

ALCOHOL-INDUCED BLACKOUTS
AND OTHER ALCOHOL-RELATED
CONSEQUENCES AS MODERATORS
OF BRIEF MOTIVATIONAL INTERVENTION OUTCOMES

By

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Abstract:

Introduction: Heavy drinking among college students remains an issue within the United States. Past research has found that recent negative experiences with alcohol-related consequences, such as alcohol-induced blackouts, can serve as “teachable moments” and enhance the efficacy of personal feedback interventions (PFIs) in reducing future drinking behaviors (Miller et al., 2018b). Thus, the purpose of the current study was to better understand how the recent experience of an alcohol-induced blackout and other alcohol-related consequences influenced the relationship between receiving a PFI and future drinking behaviors assessed at follow-up.

Method: Undergraduate students from two archival samples of heavy drinkers ($N = 142$ in one study, $N = 157$ in the second study) from a large, Southern Plains university completed studies assessing the effectiveness of a computer program called the Drinking Assessment and Feedback Tool for College Students (DrAFT-CS). Participants completed measures pertaining to drinks per week, recent experience of alcohol-related consequences and peak drinking episodes within the last month at both baseline and follow-up assessments.

Results: Multiple hierarchical linear regression analyses revealed that the recent experience of an alcohol-induced blackout or of six other pertinent alcohol-related consequences (e.g., XX, XX) did not significantly moderate the relationship between receiving a PFI and future drinking behavior assessed at follow-up.

Discussion: The current study demonstrated that the recent experience of certain alcohol-related consequences can increase the effectiveness of brief interventions in samples of college students who engage in heavy drinking. Future research should assess whether these same findings hold true for mandated samples, and it should continue to investigate whether heavy drinking college student samples evaluate alcohol-related consequences differently than average and light drinking samples.

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CHAPTER I

INTRODUCTION

Hazardous drinking among college students continues to be a problem within the United States. In fact, a recent report by the National Survey on Drug Use and Health in 2016 found that 57.1% of young adults in the typical college student range (18-25 years of age) consumed alcohol in the past month (Substance Abuse and Mental Health Services Administration, 2017b).

Additionally, the survey found that one out of every ten of those young adults was a heavy alcohol user within the past month. Furthermore, Park (2004) found that the more alcohol that college students drink, the more alcohol-related consequences they experience. These alcohol-related consequences experienced by college students can range anywhere from minor hangovers to major repercussions, such as alcohol-related injuries (Leavens, Leffingwell, Miller, Brett & Lombardi, 2017). Thus, it is important to work towards preventing hazardous drinking by reducing problematic drinking behaviors and as such the consequences associated with these risky behaviors.

Personal feedback interventions (PFIs) have been implemented to try and minimize these problematic drinking behaviors in college student populations (Larimer & Cronce, 2002). A PFI is a type of brief intervention that provides individual students with feedback on their drinking and their perceptions and misconceptions about their current alcohol use (Neighbors, Larimer & Lewis, 2004). For example, many college students misperceive their peers as drinking more

frequently and heavily than themselves (Baer & Carney, 1993; Borsari & Carey, 2003). As such, many students do not believe their drinking behavior to be hazardous or risky because they believe other people's drinking behavior to be worse than their own. Therefore, one of the goals of personal feedback interventions is to correct this misperception in order to reduce drinking and alcohol-related consequences through motivating behavior change (Neighbors, et al., 2004; Scott-Sheldon, Carey, Elliott, Garey, Carey & Nezu, 2014).

Despite the many successful strategies of PFIs, this intervention is not as effective for all college drinkers. In fact, there is conflicting findings in past research as to whether PFIs are effective for heavy drinking college students or students mandated to an alcohol intervention. White (2006) suggests that PFIs are most effective for the populations of less severe drinkers, and others such as, Carey, Scott-Sheldon, Carey and DeMartini (2007) as well as Hansen and colleagues (2012) suggest that alcohol interventions are least effective when they target heavy drinking and high-risk groups. However, Neighbors et al. (2016) found that personalized normative feedback interventions were successful in reducing alcohol use among college students who engage in heavy drinking. In addition, White, Mun and Morgan (2008) found that mandated college students who received a PFI did not significantly decrease their drinking compared to mandated college students who were part of the assessment only control. As such, White et al. (2008) speculate that it may not have been the PFI that reduced students' drinking, but instead the mandated intervention sanctions the students received. Regardless, Huh et al. (2015) suggest that the field needs to continue to develop better alcohol interventions that can benefit all types of drinkers. Thus, the question of how to reduce problematic drinking in the more hazardous populations of college student drinkers still remains.

One potential idea to further enhance and improve upon PFIs is to identify "teachable moments" that may make students more open to the influence of PFIs. Recent experience of a serious aversive consequence may represent such a moment. To date, only one study has examined this possibility. Miller et al. (2018b) found that recently experienced alcohol-induced

blackouts moderated the relationship between PFIs and alcohol-related consequences. People who reported experiencing an alcohol-related blackout in the past month, and received a personal feedback intervention, experienced the greatest decrease in alcohol-related consequences. As such, Miller et al. (2018b) concluded that alcohol-induced blackouts could serve as a cue to acting on the behavior change that the PFI motivated in the participants. In other words, people may be more motivated to make a change after the recent experience of a consequence, such as an alcohol-induced blackout, and thus they may be more open and receptive to a personal feedback intervention.

Potential moderating consequences are likely those that are viewed by most students as distinctly negative experiences. Past research has demonstrated that people who rate an alcohol-related incident that resulted in alcohol-related consequences as more aversive are more likely to change their drinking behavior (Barnett, Goldstein, Murphy, Colby & Monti, 2006; Leavens et al., 2017; Merrill, Read & Barnett, 2013). Some consequences, such as waking up in a stranger's bed after drinking, are perceived as positive by many college students who drink (Mallett, Bachrach & Turrisi, 2008). On the other hand, consequences such as alcohol-induced blackouts are perceived as negative by the majority of college students (77.4%) who drink and is among one of the most negatively-valenced consequences documented in the literature (Leavens et al., 2017). As such, it follows that the recent experience of an alcohol-induced blackout or a similar negative experience may be an event that could make students more susceptible to the influence of a PFI than students who have not recently had such an experience.

The purpose of the current study was to replicate and extend the findings of Miller et al. (2018b). First, in replicating the findings of Miller et al., (2018b) it was hypothesized that a recent past experience of an alcohol-induced blackout would moderate the relationship between personal feedback interventions and alcohol use as well as alcohol related-consequences. Specifically, it was hypothesized that those who had experienced an alcohol-induced blackout in the past month

and who received a personal feedback intervention would experience the greatest reduction in future alcohol use and its related consequences.

The second purpose of the present study was to explore whether there are other recent strongly negatively-valenced alcohol-related consequences, such as the experience of a hangover, that would also result in a significant reduction in alcohol use and its related consequences after receiving a personal feedback intervention. Leavens et al. (2017) found some consequences to be more consistently viewed by students as negative and aversive: (a) the experience of driving while intoxicated, (b) the experience of feeling sick to the stomach or throwing up, (c) the experience of sexual situations while drinking that the person later regretted, (d) the experience of interpersonal problems due to alcohol use, (e) the experience of weight gain due to alcohol use, and (f) the experience of harm to one's physical appearance due to alcohol use. Thus, it was hypothesized that the recent experience of any of these consequences may also result in a larger impact of the PFI. With each of these consequences it was hypothesized that those who received a personal feedback intervention and who recently experienced one of these consequences would also experience a larger reduction in future alcohol use and its related consequences than students who did not receive a personal feedback intervention and did not recently experience one of these consequences. Finally, while no specific hypotheses were made, the present study also proposed to examine the remaining items of the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ) to see if any other consequences also follow the pattern of moderating the relationship between personal feedback interventions and future alcohol use and its related consequences (Kahler, Strong, & Read, 2005).

CHAPTER II

REVIEW OF THE LITERATURE

College Alcohol Use

Despite a plethora of research dedicated to reducing alcohol use among college students, problematic drinking behaviors remain a concern. According to the National Survey on Drug Use and Health in 2015, 58.0% percent of college students reported consuming alcohol and in comparison, only 48.2% of young adults between the ages of 18-22 years old who were not enrolled in college reported consuming alcohol (Substance Abuse and Mental Health Administration, 2015). In addition, the survey found that 37.9% of college students participated in binge drinking, defined as consuming five or more drinks during one occasion within the past thirty days for men, and four or more drinks during one occasion for women. By comparison, 32.6% of young adults who were not enrolled in college engaged in binge drinking, and 8.5% participated in heavy drinking, which consists of binge drinking five or more times within the past thirty days. On the other hand, 12.5% of college students engaged in heavy drinking within the past 30 days (SAMSA, 2015). Thus, alcohol consumption among young adults, especially college students, remains a prominent issue.

Personal Feedback Interventions

One way to try and combat this problematic alcohol consumption in young adult populations is through the use of the personalized feedback intervention (PFI; Larimer & Crounce, 2002).

Personal feedback interventions (PFIs) are a more recent form of a brief alcohol intervention (BAI) which came about as a result of finding that the most effective parts of alcohol interventions were the personalized components, especially in samples of college students (Scott-Sheldon et al., 2014). Ever since their origin, PFIs have found some short-term success in reducing alcohol use and then alcohol-related consequences as a downstream effect (Carey et al., 2007; Cronce & Larimer, 2011; Lau-Barraco, Braitman & Stamatos, 2018b; Neighbors et al., 2004; Miller et al., 2018b; White, Mun, Pugh & Morgan, 2007; White et al., 2008). For example, past research has found that PFIs are effective in reducing alcohol use at follow-up assessments that occur less than three months as well as less than six months later (Agostinelli, Brown, & Miller, 1995; Carey et al., 2007; Carey et al., 2016; Neighbors et al., 2004; Neighbors, Lewis, Bergstorm, & Larimer, 2006; Neighbors et al., 2016; Miller et al., 2016). Several studies have also demonstrated the efficacy of PFIs over alcohol education alone as well as assessment only controls (Carey et al., 2007; Larimer & Cronce, 2002; Larimer & Cronce, 2007; Larimer et al., 2001; Reid & Carey, 2015). PFIs have also been effective when using both in-person delivery and computer delivery methods (Cronce & Larimer, 2011; Miller, Leavens, Meier, Lombardi & Leffingwell, 2016; Neighbors et al., 2004; Neighbors et al., 2006; White, 2006; White et al., 2007).

One reason for this success is that PFIs provide information pertaining to the monetary and caloric costs of alcohol consumption, and past research has found that college students actually prefer receiving information about these practical costs in their feedback (Butler, Silvestri & Correia, 2014; Miller et al., 2016). Another reason that PFIs are successful is that they challenge their participants' misperceptions of alcohol use through providing information on the descriptive and injunctive norms of peer referent groups (White et al., 2007). That is, inflated perceptions of descriptive and injunctive norms have been found to impact the amount that people drink (Borsari & Carey, 2003; DeMartini, Carey, Lao & Luciano, 2011; Neighbors et al., 2010; Walters & Neighbors, 2005). For example, many college students are under the false impression

that other students drink more heavily and more frequently than they actually do, which is a descriptive norm (Borsari & Carey, 2003). In addition, many college students believe that other college students approve of drinking more than they actually do, which is an injunctive norm (Borsari & Carey, 2003). As such, it follows that college students drink more excessively in order to “keep up” with their peers as well as gain more peer approval. Thus, the goal of PFIs is to correct these norms through providing the drinking (and sometimes the rate of approval) statistics of relevant peer referent groups in order to show students how much their peers are actually drinking (Borsari & Carey, 2003; Lau-Barraco, Braitman, Linden-Carmichael, & Stamatatos, 2018a). Several studies have shown this technique to be successful because students changing their perception of drinking norms is often what accounts for their overall reduction in alcohol use as well as its related consequences (Neighbors et al., 2004; Neighbors et al., 2006; Neighbors et al., 2016; Miller et al., 2016).

Over time PFIs have adjusted their content and their length in order to improve their outcomes (Ray et al., 2014). Specifically, past research has examined whether more or less content and personalized information are better for reducing overall drinking behavior (Kulesza, Apperson, Larimer & Copeland, 2010; Ray et al., 2014; Walters & Neighbors, 2005). For instance, Kulesza et al. (2010) found that longer alcohol interventions were no more effective in reducing drinking behavior than were shorter alcohol interventions. On the other hand, Walters & Neighbors (2005) found that each additional component in alcohol interventions may have an additive effect in reducing drinking outcomes. However, Ray et al. (2014) found that there is actually a middle ground between these two “less is more” and “more is better” arguments. That is, Ray et al. (2014) found that when alcohol interventions are highly personalized, each personalized component in the intervention has an additive effect. Thus, the more personalized feedback, the participants are given, the better the outcome. However, when the intervention is impersonal and generalized, the less components the intervention has the better the outcome (Ray

et al., 2014). In other words, when the feedback is highly personalized more feedback is better, but when the feedback is highly generalized, less feedback is better.

In a similar manner to the importance of personalization in feedback interventions, the relevance of the comparison referent group included in the feedback of PFIs is a crucial factor in the effectiveness of the intervention as well (Larimer et al., 2011; Lewis & Neighbors, 2007; Neighbors et al., 2010; Neighbors, O'Connor, Lewis, Chawla, Lee & Fossos, 2008; Reed, Lange, Ketchie & Clapp, 2007). For example, past research has found that alcohol interventions may benefit more from gender specific feedback as opposed to gender neutral feedback (Borsari & Carey, 2003; Lewis & Neighbors, 2007; Walters & Neighbors, 2005). That is, Lewis and Neighbors (2007) found that presenting gender specific feedback to women was found to be more effective than presenting gender-neutral feedback. Specifically, gender specific feedback mediated the relationship between the personalized normative feedback intervention and the reduction in drinking behavior for women especially for women who strongly identified as being a woman. However, the same effect was not found for men. In fact, men seemed to benefit more from gender neutral feedback about the “typical” college student because men already view the “typical” college student as male whereas women view the “typical” college student as either a male or a female.

In addition, it appears that the proximity of the normative reference group as well as the salience of that reference group are important factors that contribute to people’s perceptions of drinking norms (Neighbors et al., 2010). That is, Neighbors et al. (2010) found that the participants perceived referent groups more distal to themselves, for example the “typical college student” to drink way more than the participants themselves drank. The previous study also found that the participants perceived more proximal peer referent groups (i.e., same race, same sex, same Greek organization) to drink about the same amount as the participants themselves drank. Thus, the participants were often misperceiving the amount that their friends (or same sex/race/Greek status peers) and that they themselves drank as normal and average compared to

the perceived excessive amount that distant others drank. Finally, people's social identity and how important it is for them to make social comparisons between themselves and their peers are also significant components of alcohol interventions (Litt, Lewis, Stahlbrandt, Firth & Neighbors, 2012; Neighbors et al., 2016). That is, people who constantly compare themselves to their peers find drinking norms to be more important than people who are not as concerned with comparing themselves to their peers (Litt et al., 2012). Thus, people who make more frequent social comparisons may benefit more from an intervention that corrects misperceptions of social drinking norms.

Alcohol-Related Consequences

One reason that heavy and frequent alcohol consumption in college students can be so problematic is because the more alcohol that college students consume, the more alcohol-related consequences they experience (Park, 2004; Wicki et al., 2018). Alcohol-related consequences can range anywhere from saying something embarrassing to experiencing an alcohol-related injury that results in a visit to the emergency room (Leavens et al., 2016). Past research shows that how people perceive alcohol-related consequences influences their experience of those consequences and that perception also influences their future drinking behavior (Barnett et al., 2006; Barnett et al., 2015; Lee, Patrick, Neighbors, Lewis, Tollison & Larimer, 2010b; Merrill et al., 2013; Park, 2004; Patrick & Maggs, 2011; White & Ray, 2014). For example, college students actually perceive some alcohol-related consequences, such as waking up in a stranger's bed, as a positive consequence of drinking (Mallett et al., 2013). Specifically, Lee et al. (2010b) found that people viewed many of the consequences of drinking as fun or social consequences especially if they experienced those consequences while they were out drinking with other people. Additionally, they found that people who drank more reported experiencing more positive alcohol-related consequences, such as getting to know more people, and they viewed their drinking more positively than people who had experienced more negative alcohol-related consequences.

Unfortunately, past research has shown that the frequent experience of positive social alcohol-related consequences can actually reinforce and maintain consistent levels of heavy drinking (Park, Kim & Sori, 2013). Similarly, people who engage in more frequent heavy drinking also often report experiencing more positive alcohol-related consequences (Park et al., 2013). Thus, it follows that positive consequences continually reinforce heavy drinking and heavy drinking simultaneously leads to the perception of experiencing more positive alcohol-related consequences in one never ending cycle of reinforcement.

Another factor that may reinforce heavy drinking behavior is the normative perception that other college students experience far more negative alcohol-related consequences than they actually do (Lee, Geisner, Patrick & Neighbors, 2010a). That is, Lee et al. (2010a) found that college students overestimate the number of negative alcohol-related consequences their peers have experienced, and college students underestimate how negatively their peers perceived those consequences to be. In other words, students thought their peers rated alcohol-related consequences more positively when in actuality research shows that most college students evaluate negative alcohol-related consequences as negative experiences (Barnett et al., 2015; Leavens et al., 2017; Lee et al., 2010a; Lee et al., 2010b; Merrill et al., 2013). This misperception could contribute not only to more extreme drinking habits to “fit in” and experience all the consequences of drinking that one's peers are perceived to experience, but it also contributes to the misguided assumption that alcohol-related consequences are not that bad because one's peers are perceived to think those consequences are not that bad. Therefore, interventions should not only target normative perceptions of drinking but also normative perceptions of experiencing alcohol-related consequences.

However, Lee et al. (2010b) also found that negative social consequences of drinking were most strongly associated with how people later perceived the event. For instance, getting in a fight would be a negative social consequence of drinking as would experiencing embarrassment. In both these instances the alcohol-related consequence could have a negative

impact on the person's social standing (e.g. embarrassing self by losing the fight) and thus the person might evaluate the consequence more negatively than if the consequence had a positive impact on the person's social standing (e.g. winning the fight and gaining peer approval).

In a similar manner, past research has found that when alcohol-related consequences are particularly aversive, people report greater motivation to change their drinking behavior because they do not want to experience that consequence again (Barnett et al., 2006). In fact, negative perceptions of alcohol-related consequences often do lead to an overall reduction in future drinking behavior (Barnett et al., 2015; Merrill et al., 2013). Furthermore, Merrill et al. (2013) found that the more people experienced alcohol-related consequences the more negatively they began to perceive alcohol-related consequences.

Teachable Moments and Alcohol-Induced Blackouts

Research suggests that certain alcohol-related consequences may serve as “teachable moments” in which people are more open to interventions in order to prevent future problematic drinking behaviors and their related consequences (Barnett, Monti & Wood, 2001). Specifically, “teachable moments” are defined as naturally occurring events that impact people's health and that motivate people to reduce their unhealthy behaviors (McBride, Emmons & Lipkus, 2003). It is believed that there are three components involved that help determine what constitutes a teachable moment (McBride et al., 2003). First, McBride et al. (2003) found that in order for an event to be considered a teachable moment it must increase a person's perception that his or her health is personally at risk. Second, the researchers found that the event must result in a strong emotional response from the person, and third the event must change how the person thinks about his or her self-concept. If all three of these components are met as a result of problematic alcohol use, then the experience may result in a teachable moment in which the person is more open to receiving an intervention for his or her alcohol use.

Thus far, past research on alcohol use has only really considered emergency departments and primary care settings for teachable moments to take place as they represent the first

component of McBride et al.'s (2003) teachable moment paradigm, and as such a brief intervention for alcohol misuse was developed specifically for emergency settings: The Alcohol Screening, Brief Intervention, and Referral to Treatment (SBIRT; Graham et al., 2019; McPherson, Goplerud, Olufokunbi-Sam, Jacobus-Kantor, Lusby-Treber & Walsh, 2009). The goal of SBIRT is to promote a universal alcohol screening measure to identify problematic drinking behaviors and then provide a brief intervention to people who are identified by the screener as potential substance misusers (Sahker, Lancianese, Jones & Arndt, 2018; SAMHSA, 2017a). Past research has shown that SBIRT has been effective in reducing both overall alcohol consumption as well as hazardous drinking (Aldridge, Linford & Bray, 2017; Sahker et al., 2018). It follows that one reason for the efficacy of SBIRT could be because people's perception of possible harm to their health is elevated while in an emergency setting. Additionally, being identified in by an alcohol screener as a problematic alcohol user in an emergency or primary care setting may be enough to change how a person identifies or views his or her self-concept.

In addition to emergency department settings in which people's overall health risk perceptions may be increased, the person's overall perception and affective response to the alcohol-related consequences are important components as well (Barnett et al., 2006; McBride et al., 2003). For example, Barnett et al. (2006) found that students who experienced an alcohol-related consequence that they found to be particularly aversive were more likely to intend to change their drinking behavior, and this finding was especially true for students who were lighter drinkers and had experienced fewer prior alcohol-related consequences. Because alcohol-induced blackouts are a particularly aversive consequence, it is believed that alcohol-induced blackouts may be one of the alcohol-related consequences that can be used as such a teachable moment for interventions (Miller, DiBello, Carey, & Pedersen, 2018a; Miller et al., 2018b; White, 2003).

One reason that alcohol-induced blackouts may be perceived as particularly aversive is because they are known to be predictive of other alcohol-related consequences, such as experiencing a hangover and missing work or class (Hingson, Zha, Simons-Morton & White,

2016). Alcohol-induced blackouts also are predictive of additional social, emotional, and academic consequences (Read, Merrill, Kahler & Strong, 2007; Wilhite & Fromme, 2015). For instance, Wilhite and Fromme (2015) found that during alcohol-induced blackouts people may not be aware of making hurtful or insensitive comments to other people. It follows that these comments could result in the person putting a strain on relationships or even lose those relationships without realizing it. Additionally, Read and colleagues (2007) found that students who experience alcohol-induced blackouts often have a worse academic performance later on in the semester. Even more importantly people could seriously injure themselves or others during an alcohol-induced blackout (Mundt, Zakletskaia, Brown & Fleming, 2012). For example, Mundt et al. (2012) found that alcohol-induced blackouts can lead people to be three times more likely to suffer from an alcohol-related injury than those who consumed the same amount of alcohol but did not experience an alcohol-induced blackout. Additionally, alcohol-induced blackouts can lead to incapacitated sexual revictimization among women (Valenstein-Mah, Larimer, Zoellner & Kaysen, 2015). Therefore, alcohol-induced blackouts can be particularly damaging to people (or their reputations) because the consequences of said blackout can result in social, emotional, or physical consequences for the person experiencing the blackout as well as for the people around them. As such, alcohol-induced blackouts may serve as motivators for people to change their current drinking behavior (Marino & Fromme, 2018)

Recently, one study found that alcohol-induced blackouts may moderate the relationship between PFIs and drinking behavior in college students (Miller et al., 2018b). That is, Miller and colleagues found that after receiving a personal feedback intervention, people who had experienced an alcohol-induced blackout within the past month then experienced a greater decrease in alcohol-related consequences during the one-month follow-up period than people who received a PFI but had not experienced an alcohol-induced blackout in the past month. It is likely that this decrease in alcohol-related consequences could be related to a decrease in peak blood alcohol concentration (BAC) which could be attributed to people drinking more slowly and

moderating their alcohol consumption in general. Furthermore, Miller et al. (2018b) posits that the loss of control and memory experienced during alcohol-induced blackouts may be threatening to college students and a personal feedback intervention may prompt them to take action and change their behavior in order to try and combat that perceived threat.

An additional study by Miller et al. (2018a) found that alcohol-induced blackouts have been shown to moderate the relationship between PFIs and drinking behavior in other populations as well. Specifically, Miller et al. (2018a) examined the effect of alcohol-induced blackouts as a moderator among a sample of young adult veterans. The results of the study indicated that people who received a personalized normative feedback intervention experienced a significant reduction in alcohol use and its related consequences and alcohol-induced blackouts moderated that relationship. In other words, young adult veterans who had experienced an alcohol-induced blackout in the past month were more likely to decrease their drinking and experience fewer alcohol-related consequences during the one-month follow-up after receiving a personalized normative feedback intervention. Additionally, “feeling bad about oneself” after drinking also moderated the relationship between PFI and experiencing a reduction in alcohol use and its related consequences at the one-month follow-up (Miller et al., 2018a). That is, veterans who had recently experienced an alcohol-induced blackout or felt bad about themselves after drinking were more likely to reduce their drinking behavior and experience fewer alcohol-related consequences during the one-month follow-up after receiving an intervention. As such, these two studies by Miller et al. (2018a; 2018b) both add to the assertion that certain alcohol-related consequences can serve as “teachable moments” in which people are more open to receiving interventions and feedback about their drinking habits (Barnett et al., 2001).

The current study

To date, very few studies have examined alcohol-induced blackouts as moderators and no study has investigated all 24 alcohol-related consequences that make up the BYAACQ as moderators of intervention outcomes. As such, the purpose of the current study was to replicate

and extend the findings of Miller et al. (2018b). That is, the present study examined the effect of alcohol-induced blackouts as moderators of the relationship between PFIs and alcohol use and its related consequences. In addition, the present study tested the other 23 items of the BYAACQ as moderators of the same relationship. Specifically, it was hypothesized that those who had experienced an alcohol-induced blackout in the past month and who received a personal feedback intervention would experience the greatest reduction in future alcohol use and its related consequences.

Furthermore, it was hypothesized that the past month experience of the following alcohol-related consequences would each also moderate the relationship between personal feedback interventions and alcohol use and its related consequences: the experience of driving while intoxicated, the experience of feeling sick to the stomach or throwing up after drinking, the experience of a sexual situation while drinking that the person later regretted, the experience of interpersonal problems due to alcohol use, the experience of weight gain due to alcohol use, and the experience of harm to one's physical appearance due to alcohol use. With each of these consequences it was hypothesized that those who received a personal feedback intervention and who recently experienced one of these consequences would also experience a reduction in future alcohol use and its related consequences. Finally, while no specific hypotheses were made, the present study also proposed to examine the remaining items of the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ) to see if any other consequences also follow the pattern of moderating the relationship between personal feedback interventions and the experience of future alcohol use and its related consequences.

Hypothesis 1a: The experience of an alcohol induced-blackout in the past month would moderate the relationship between receiving a personal feedback intervention and future alcohol use as measured by the DDQ. In other words, the participants who had recently experienced an alcohol-induced blackout and who received a PFI would experience the greatest reduction in future

alcohol use. The testing of this hypothesis was a replication test of the finding from Miller et al. (2018b).

Hypothesis 1b: The experience of an alcohol induced-blackout in the past month would moderate the relationship between receiving a personal feedback intervention and the experience of future alcohol-related consequences as measured by the BYAACQ such that the participants who had recently experienced an alcohol-induced blackout and who received a PFI would experience the greatest reduction in future alcohol-related consequences. The testing of this hypothesis was also a replication test of the finding from Miller et al. (2018b).

Hypothesis 2a: The past month experience of driving while intoxicated, feeling sick to the stomach or throwing up due to alcohol use, regretting a sexual situation that occurred while drinking, experiencing interpersonal problems due to alcohol use, gaining weight due to alcohol use, or experiencing harm to one's physical appearance due to alcohol use would all also moderate the relationship between receiving a personal feedback intervention and future alcohol use as measured by the DDQ. In other words, the participants who had recently experienced one of these consequences and who received a PFI will experience a greater reduction in alcohol use than the participants who had not recently experienced one of these consequences and who did not receive a PFI. The testing of this hypothesis would extend the findings of Leavens et al. (2017).

Hypothesis 2b: The past month experience of the above six consequences would also moderate the relationship between receiving a PFI and experiencing future alcohol-related consequences as measured by the BYAACQ such that the participants who had recently experienced one of the six consequences and who received a PFI would experience a greater reduction in alcohol-related consequences. The testing of this hypothesis would extend the findings of Leavens et al. (2017).

CHAPTER III

METHODOLOGY

Participant Selection and Recruitment

The present study examined archival samples of undergraduate students that participated in randomized clinical trials of PFIs for alcohol misuse among college students who were recruited from a large, public, Southern Plains University. All of the participants were recruited through an online participant pool management system. In order to be eligible to participate, the students had to meet all of the following inclusion criteria: (a) be between 18 and 25 years of age, (b) be enrolled in college, (c) have at least one heavy drinking episode in the past month (that is 5 drinks or more in one sitting for males, and 4 drinks or more in one sitting for females), (d) consume at least 20 drinks per month on average, and (e) have experienced at least one negative alcohol-related consequence during the past month. All procedures were approved by the university's Institutional Review Board.

Procedures

The participants took part in one of two randomized controlled trials (RCTs) with a short-term follow-up assessment that assessed alcohol use among college students. Each of the two RCTs assessed the effectiveness of an electronic intervention delivered via desktop computer called the Drinking Assessment and Feedback Tool for College Students (DrAFT-CS) in reducing alcohol use and its related consequences. Both RCTs examined four conditions: three intervention

conditions and one control condition. The three PFI condition in Wagener et al. (2012) consisted of the DrAFT-CS condition, the in-person PFI condition, and the comprehensive assessment condition. Additionally, the three PFI conditions in Weaver et al. (2014) consisted of the DrAFT-CS condition, the DrAFT-CS condition with an additional moderating alcohol intake module delivered via a computer, and the moderation skills module delivered by itself. Both RCTs found a small but reliable intervention effect for the DrAFT-CS treatment groups as a whole when compared to control groups. For a more thorough description of the procedures used see Wagener et al. (2012) and Weaver et al. (2014). The procedure of the present study included a re-analysis of the data collected by Wagener et al. (2012) and Weaver et al. (2014) to see if the experience of a specific alcohol-related consequence, such as an alcohol-induced blackout, moderated the relationship between the DrAFT-CS intervention and future alcohol use as well as its related consequences.

Measures

Demographics. The participants completed a questionnaire assessing demographic information, such as gender, age, ethnicity, year in school, and Greek organization involvement.

Alcohol Use. The participants completed the Frequency Quantity Questionnaire (FQQ; Dimeff, Baer, Kivlahan & Marlatt, 1999), which is a brief self-report measure that assesses the largest number of drinks consumed in one sitting during the past month. It also provides a measure of the average number of drinks consumed on a typical weekend evening, the number of days alcohol was consumed over the past two weeks, and the number of days the person drank with the intention of getting drunk during the past two weeks. In addition, the participants also completed the Daily Drinking Questionnaire (DDQ; Collins, Parks & Marlatt, 1985) which is a brief self-report, 4-item, measure that is used to assess the number of alcoholic drinks that a person consumes each day as well as the number of hours spent drinking each day during a typical drinking week from the past month. Furthermore, the DDQ measures the frequency of the individuals' alcohol consumption from the previous month with an 8-point Likert-type scale that

ranges from “never” to “every day.” Finally, the DDQ assesses the number of drinks typically consumed during any one single occasion over the course of the previous month. The DDQ is known to be significantly correlated with and demonstrate moderate convergent validity with the Drinking Practices Questionnaire, $r(52) = .50, p = .001$ (Collins et al., 1985).

Alcohol-related consequences. To assess for the experience of alcohol-related consequences, the participants completed the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler et al., 2005). The BYAACQ is a 24-item measure that assesses potential drinking related consequences experienced by college students over the course of the past month. The items are dichotomous (i.e. “yes I have experienced this consequence while drinking over the past month,” or “no I have not experienced this consequence while drinking over the past month”) and range from less severe consequences, such as “while drinking, I have said of done embarrassing things,” to more severe consequences, such as “in the past month, I have not been able to remember long stretches of time while drinking” (indicative of an alcohol-induced blackout). Scores can range from 0 to 24, and the higher scores indicate a greater number of consequences experienced, while the lower scores indicate a fewer number of consequences experienced. Lastly, the BYAACQ is known to demonstrate good internal consistency ($\alpha = .89$; Kahler et al., 2005).

Data were screened for missingness prior to analysis. See Wagener et al. (2012) and Weaver et al. (2014) for a more detailed description on data screening and participant flow diagrams. The final sample consisted of 142 participants from Wagener et al. (2012) and 157 participants from Weaver et al. (2014).

As part of the data analytic plan, 4 moderation analyses were conducted in each of the two datasets as well as several exploratory moderation analyses. Because there were not significant differences between the three PFI groups in each dataset, the PFI groups were collapsed into one group in order to provide more power in all analyses (Wagener et al., 2012; Weaver et al., 2014). To reduce error variance from conducting multiple moderation analyses, the

six alcohol-related consequences in hypothesis two (driving while intoxicated, feeling sick to the stomach or throwing up, regretful sexual experiences, interpersonal problems, weight gain, and harm to one's physical appearance) were collapsed into a single moderator. In addition, to account for possible baseline group differences, all analyses controlled for age, gender, and drinking variables as measured by the DDQ at baseline.

All hypotheses were assessed through a hierarchical regression model in SPSS to examine the alcohol-related consequences as moderator of intervention effects on future alcohol-related consequences. In Step 1 of each model, age, gender, and baseline drinks per week were included as covariates. In Step 2 of each model, the covariates, the group (PFI vs control) and the baseline moderator [e.g., past month experience of alcohol-induced amnesia (yes vs no), past month experience of driving while drunk (yes vs no), etc.] were assessed as predictors of alcohol use and its related consequences at the 1-month and 10-week follow-up assessments. In Step 3, the covariates, the independent variable (group), the moderator, and the interaction between the group and the moderator were assessed as predictors of alcohol use and its related consequences at the 1-month and 10-week follow-ups.

CHAPTER IV

FINDINGS

Sample characteristics

The final sample of 142 participants from Wagener et al. (2012) consisted of primarily male (54.6%) participants with a mean age of 20.9 ($SD = 1.9$). Participants identified primarily as Caucasian (84.6%). The participants reported drinking an average of 22.3 ($SD = 13.6$) drinks per week. In this sample, the participants reported experiencing 10.8 ($SD = 4.9$) alcohol-related consequences in the past 30 days. The final sample of 157 participants from Weaver et al. (2014) consisted of primarily male (50.6%) and Caucasian participants (83.1%) with a mean age of 20.1 ($SD = 5.5$). The participants further reported drinking an average of 22.7 ($SD = 12.8$) drinks per week. Additionally, the participants reported experiencing 10.5 ($SD = 4.1$) alcohol-related consequences in the past 30 days.

Alcohol-induced blackouts as a moderator of the relationship between PFIs and future alcohol-related consequences

Item number nine of the BYAACQ, past month experience of an alcohol-induced blackout, was ran in separate moderation analyses for each of the two datasets. In each of these analyses, group (PFI vs control) was the independent variable, while the remaining twenty-three items of the BYAACQ assessed at follow-up were summed to create the dependent variable (experience of alcohol-related consequences). Baseline alcohol use, measured in drinks per week

(DPW) by the DDQ, along with gender and age were covariates in all analyses. The past month experience of an alcohol-induced blackout did not significantly moderate the relationship between group and the experience of alcohol-related consequences at follow-up in the Wagener et al. (2012) dataset, $F(6, 131) = 8.00, p = .92, R^2 = .27$, or in the Weaver et al. (2014) dataset, $F(6, 137) = 8.94, p = .53, R^2 = .28$.

Alcohol-induced blackouts as a moderator of the relationship between PFIs and future alcohol use

In a similar manner as above, item number nine of the BYAACQ was ran in separate moderation analyses for each of the datasets. In these analyses, group (PFI vs control) was the independent variable and drinks per week at follow-up as measured by the DDQ was the dependent variable. Once again, baseline alcohol use, gender, and age were covariates in all analyses. The past month experience of an alcohol-induced blackout did not significantly moderate the relationship between group and weekly alcohol use at follow-up in either the Wagener et al. (2012) dataset, $F(6, 135) = 36.24, p = .87, R^2 = .62$ or the Weaver et al. (2014) dataset, $F(6, 134) = 21.70, p = .49, R^2 = .49$.

Summed alcohol-related consequences as a moderator of the relationship between PFIs and future alcohol-related consequences

Six items of the BYAACQ (past month experience of driving while intoxicated, feeling sick to the stomach or throwing up, regretful sexual experiences, interpersonal problems, weight gain, and harm to one's physical appearance) were collapsed into a single moderator, and ran in separate moderation analyses for each of the two datasets. In a similar manner to above, group (PFI vs control) was the independent variable, while the remaining eighteen items of the BYAACQ were summed at follow-up to create the dependent variable (experience of alcohol-related consequences). Baseline alcohol use, measured in drinks per week (DPW) by the DDQ, along with gender and age were covariates in all analyses. The past month experience of the summed alcohol-related consequences did not significantly moderate the relationship between

group and the experience of alcohol-related consequences at follow-up in the Wagener et al. (2012) dataset, $F(6, 131) = 9.76, p = .65, R^2 = .31$, or in the Weaver et al. (2014) dataset, $F(6, 137) = 6.89, p = .90, R^2 = .23$.

Summed alcohol-related consequences as a moderator of the relationship between PFIs and future alcohol use

Once again, the six collapsed items of the BYAACQ were ran in separate moderation analyses for each of the two datasets. The independent variable remained group (PFI vs control), while drinks per week at follow-up as measured by the DDQ was the dependent variable. Baseline alcohol use, measured in drinks per week (DPW) by the DDQ, along with gender and age were covariates in all analyses. The past month experience of the summed alcohol-related consequences did not significantly moderate the relationship between group and alcohol use at follow-up in the Wagener et al. (2012) dataset, $F(6, 135) = 36.09, p = .40, R^2 = .62$, or in the Weaver et al. (2014) dataset, $F(6, 134) = 21.39, p = .56, R^2 = .49$.

Exploratory Analysis

The six collapsed items of the BYAACQ were ran in additional separate moderation analyses for each of the two datasets. For these analyses, the independent variable remained group (PFI vs control), while alcohol use at follow-up was measured by each of the items of the FQQ as the dependent variable. Baseline alcohol use, measured in drinks per week (DPW) by the DDQ, along with gender and age were covariates in all analyses. The past month experience of the summed alcohol-related consequences did significantly moderate the relationship between group and how frequently alcohol was consumed at follow-up in the Weaver et al. (2014) dataset, $F(6, 135) = 6.43, p < .01, R^2 = .22$. Specifically, the interaction between receiving a PFI and recently experiencing one of the six summed consequences accounted for an additional 3.9% of the variance in explaining how frequently alcohol was consumed at follow-up. Additionally, the effect was stronger for people who had recently experienced one or two of the alcohol-related consequences and who received a PFI. In other words, people who experienced one or two of the

summed six consequences and received a PFI reported drinking less frequently than people who experienced one or two of the consequences and did not receive a PFI.

The remaining 17 items of the BYAACQ were ran as moderators of intervention outcomes as part of an exploratory analysis. Item number one, the past month experience of saying or doing embarrassing things while drinking did significantly moderate the relationship between group and how frequently alcohol was consumed at follow-up as measured by the FQQ in the Wagener et al. (2012) dataset, $F(6, 135) = 8.02, p < .001, R^2 = .26$. In other words, the interaction between receiving a PFI and recently saying or doing something embarrassing while drinking accounted for an additional 16.0% of the variation in explaining how frequently alcohol was consumed at follow-up.

Item number six, the past month experience of passing out while drinking, did significantly moderate the relationship between group and the number of drinks per week consumed at follow-up as measured by the DDQ in the Wagener et al. (2012) dataset, $F(6, 135) = 38.94, p < .05, R^2 = .63$, and in the Weaver et al. (2014) dataset, $F(6, 134) = 23.40, p < .05, R^2 = .51$. That is, in the Wagener et al. (2012) dataset, the interaction between receiving a PFI and recently experiencing passing out while drinking accounted for an additional 4.3% of the variation in explaining the number of drinks consumed at follow-up. The effect was strongest for people who received a PFI but had not recently experienced passing out while drinking. Furthermore, in the Weaver et al. (2014) dataset, the interaction accounted for an additional 4.2% of the variation in explaining the number of drinks per week consumed at follow-up. Similarly, the effect was strongest for people who received a PFI but did not recently experience passing out while drinking.

Item number eight, the past month experience of engaging in impulsive behaviors that the person later regretted, significantly moderated the relationship between group and how frequently alcohol was consumed at follow-up as measured by the FQQ in the Weaver et al. (2014) dataset, $F(6, 135) = 7.73, p < .05, R^2 = .26$. In other words, the interaction between receiving a PFI and

recently engaging in impulsive behaviors while drinking accounted for an additional 7.6% of the variation in explaining how frequently alcohol was consumed at follow-up. The effect was strongest for people who received a PFI but had not recently experienced engaging in impulsive behaviors that they later regretted. Item number eight also significantly moderated the relationship between group and the frequency of heavy episodic drinking episodes at follow-up as measured by the FQQ in the Wagener et al. (2012) dataset, $F(6, 134) = 9.90, p < .05, R^2 = .31$. That is, the interaction between receiving a PFI and recently engaging in impulsive behaviors while drinking accounted for an additional 4.2% of the variation in explaining the frequency of heavy episodic drinking episodes at follow-up. In a similar manner, the effect was strongest for people who received a PFI but had not recently experienced engaging in impulsive behaviors that they later regretted.

Item number thirteen, the past month experience of having difficulty limiting alcohol consumption, significantly moderated the relationship between group and the experience of alcohol-related consequences at follow-up as measured by the BYAACQ in the Wagener et al. (2012) dataset, $F(6, 131) = 7.45, p < .05, R^2 = .25$. In other words, the interaction between receiving a PFI and recently having difficulty limiting alcohol intake accounted for an additional 6.1% of the variation in explaining the experience of alcohol-related consequences at follow-up. Again, the effect was strongest for those who received a PFI but had not recently experienced having difficulty limiting alcohol.

Item number sixteen, the past month experience of having felt badly about oneself because of their drinking, significantly moderated the relationship between group and the experience of alcohol-related consequences at follow-up as measured by the BYAACQ in the Wagener et al. (2012) dataset, $F(6, 131) = 7.77, p < .05, R^2 = .26$. Specifically, the interaction between receiving a PFI and recently feeling badly about ones drinking habit accounted for an additional 4.5% of the variation in experiencing alcohol-related consequences at follow-up. The

effect was strongest for those who received a PFI but who had not recently felt badly about oneself because of their drinking.

Item number seventeen, the past month experience of having less energy from drinking, significantly moderated the relationship between group and the number of drinks per week consumed at follow-up as measured by the DDQ in the Weaver et al. (2014) dataset, $F(6, 134) = 22.93, p < .05, R^2 = .51$. Specifically, the interaction between receiving a PFI and recently having less energy from drinking accounted for an additional 4.0% of the variation in explaining the number of drinks consumed at follow-up. The effect was strongest for people who received a PFI and who had not recently experienced having less energy from drinking.

Item number nineteen, the past month experience of spending too much time drinking, significantly moderated the relationship between group and the experience of alcohol related consequences at follow-up as measured by the BYAACQ in the Wagener et al. (2012) dataset, $F(6, 131) = 7.21, p < .05, R^2 = .25$. That is, the interaction between receiving a PFI and recently spending too much time drinking accounted for an additional 5.2% of the variation in the experience of alcohol-related consequences at follow-up. The effect was strongest for those who had received a PFI but had not recently experienced spending too much time drinking. In addition, the past month experience of spending too much time drinking significantly moderated the relationship between group and the peak drinking episode as measured by the FQQ at follow-up in the Wagener et al. (2012) dataset, $F(6, 135) = 20.90, p < .05, R^2 = .48$. Specifically, the interaction accounted for an additional 4.0% of the variation in how many drinks were consumed during a peak drinking episode at follow-up. Similarly, the effect was strongest for people who had received a PFI but had not recently spent too much time drinking. Finally, spending too much time drinking significantly moderated the relationship between group and the frequency of heavy episodic drinking episodes as measured by the FQQ at follow-up in the Wagener et al. (2012) dataset, $F(6, 134) = 10.76, p < .05, R^2 = .33$. In other words, the interaction accounted for an additional 7.9% of the variation in the frequency of heavy episodic drinking episodes at follow-

up. In a similar manner to the above findings, the effect was strongest for those who received a PFI but had not recently experienced spending too much time drinking.

Lastly, item number twenty-four, the past month experience of needing a drink after waking up, significantly moderated the relationship between group and the number of drinks per week consumed at follow-up as measured by the DDQ in the Wagener et al. (2012) dataset, $F(6, 135) = 38.60$, $p < .05$, $R^2 = .63$. That is, the interaction between receiving a PFI and recently needing a drink after waking up accounted for an additional 4.2% of the variation in the number of drinks consumed at follow-up. This time the effect was strongest for those who received a PFI and who had recently experienced needing a drink after waking up.

CHAPTER V

CONCLUSION

The current study is an extension of past research examining alcohol-related consequences as moderators of intervention outcomes. Contrary to hypotheses, experiencing an alcohol-induced blackout in the past month and receiving a personal feedback intervention did not significantly reduce alcohol consumed or alcohol-related consequences experienced at the follow-up assessment. In other words, people who had experienced an alcohol-induced blackout and received a PFI were just as likely as people who had not experienced an alcohol-induced or receive a PFI to reduce their drinking or experience fewer consequences. Additionally, experiencing one of the six collapsed alcohol-related consequences and receiving a personal feedback intervention did not significantly reduce the amount of alcohol consumed or the number of alcohol-related consequences experienced at the follow-up assessment. People who had experienced one of the other six alcohol-related consequences and had received a PFI were just as likely as people who had not experienced one of those consequences or receive a PFI to reduce their drinking or experience less consequences. Interestingly, as part of exploratory findings, people who had recently experienced consequences such as recently experiencing needing a drink after waking up were more likely to reduce their alcohol intake after receiving a PFI than people who had not experienced that consequence. These findings indicate the continued need to identify

potential teachable moments as intervention targets in an effort to reduce hazardous drinking among young adults (Substance Abuse and Mental Health Services Administration, 2017b).

Taken together, these findings suggest that, alcohol-related consequences, such as needing a drink after waking up, can be teachable moments and as such potential targets of brief interventions, however, it could be that heavy college drinkers negatively evaluate different alcohol-related consequences than the average college student who drinks. For example, past research has shown that in a sample of college students, consequences such as alcohol-induced blackouts are evaluated the most negatively (Leavens et al., 2017). However, research has also demonstrated that PFIs are less successful with samples of college students that drink more heavily (Hansen et al., 2012). As such, it could be that the effectiveness of PFIs could be increased for heavy drinkers if alcohol-related consequences that are important to them are targeted (Carey et al., 2007; Hansen et al., 2012). While intuition would suggest that more potentially severe consequences, such as driving while intoxicated, could motivate heavy drinkers to reduce their alcohol-consumption, research suggests that the smaller alcohol-related consequences with more immediate effects could be the most motivating due to delay discounting (Kollins, 2003). Delay discounting demonstrates that college students will discount long-term consequences of drinking because they are not as imminent and thus short-term consequences such as needing a drink after waking up could be more important to heavy drinkers (Kollins, 2003).

Another possible explanation of the present findings could have to do with the nature of the alcohol-related consequences themselves. Specifically, the way the Young Adult Alcohol Consequences Questionnaire was originally developed included eight different factors of consequences: social-interpersonal consequences, impaired control, self-perception, self-care, risk behaviors, academic/occupational consequences, physical dependence, and blackout drinking (Read, Kahler, Strong, & Colder, 2006). No study has examined whether the same eight categories hold true in the BYAACQ as of yet. Interestingly for the eight items that significantly

moderated the relationship between group and the outcomes in the present study, each item came from a different one of the eight categories identified in the YAACQ. In other words, each category was represented, and no two items came from the same category. Item number six, passing out while drinking, item number eight, doing impulsive things while drinking, and item number nineteen, spending too much time drinking significantly moderated the most outcomes and fell into the blackout drinking, risk behaviors, and academic/occupational categories respectively. As such, it could be passing out, smaller risks, and neglecting obligations are more important to heavy drinking college students due to delay discounting (Kollins, 2003). This possibility is in contrast with the importance of social consequences that are perceived as negative by average college students who drink (Lee et al., 2010b). This difference could in part be due to the average college student mainly only drinking in social settings, while heavy drinkers may engage in more alcohol consumptions outside of social settings, thus why they may feel they spend too much time drinking. Therefore, future research needs to evaluate whether the alcohol-related consequences that are negatively evaluated by heavy drinkers differ from those alcohol-related consequences that are evaluated negatively by average and light drinkers.

While the main findings of the present study were not significant, these findings do still contribute to the knowledge of the field by emphasizing the need to further study potential alcohol-related consequences as teachable moments and targets of interventions for not just populations of heavy drinkers, but for average and light drinkers as well. The findings of the present study illustrate that the recent experience of certain alcohol-related consequences can increase peoples' receptiveness to brief interventions, such as PFIs, it is just that these consequences differ from the predicted consequences. Thus, these findings add to the growing field of the subjective evaluation of alcohol-related consequences and whether these consequences are negatively or positively evaluated by college students (Lee et al., 2010b). The consequences identified in the present study as possible targets of interventions should be evaluated in samples of mandated college students as well to try and increase the effectiveness of

brief interventions in a sample that is not as receptive as receptive to interventions (Carey et al, 2007; Hansen et al., 2012).

While the present study advances the field of research in alcohol-related consequences, it is not without its limitations. First, the sample consisted of a predominantly White group of students, so an ethnically diverse sample was not achieved. As such, the findings of the present study cannot be generalized to more diverse populations of college students. Additionally, both Wagener et al. (2012) and Weaver et al., (2014) had high rates of attrition and non-responders. Finally, the current study is not an exact replication of Miller et al. (2018b) because structural equation modeling was not used. Future research should more closely follow the statistical procedures utilized by Miller et al. (2018b) in order to obtain a more valid replication. In addition, future research should use a larger sample size in order to ensure there is enough power for desired analyses.

In conclusion, the current study adds to the understanding of how the experience of certain alcohol-related consequences influence college students' drinking behaviors. Given that past experience and subjective evaluations of consequences matter, it is important that researchers understand which alcohol-related consequences college students perceive as negative and will motivate the students to change their future drinking behavior (Barnett et al., 2006; Barnett et al., 2015; Lee, Patrick, Neighbors, Lewis, Tollison & Larimer, 2010b; Merrill et al., 2013; Park, 2004; Patrick & Maggs, 2011; White & Ray, 2014). If as the present study suggests, college students who engage in heavy drinking practices respond to the recent past experience of needing a drink after waking up, etc. to motivate their behavior change, then brief alcohol interventions should begin to incorporate a focus on these specific consequences in order to improve the effectiveness of brief interventions in samples of heavy drinking college students.

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Table 1.

Hierarchical linear regression moderation model of group and alcohol-induced blackout (Blackout) on alcohol-related consequences at follow-up controlling for age, gender, and drinks per week (DPW) at baseline in the Wagener et al. (2012) dataset.

Variables	<i>b</i>	<i>t</i>	<i>p</i>	F Change (<i>df</i>)	R ² Change
Step 1				7.60 (3, 134)	.15**
Age	-0.30	-1.25	.22		
Gender	1.40	1.41	.16		
DPW Baseline	0.16	4.58	<.001		
Step 2				10.96 (2, 132)	.12**
Age	-0.27	-1.16	.25		
Gender	0.88	0.91	.37		
DPW Baseline	0.12	3.40	.001		
Blackout	3.45	3.74	<.001		
Group	-2.10	-2.12	<.05		
Step 3				.01 (1, 131)	.92
Age	-0.26	-1.14	.26		
Gender	0.87	0.89	.38		
DPW Baseline	0.12	3.39	.001		
Blackout	3.28	1.80	.08		
Group	-2.01	-1.56	.12		
Blackout x Group	0.07	0.10	.92		

Note. * $p < .05$; ** $p < .01$.

Table 2.

Hierarchical linear regression moderation model of group and alcohol-induced blackouts (Blackout) on alcohol-related consequences at follow-up controlling for age, gender, and drinks per week (DPW) at baseline in the Weaver et al. (2014) dataset.

Variables	<i>b</i>	<i>t</i>	<i>p</i>	F Change (<i>df</i>)	R² Change
Step 1				11.00 (3, 140)	.19**
Age	0.17	0.72	.47		
Gender	1.45	2.04	<.05		
DPW Baseline	0.16	5.74	<.001		
Step 2				8.46 (2, 138)	.09**
Age	0.5	0.23	.82		
Gender	1.44	2.11	<.05		
DPW Baseline	0.14	5.27	<.001		
Blackout	2.62	4.00	<.001		
Group	.07	0.90	.37		
Step 3				.002 (1, 137)	.53
Age	.05	0.21	.83		
Gender	1.50	2.17	<.05		
DPW Baseline	0.14	5.30	<.001		
Blackout	1.91	1.48	.14		
Group	0.16	0.15	.88		
Blackout x Group	0.95	0.64	.53		

Note. * $p < .05$; ** $p < .01$.

Table 3.

Hierarchical linear regression moderation model of group and alcohol-induced blackouts (Blackout) on DPW at follow-up controlling for age, gender, and drinks per week (DPW) at baseline in the Wagener et al. (2012) dataset.

Variables	<i>b</i>	<i>t</i>	<i>p</i>	F Change (<i>df</i>)	R² Change
Step 1				70.78 (3, 138)	.61**
Age	-0.40	-0.89	.38		
Gender	-3.17	-1.72	.09		
DPW Baseline	0.82	12.61	<.001		
Step 2				1.91 (2, 136)	.01
Age	-0.34	-0.75	.46		
Gender	-3.24	-1.66	.10		
DPW Baseline	0.80	11.48	<.001		
Blackout	2.03	1.10	.27		
Group	-2.77	-1.40	.16		
Step 3				.00 (1, 135)	.87
Age	-0.34	-0.75	.45		
Gender	-3.21	-1.64	.10		
DPW Baseline	0.80	11.43	<.001		
Blackout	2.54	0.70	.49		
Group	-3.03	-1.18	.24		
Blackout x Group	-0.21	-0.16	.87		

Note. * $p < .05$; ** $p < .01$.

Table 4.

Hierarchical linear regression moderation model of group and summed alcohol-induced blackouts (Blackout) on DPW at follow-up controlling for age, gender, and drinks per week (DPW) at baseline in the Weaver et al. (2014) dataset.

Variables	<i>b</i>	<i>t</i>	<i>p</i>	F Change (<i>df</i>)	R² Change
Step 1				41.01 (3, 137)	.47**
Age	-0.78	-1.33	.19		
Gender	-7.24	-4.27	<.001		
DPW Baseline	0.55	8.27	<.001		
Step 2				2.36 (2, 135)	.02
Age	-0.75	-1.28	.20		
Gender	-7.87	-4.62	<.001		
DPW Baseline	0.53	11.48	<.001		
Blackout	1.46	0.90	.37		
Group	-3.62	-1.98	<.05		
Step 3				.49 (1, 134)	.49
Age	-0.77	-1.30	.19		
Gender	-7.70	-4.47	<.001		
DPW Baseline	0.54	7.93	<.001		
Blackout	-0.45	-0.14	.89		
Group	-5.05	-1.84	.07		
Blackout x Group	2.57	0.70	.49		

Note. * $p < .05$; ** $p < .01$.

Table 5.

Hierarchical linear regression moderation model of group and summed alcohol-related consequences (Consequences) on alcohol-related consequences at follow-up controlling for age, gender, and drinks per week (DPW) at baseline in the Wagener et al. (2012) dataset.

Variables	<i>b</i>	<i>t</i>	<i>p</i>	F Change (<i>df</i>)	R ² Change
Step 1				7.14 (3, 134)	.14**
Age	-0.30	-1.45	.15		
Gender	1.13	1.34	.18		
DPW Baseline	0.13	4.37	<.001		
Step 2				16.21 (2, 132)	.17**
Age	-0.27	-1.44	.15		
Gender	0.36	0.44	.66		
DPW Baseline	0.08	2.60	<.05		
Consequences	1.32	4.76	<.001		
Group	-2.15	-2.67	<.05		
Step 3				.21 (1, 131)	.00
Age	-0.27	-1.45	.15		
Gender	0.39	0.47	.64		
DPW Baseline	0.08	2.63	<.05		
Consequences	1.12	2.06	.04		
Group	-1.80	-1.62	.11		
Consequences x Group	0.08	0.46	.65		

Note. * $p < .05$; ** $p < .01$.

Table 6.

Hierarchical linear regression moderation model of group and summed alcohol-related consequences (Consequences) on alcohol-related consequences at follow-up controlling for age, gender, and drinks per week (DPW) at baseline in the Weaver et al. (2014) dataset.

Variables	<i>b</i>	<i>t</i>	<i>p</i>	F Change (<i>df</i>)	R ² Change
Step 1				10.13 (3, 140)	.18**
Age	0.07	0.34	.74		
Gender	1.02	1.62	.11		
DPW Baseline	0.14	5.51	<.001		
Step 2				4.78 (2, 138)	.05*
Age	-0.01	-0.03	.98		
Gender	0.91	1.46	.15		
DPW Baseline	0.13	5.15	<.001		
Consequences	0.72	2.79	<.05		
Group	-0.94	1.40	.17		
Step 3				.02 (1, 137)	.00
Age	-0.01	-0.03	.98		
Gender	0.91	1.44	.15		
DPW Baseline	0.13	5.11	<.001		
Consequences	0.77	1.52	.13		
Group	1.10	0.77	.44		
Consequences x Group	-0.07	-0.12	.93		

Note. * $p < .05$; ** $p < .01$.

Table 7.

Hierarchical linear regression moderation model of group and summed alcohol-related consequences (Consequences) on DPW at follow-up controlling for age, gender, and drinks per week (DPW) at baseline in the Wagener et al. (2012) dataset.

Variables	<i>b</i>	<i>t</i>	<i>p</i>	F Change (<i>df</i>)	R ² Change
Step 1				70.78 (3, 138)	.61**
Age	-0.40	-0.89	.38		
Gender	-3.17	-1.72	.09		
DPW Baseline	0.82	12.61	<.001		
Step 2				1.39 (2, 136)	.01
Age	-0.35	-0.76	.45		
Gender	-2.86	-1.46	.15		
DPW Baseline	0.81	11.54	<.001		
Consequences	0.28	0.42	.68		
Group	-3.10	-1.58	.12		
Step 3				.70 (1, 135)	.00
Age	-0.35	-0.77	.44		
Gender	-2.82	-1.44	.15		
DPW Baseline	0.82	11.56	<.001		
Consequences	-0.58	-0.48	.63		
Group	-1.57	-0.59	.56		
Consequences x Group	0.33	0.84	.40		

Note. **p* < .05; ***p* < .01.

Table 8.

Hierarchical linear regression moderation model of group and summed alcohol-related consequences (Consequences) on DPW at follow-up controlling for age, gender, and drinks per week (DPW) at baseline in the Weaver et al. (2014) dataset.

Variables	<i>b</i>	<i>t</i>	<i>p</i>	F Change (<i>df</i>)	R ² Change
Step 1				41.01 (3, 137)	.47**
Age	-0.78	-1.33	.19		
Gender	-7.24	-4.27	<.001		
DPW Baseline	0.55	8.27	<.001		
Step 2				1.95 (2, 135)	.02
Age	-0.70	-1.19	.24		
Gender	-7.75	-4.49	<.001		
DPW Baseline	0.54	8.05	<.001		
Consequences	0.00	0.00	1.00		
Group	-3.62	-1.97	<.05		
Step 3				.34 (1, 134)	.00
Age	-0.72	-1.22	.22		
Gender	-7.70	-4.44	<.001		
DPW Baseline	0.55	8.04	<.001		
Consequences	-0.65	-0.49	.62		
Group	-5.55	-1.46	.15		
Consequences x Group	0.90	0.58	.56		

Note. **p* < .05; ***p* < .01.

APPENDIX

IRB Approval

Date: 11/05/2019

Application Number: AS-19-124

Proposal Title: Re-analysis of DrAFT Data

Principal Investigator: Delaney Dunn Co-Investigator(s):

Faculty Adviser: Thad Leffingwell

Project Coordinator:

Research Assistant(s):

Processed as: Not Human Subjects Research

Status Recommended by Reviewer(s): Closed

Based on the information provided in this application, the OSU-Stillwater IRB has determined that your project does not qualify as human subject research as defined in 45 CFR 46.102 (d) and (f) and is not subject to oversight by the OSU IRB. Should you have any questions or concerns, please do not hesitate to contact the IRB office at 405-744-3377 or irb@okstate.edu.

Sincerely,

Oklahoma State University IRB

VITA

Delaney Shannon Dunn

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