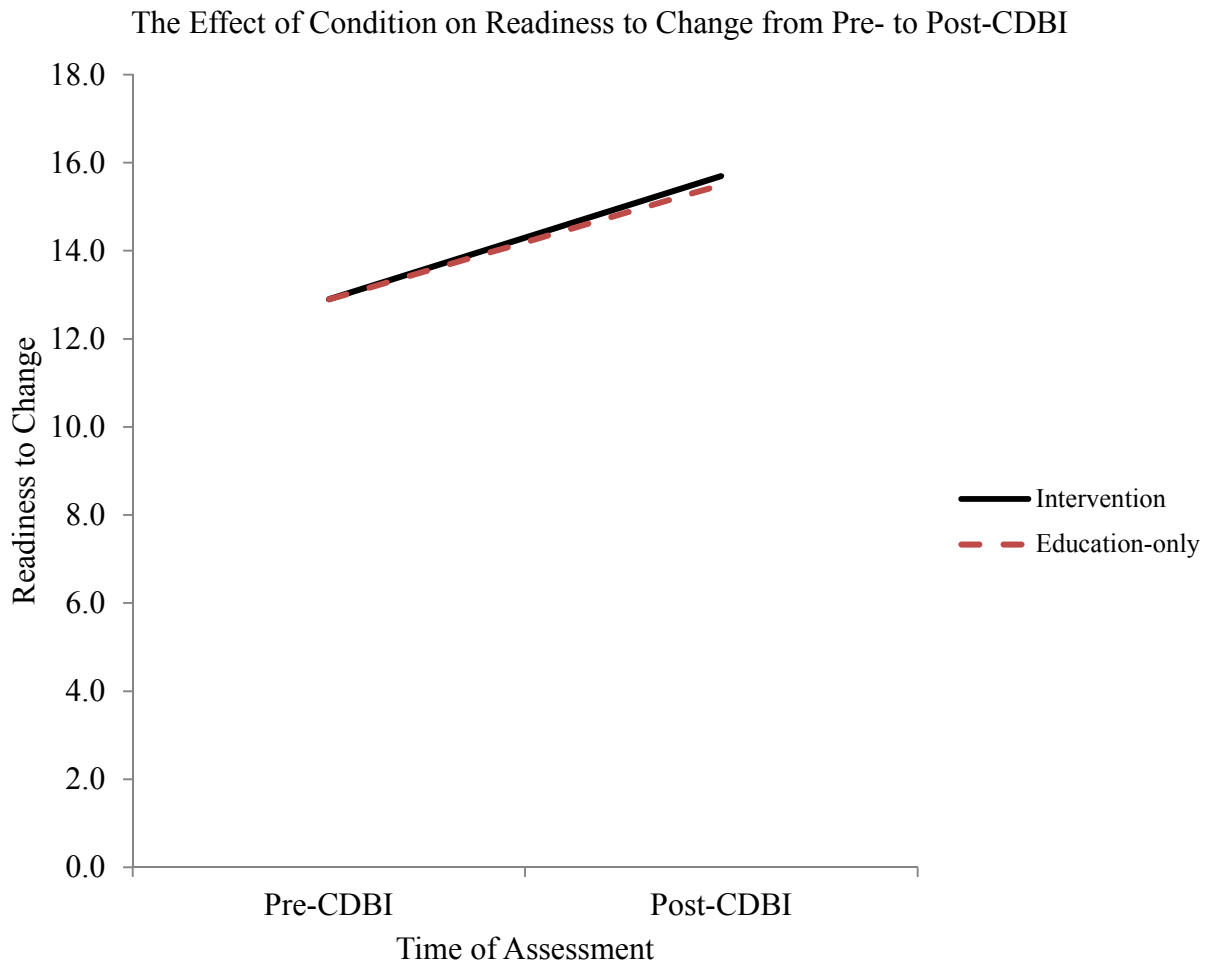
Note. *N* = 99; Means and standard deviations for Intentions to Reduce Drinking (IRD).

Table 14. Median split for RTC at baseline, post-CDBI, and change scores for low vs. high secondary psychopathy by condition

Group	<i>N</i>	Baseline	Post-CDBI	Change Score
Education-only (Low PPI SCI)	26	10.6 (7.63)	12.2 (8.45)	1.60 (5.64)
Education-only (High PPI SCI)	25	15.4 (7.65)	18.8 (7.36)	3.40 (3.79)
Intervention (Low PPI SCI)	25	10.5 (7.57)	13.8 (9.31)	3.30 (5.41)
Intervention (High PPI SCI)	24	15.5 (5.89)	17.7 (6.04)	2.20 (6.19)

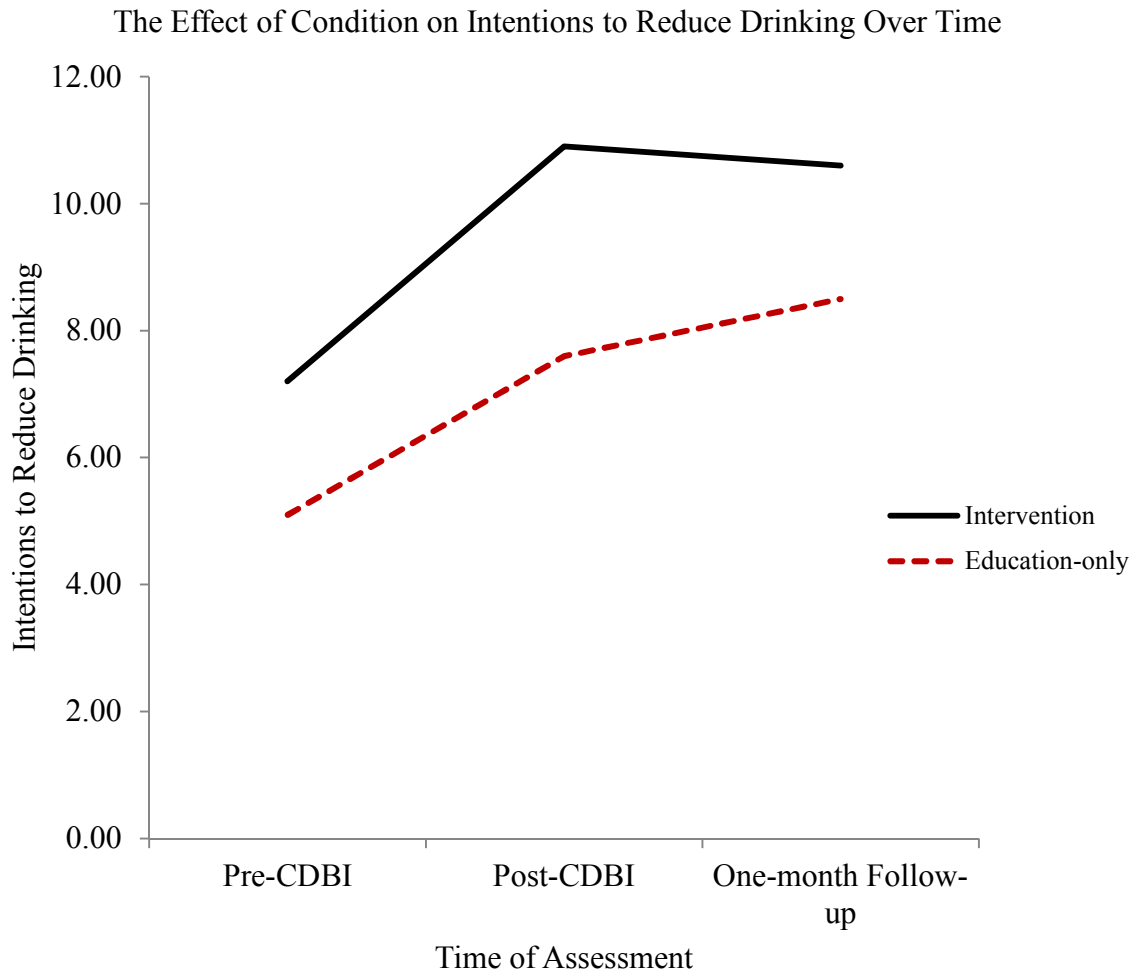
Note. *N* = 100; Means and standard deviations for Readiness to Change (RTC).

Figure 1.



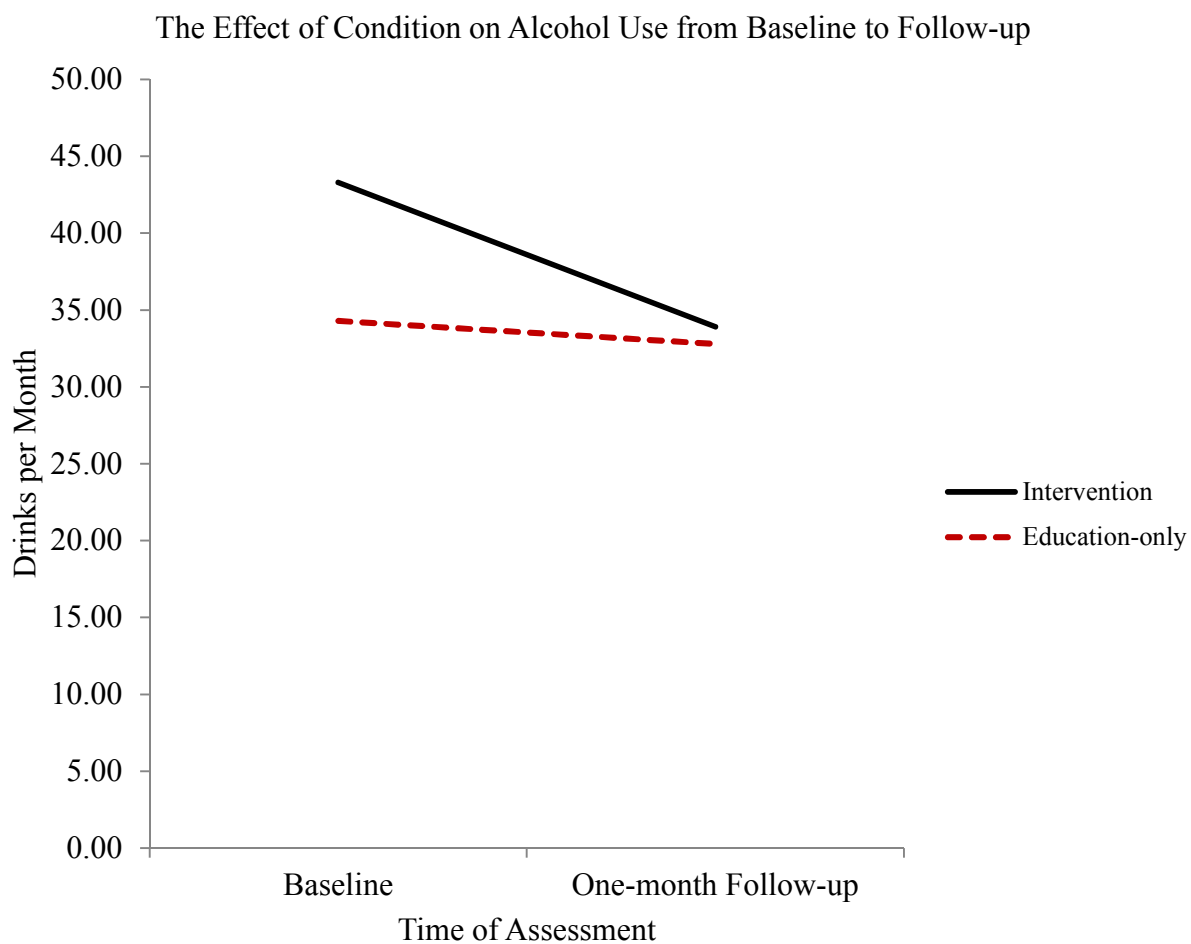
Note. Mean scores on readiness to change from pre- to post-test by condition.

Figure 2.



Note.  $N = 98$ ; Mean scores on intentions to reduce drinking from pre-test to one-month follow-up by condition.

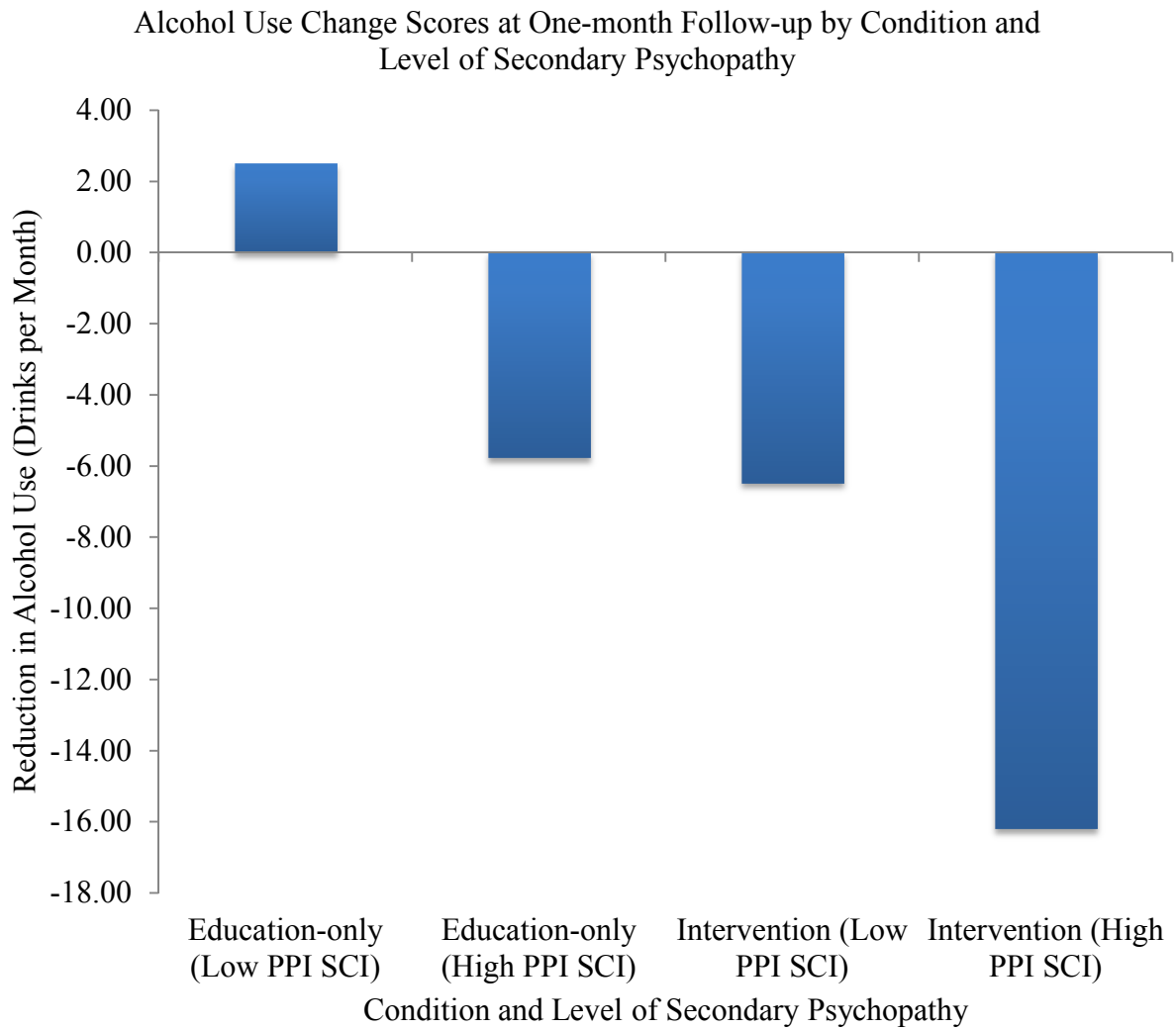
Figure 3.



Note.  $N = 96$ ; Mean number of standard drinks at baseline and follow-up by condition.

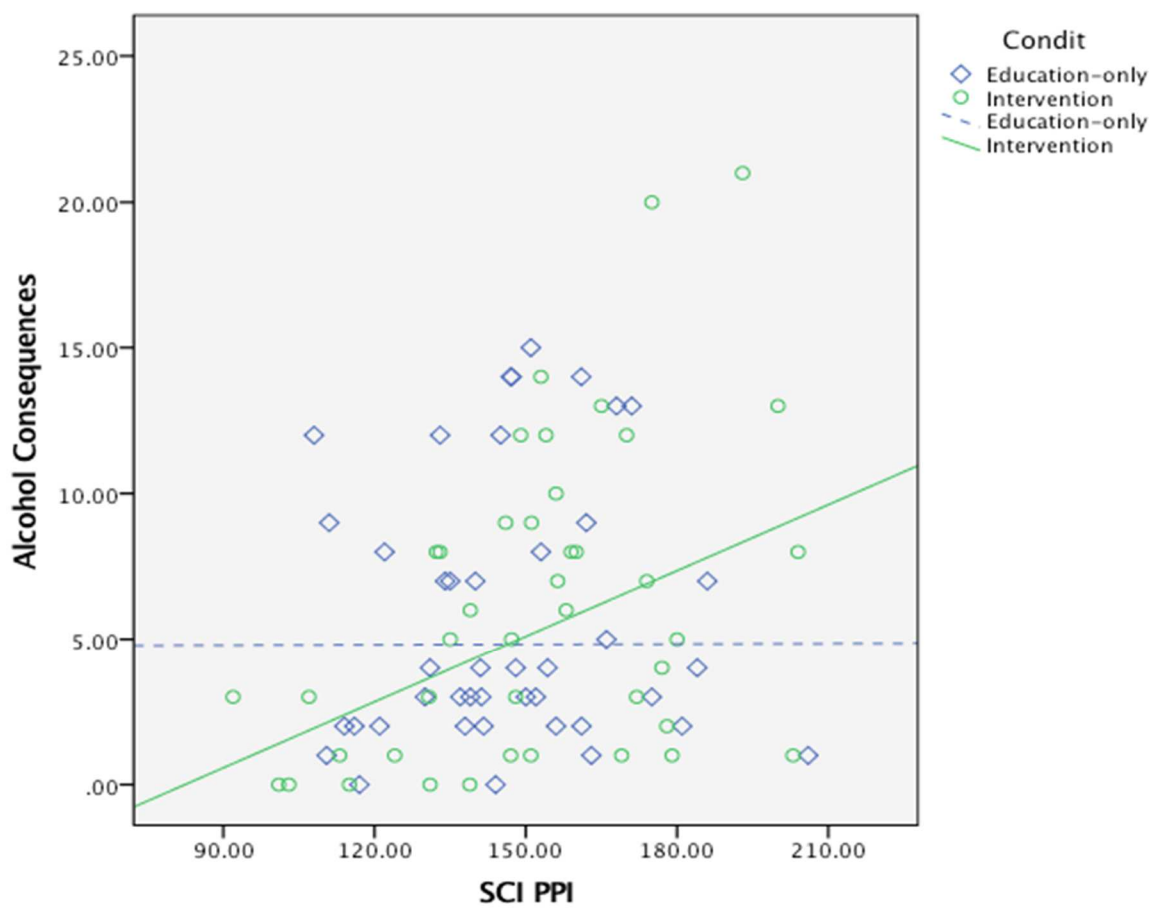


Figure 4.



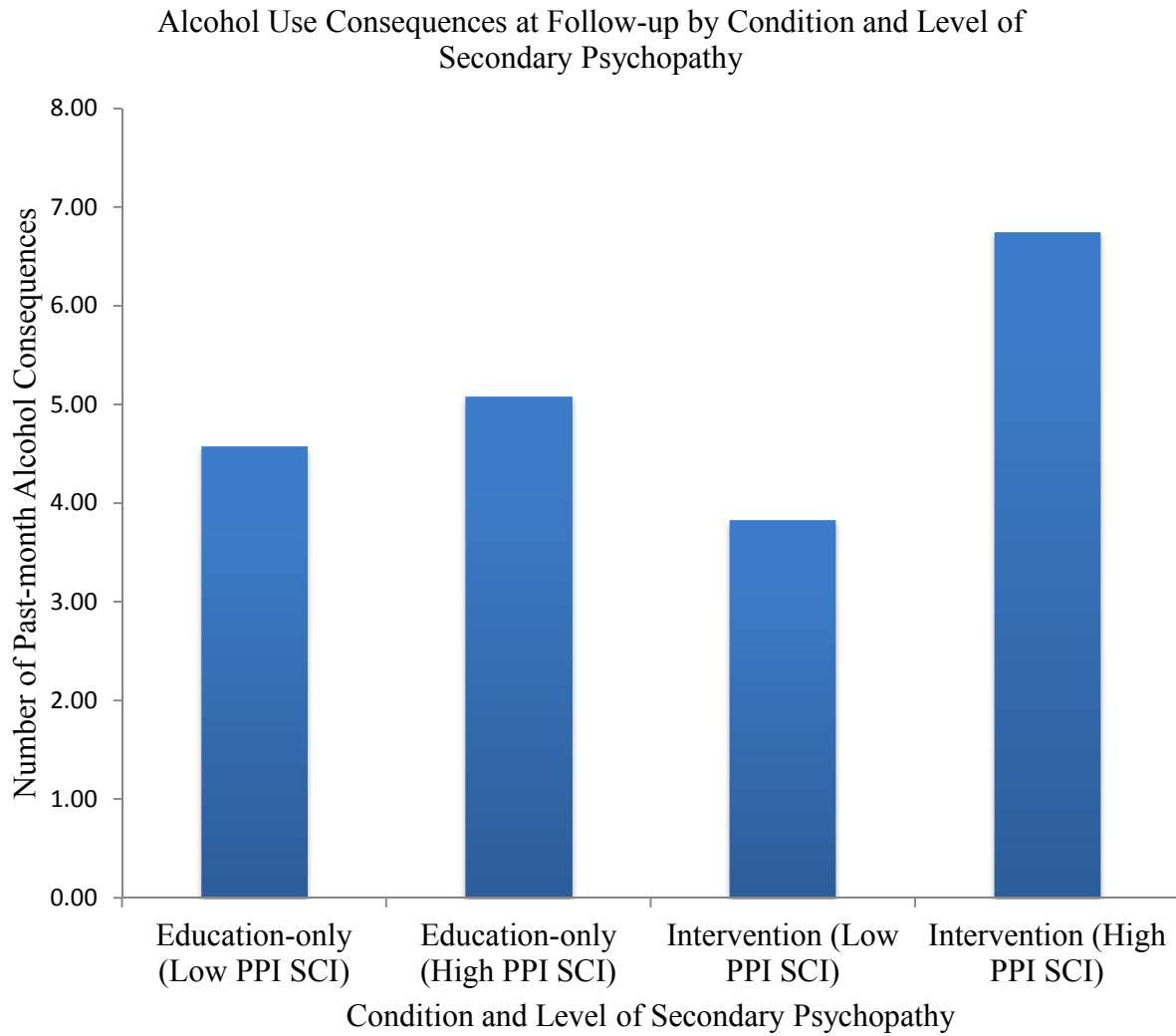
Note.  $N = 97$ ; Mean changes in standard drinks at follow-up by condition and level of secondary psychopathy; a negative mean score is indicative of a reduction in alcohol use.

Figure 5. The interactive effect of secondary psychopathy and condition on alcohol consequences



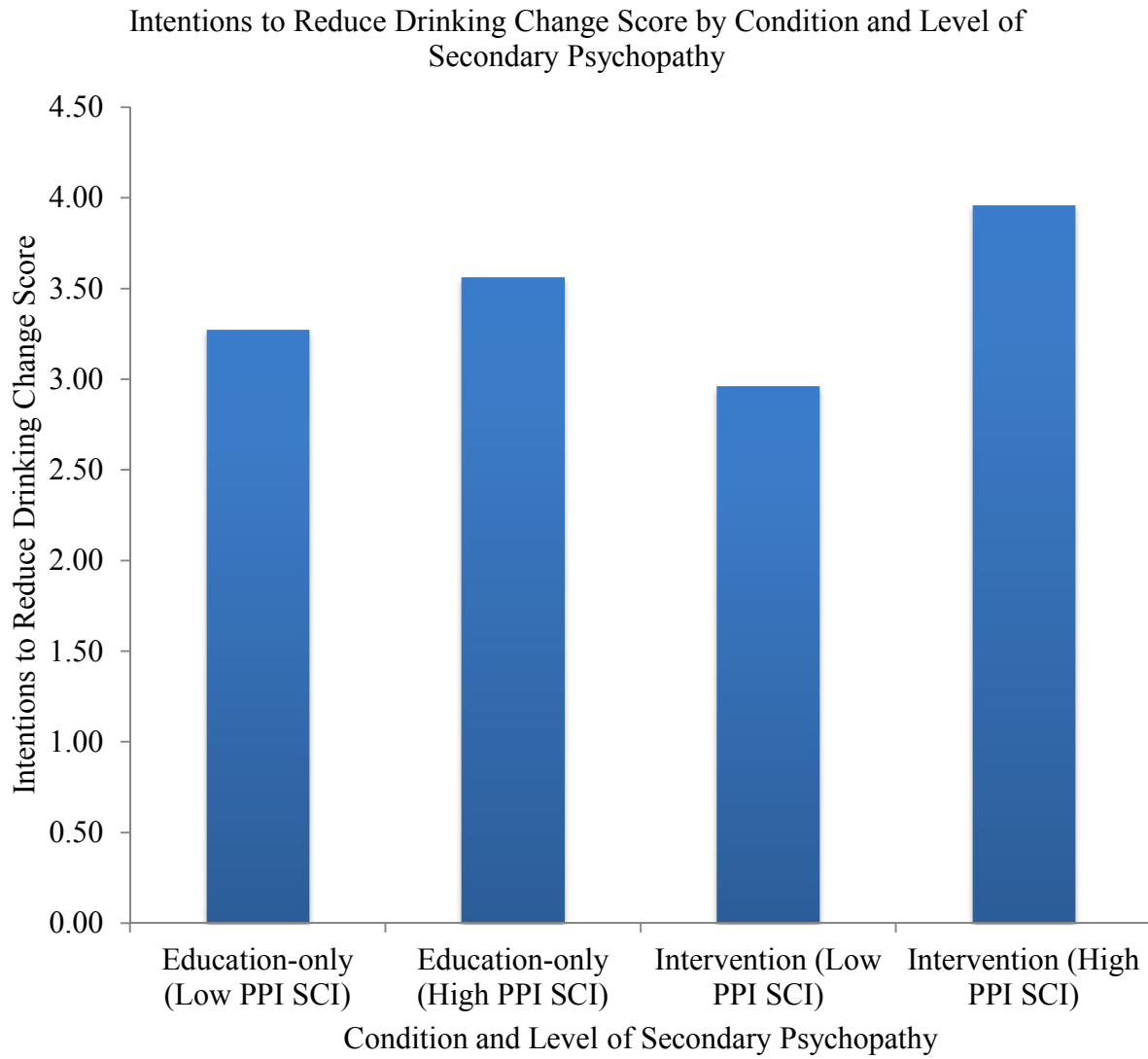
Note.  $N = 99$ ; Differences in alcohol use consequences at follow-up by condition and level of secondary psychopathy.

Figure 6.



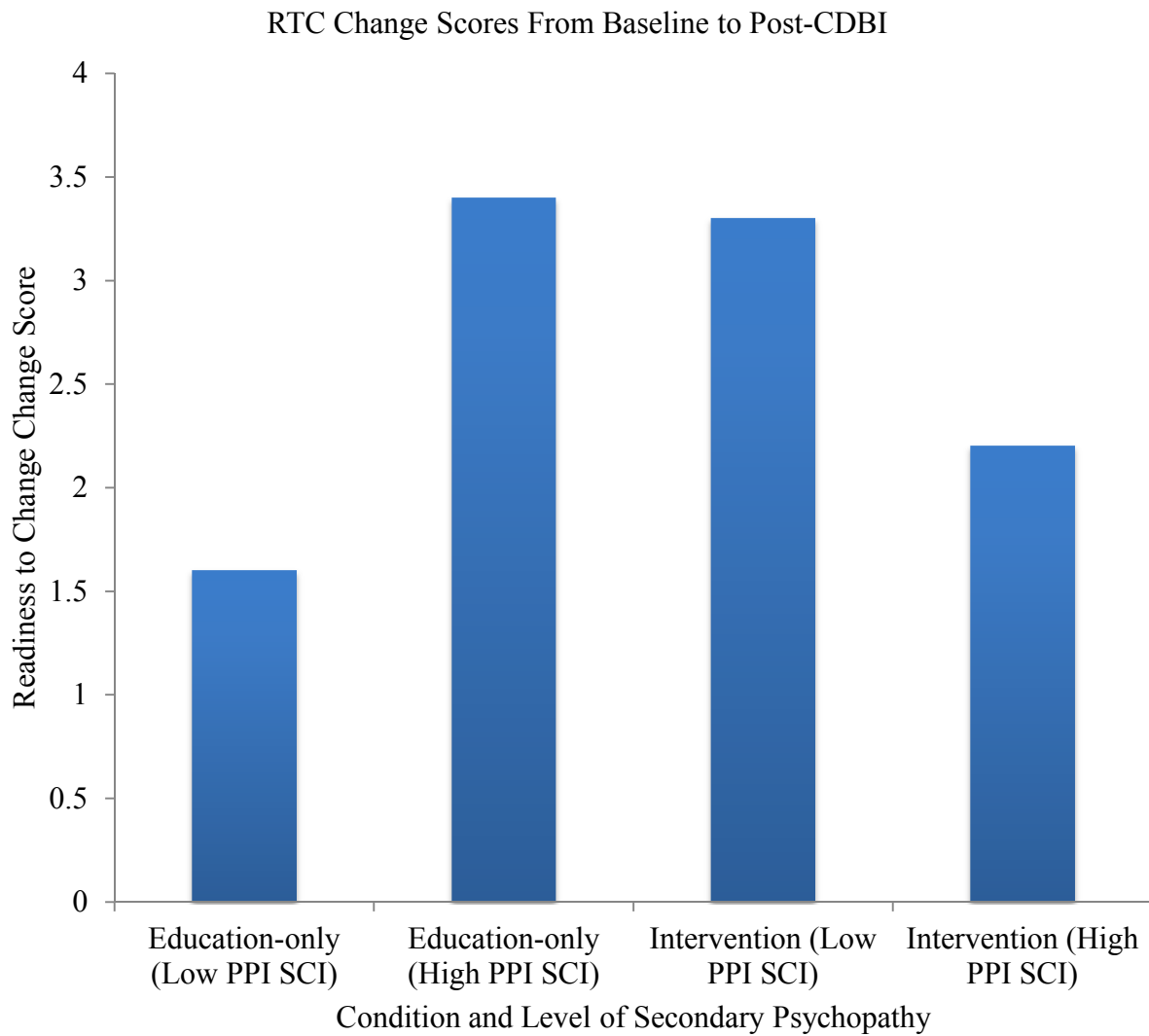
Note.  $N = 99$ ; Mean number of alcohol use consequences at follow-up by condition and level of secondary psychopathy.

Figure 7.



Note.  $N = 99$ ; Mean change in intentions to reduce drinking by condition and level of secondary psychopathy.

Figure 8.



Note.  $N = 100$ ; Mean change in readiness to change by condition and level of secondary psychopathy.

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**ABSTRACT****THE EFFECT OF A COMPUTER-DELIVERED BRIEF INTERVENTION ON HEAVY ALCOHOL USE: A PILOT STUDY**

by

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Alcohol misuse remains a significant issue on college campuses. One potential remedy, especially for those unwilling or unable to seek face-to-face intervention, are computer-delivered brief interventions. Although the literature is mixed regarding the magnitude of their effect on alcohol use, findings are consistent that they at least produce small changes in alcohol use. The current study tested a computer-delivered brief intervention (CDBI) against an education-only control in order to examine its efficacy in reducing alcohol use. Additionally, it tested the interactive effects of secondary psychopathic personality, a trait associated with higher rates of alcohol use. 100 heavy drinking college students were randomized to either the intervention or education-control condition. Overall, both groups showed reductions in readiness to change, intentions to reduce drinking, and alcohol use at one-month follow-up; there was no change in alcohol use consequences in either group. Secondary psychopathic personality was related to trend level reductions in alcohol use across conditions, and those with higher levels of secondary psychopathy had more alcohol use consequences at follow-up compared to the education-only condition. In total, both programs were generally effective at increasing motivation to change

and reducing alcohol use. These findings suggest that (1) computerized programs aimed at reducing alcohol use can produce small but meaningful changes and (2) individuals with higher levels of secondary psychopathic personality traits can benefit from these programs.

**AUTOBIOGRAPHICAL STATEMENT**

Prior to entering graduate school in 2012, I earned a bachelor's degree in psychology from Wayne State University. Throughout graduate school, my research has focused on the interplay between alcohol use and psychopathic personality traits. In the future, I hope to continue researching the comorbidity of substance use disorders and personality disorders, and extend my work into clinical settings. I am currently completing my pre-doctoral internship at the United States Medical Center for Federal Prisoners in Springfield, Missouri. Following internship, I will begin my career as a forensic evaluator at the Center for Forensic Psychiatry.