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Brief Intervention to Reduce Alcohol Use Among Men Who Have Sex with Men

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy

in

Public Health (Health Behavior)

by

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DEDICATION

This manuscript is dedicated to the individuals who supported me through this process.

To my family: my husband, Benjamin James Croff, who made many sacrifices to help me succeed. Thank you for keeping a level head and a clear mind and for giving me clarity when I needed it. To our son, Benjamin Luka Croff, for giving me a deadline I couldn't work around. To my parents, Bill and Lynne Ketchie, who nurtured my inquisitive mind and taught me the importance of education and persistence. To my sister, Gayle Ketchie, for her love and ability to ground me.

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EPIGRAPH

… that men should
put an enemy in their mouths,
to steal way their brains!

That we should
with joy,
pleasance,
revel,
and applause
transform ourselves into beasts!

William Shakespeare, Othello

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ABSTRACT OF THE DISSERTATION

Brief Intervention to Reduce Alcohol Use

Among Men Who Have Sex with Men

by

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Doctor of Philosophy in Public Health (Health Behavior)

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Introduction: Men who have sex with men (MSM) who abuse alcohol are at increased risk for unprotected sexual intercourse, which may lead to transmission of HIV. Although there is no definitive causal link between alcohol use and risky sexual behavior, the two behaviors are highly correlated. **Design:** A randomized control trial was designed to test a brief alcohol intervention against an attention-placebo control intervention. A sample of 152 MSM were recruited over 13 weeks at a local gay bar. Sober bar patrons were recruited prior to entering the

bar and asked to complete a brief assessment and receive feedback. Patrons were randomly assigned to receive feedback on their planned alcohol use or on their carbon footprint (attention-placebo control condition). This scripted feedback, based on the health belief model, was tailored to the individual through a brief assessment. Participants were asked to complete a brief survey and give a breath sample at exit from the bar. Participants were followed-up within one week to assess alcohol-related problems and sexual activity following the interview night. **Findings:** Breath alcohol concentrations (BrAC) at exit from the bar were not significantly different between those in the experimental alcohol feedback condition and those in the attention-placebo control condition. Among participants receiving the experimental brief alcohol intervention, those categorized as high-risk for alcohol-related problems at entrance drank significantly less than planned as compared to participants categorized as low-risk for alcohol related problems ($F=13.9$, $p \leq 0.001$). Further, participants categorized as high-risk at entrance drove at a significantly lower rate than participants categorized as low-risk and at-risk ($\chi^2=8.9$, $p \leq 0.05$). **Discussion:** This brief alcohol intervention did not significantly reduce BrAC at exit from the bar for the group as a whole. However, evidence indicates that this intervention was more appropriate for those who planned to drink at

rates that would put them at higher risk of alcohol related problems as compared to those who were at low-risk of alcohol related problems.

CHAPTER 1: INTRODUCTION

The acute risks associated with alcohol use include unprotected sexual behavior (Wechsler, Davenport, Dowdall, Moeykens, & Catillo, 1994). This risk is particularly salient for men who have sex with men (MSM) because they continue to make up a large proportion of Human Immunodeficiency Virus (HIV) cases. Sexual contact with another male remains the leading cause of HIV transmission among men (CDC, 2005). MSM are disproportionately affected by the HIV epidemic, representing approximately half of all HIV infections each year (CDC, 2005).

The causal association between alcohol use and risky sexual behavior remains unclear, as it is methodologically difficult to study (Leigh & Stall, 1993). It has been suggested that alcohol use and risky sexual behavior are highly correlated because they occur in a single environmental context. Bars afford access to alcohol and the opportunity to meet new sexual partners (Cooper & Orcutt, 2000). This drinking context can also be highly sexualized, e.g., sexual dancing, scantily clad go-go dancers, underwear/condom promotions. As such, the bar environment represents a contextual nexus for two behaviors. Such an environment presents potential "leverage points" for which both behaviors may be addressed (Stokols, 2001).

Brief interventions (BIs) on alcohol use have been found effective across populations and in multiple environments, including college campuses, primary care facilities, emergency departments, and trauma departments. BIs on alcohol use occurring in the health care system are typically classified as Screening, Brief Intervention, and Referral to Treatment (SBIRT). SBIRT is a model program and is endorsed by the Substance Abuse and Mental Health Services Administration (SAMHSA) and the World Health Organization (WHO). In the clinical setting, patients may be more likely to perceive susceptibility to illness/injury because they are waiting to be seen for an ailment, which may not be directly related to risks of alcohol use. During this time of increased perceived susceptibility, however, patients may also feel vulnerability to other health threats, including risks associated with alcohol consumption. A similar intervention model applied in close temporal proximity to the drinking behavior may be an appropriate way to reduce alcohol-related problems in the community.

Many brief interventions, including SBIRT, are conceptually grounded in Motivational Interviewing coupled with Transtheoretical Model. The use of these theoretical models is appropriate for these intensive interventions; however, these interventions can also be interpreted using constructs from the Health Belief Model. As described

above, SBIRT operates in a clinical context of heightened perceived *threat*. Health Belief Model predicts that *threat* perception, coupled with heightened perceived *benefits* and minimal perceived *barriers*, will shift the decisional balance toward the health promotive behavior. These constructs can be applied to a brief alcohol intervention for individuals immediately prior to bar attendance.

Field-based intervention research in the bar setting has many unique practical and methodological challenges. Practically, the bar owner and management is aware that agreement to participate could potentially reduce profits. Methodologically, the effects of drinking at the bar must be assessed independently of behaviors in similar drinking contexts (Voas, Furr-Holden, Lauer, Bright, Johnson, & Miller, 2006). Many field studies of drinking behavior have used a portal methodology (Clapp, Holmes, Reed, Shillington, Freisthler, & Lange, 2007; Voas, Furr-Holden, Lauer, Bright, Johnson, & Miller, 2006; Kelley-Baker, Voas, Johnson, Furr-Holden, & Compton, 2007; Clapp, et al., 2009), which allows assessment of behavior immediately prior to entrance into and immediately following exit from a behaviorally relevant environmental context. This method has been adapted to provide bar patrons with a brief intervention immediately following entrance assessment.

This study applied the concepts of screening and brief intervention outside of the clinical context, immediately prior to alcohol use. A post-test only, randomized attention-placebo control design was employed to test a brief tailored alcohol feedback intervention against a brief tailored carbon footprint intervention. This study targeted MSM attending a local gay bar and aimed to reduce alcohol use and alcohol-related problems, including unprotected sexual intercourse.

The following specific aims and hypotheses were proposed to evaluate the utility of the brief alcohol feedback intervention:

Specific Aim 1: To test the effectiveness of a tailored feedback intervention based on the health belief model on intoxication through comparison of breath alcohol concentrations (BrAC) between the brief alcohol intervention group and an attention-placebo control group upon exit from the bar.

Hypothesis 1: Breath alcohol concentrations (BrACs) will be lower among those in the brief alcohol intervention than those in the attention-placebo control group.

Specific Aim 2: To examine differences between estimated and actual exit BrAC by baseline alcohol risk category for those in the brief alcohol intervention.

Hypothesis 2: Among those in the alcohol intervention, differences between estimated and exit BrAC will be greatest for those in the high-risk and at-risk groups, as compared to the low-risk group. Theoretically, this relationship is supported by Health Belief Model, as the no/low risk group receives minimal information to increase perception of threat/risk.

Specific Aim 3: To test the effectiveness of tailored feedback intervention based on the health belief model through comparison of the experimental group to the placebo control group on differences in continued drinking after leaving the bar the night of the field interview.

Hypothesis 3: Those in the experimental group will be less likely than those in the control group to continue drinking after leaving the bar.

Specific Aim 4: To compare the experimental group to the placebo control group on differences in alcohol-related problems immediately following the field interview and intervention. Specifically, whether participants drove after drinking the night of the interview, whether participants experienced hangovers the day after the interview, whether participants got sick from drinking, whether participants fell or were injured from drinking, and whether participants engaged in unplanned sexual behavior after leaving the bar.

Hypothesis 4: Those in the experimental group will be less likely to experience alcohol-related problems (driving after leaving, hangover, illness, injury, unplanned sexual activity) following this drinking occasion than those in the control group.

Exploratory Aim 1: To assess whether differences between groups in alcohol consumption, if any, contribute to differences in risky sexual behavior. Specifically, do single night reductions in BrAC result in reduction of subsequent risky sexual behavior?

Exploratory Hypothesis 1: During the night of the study, the brief alcohol intervention will result in greater reductions in risky sexual behavior than the brief carbon-footprint intervention.

Exploratory Aim 2: To test the effectiveness of the tailored feedback placebo control based on the health belief model through comparison of number of paper towels used in the bar between the brief alcohol intervention group and an attention-placebo control group.

Exploratory Hypothesis 2: Number of paper towels used to dry hands inside the bar will be lower among those in the attention-placebo control group than those in the brief alcohol intervention group.

In the following chapters, I will present the public health and research significance of this study, background on brief alcohol intervention research, and the rationale and theoretical basis of this study. I will then introduce the methods used for this study, including detailed descriptions of the intervention scripts. I will present the results of this brief field trial. Finally, I will discuss the strengths and weaknesses of this trial and ideas for future directions.

CHAPTER 2: BACKGROUND AND SIGNIFICANCE

ALCOHOL ABUSE

Alcohol is the third leading lifestyle related cause of death in the U.S. (Mokdad, Marks, Stroup, & Gerberding, 2004). Excessive alcohol consumption results in over 79,000 deaths (CDC, 2008), approximately 1.6 million hospitalizations (Chen & Yi, 2007), and over 4 million emergency room visits (McCaig & Burt, 2005) each year. Immediate and short-term risks of alcohol use include: unintentional injuries, violence, alcohol poisoning, and unplanned or unprotected sexual behavior (Wechsler, Davenport, Dowdall, Moeykens, & Catillo, 1994; Smith, Branas, & Miller, 1998; Sanap & Chapman, 2003). Risks of unprotected sexual behavior are particularly salient among men who have sex with men (MSM) because they continue to make up a large proportion of Human Immunodeficiency Virus (HIV) cases: 67% of HIV infections among men are through unprotected sexual contact with another male (CDC, 2005).

ALCOHOL ABUSE AMONG MSM

A large scale random household survey identified few differences between the drinking patterns of homosexual and heterosexual men (Stall & Wiley, 1988). And yet, alcohol use is prevalent among urban MSM: 85% reported using alcohol in the previous 6 months (Stall, et al.,

2001). Over 12% of urban MSM reported three or more of the following alcohol-related problems: fear of dependence on alcohol, needing to have a few drinks in order to change a mood, loss of control once drinking starts, drinking to relieve a hangover, conflict with a lover or close friend due to drinking, or loss of a job due to drinking (Stall, et al., 2001). Further, 8% of urban MSM reported frequent/heavy alcohol use, defined by the authors as consuming five or more drinks in a sitting at least once a week (Stall, et al., 2001). Ramirez-Valles and colleagues also found that heavy alcohol consumption was also common among Latino MSM in Chicago and San Francisco: over a third of the Chicago sample and approximately one-sixth of the San Francisco sample reported heavy alcohol use (Ramirez-Valles, Garcia, Campbell, Diaz, & Heckathorn, 2008).

INTOXICATION & RISKY SEXUAL BEHAVIOR

A causal link between alcohol consumption and sexual behavior has not been established. If alcohol use *causes* sexual risk, it could operate by (1) increasing the number of sexual partners, or (2) from a reduction in use of condoms, or (3) through some combination of these behaviors. When compared to sex in a monogamous relationship, the risk from additional casual sexual partners is only noteworthy when condoms are not used. In fact, a previous U.S. Surgeon General defined

risky sexual behavior through the potential to transmit the virus (Koop, 1987). Risky sexual behaviors are therefore defined by condom use behaviors with non-monogamous sexual partners, as is commonly operationalized in the field (Koop, 1987; Strathdee, et al., 2008; Mustanski, 2008; Paul, Stall, & Davis, 1993).

Identification of the causal relationship between alcohol consumption and risky sexual behavior is methodologically difficult (Leigh & Stall, 1993; Donovan & McEwan, 1995). Leigh and Stall note three main types of studies evaluating the relationship between alcohol consumption and risky sexual behavior: global association studies, situational association studies, and event studies (Leigh & Stall, 1993). Leigh and Stall, however, failed to note a potential important study type that can be used to detect the causal link between alcohol consumption and risky sexual behavior: natural and designed experimental trials to reduce alcohol consumption among sexually active participants. Each of these types of studies are reviewed below.

GLOBAL ASSOCIATION STUDIES

Global association studies examine associations between alcohol use and risky sexual behavior. The majority of global association studies indicate that heavier drinkers have more sexual partners and use condoms less consistently than their lighter drinking peers. Alcohol use

was found to be associated with a 30% increase in unprotected anal intercourse among MSM in San Francisco (Eckstrand & Coates, 1990). Further, high rates of unprotected sex were reported among MSM entering outpatient alcohol/drug treatment (Paul, Stall, & Davis, 1993). These cross-sectional designs suffer two major limitations: first, they preclude identification of causation because they cannot assess temporal order or proximity of behaviors; and second, they fail to assess frequency of sexual activity under the influence (Leigh & Stall, 1993).

SITUATIONAL ASSOCIATION STUDIES

Situational association studies examine the association between the number of high-risk sexual behaviors and the number of sexual behaviors that occur under the influence (Leigh & Stall, 1993). Situational association studies typically find a strong association between the use of alcohol with sex and high-risk sexual behaviors (Leigh & Stall, 1993). A situational association study of MSM found that more unprotected insertive anal intercourse was reported among those who drank alcohol more frequently before or during sexual activity than those who did not consume alcohol before or during sexual activity (Purcell, Parsons, Halkitis, Mizuno, & Woods, 2001). Although these studies focus on consumption of alcohol before sexual activity, they too fail to establish causality. In such studies, the measurement does not

determine if risky sex and intoxicated sex occurred on the same occasion.

EVENT LEVEL STUDIES

Among these types of cross-sectional studies, event level analyses provide the best explanatory power because they ask the participant to recall any alcohol and condom use during a person's last sexual encounter (Leigh & Stall, 1993). In a retrospective study over a period of 6 months, MSM were 4 times more likely to have unprotected sex with a casual partner after drinking than when sober (Seage, et al., 1998). Another event-level study found that MSM who reported consuming 4 or more drinks where three times more likely to engage in unprotected anal sex with a casual sexual partner (Vanable, et al., 2004). In a meta-analysis of event level studies, however, Leigh identified a relationship between alcohol consumption and risky sexual behavior only during first intercourse and failed to identify a relationship in recent sexual encounters or during recent encounters with new partners (Leigh B. C., 2002). Many of the studies included in this meta-analysis, however, were among heterosexual adults; it is conceivable that sexual risk behaviors differ between young heterosexual adults and MSM.

More recent event level studies include methods of data collection that move beyond a focus explicitly on the last sexual encounter. Timeline follow-back and diary studies are popular approaches to identifying frequency of alcohol consumption and sexual activity, enabling within and between subjects analyses. A timeline follow-back study of MSM with alcohol abuse problems suggests that drinking increases sexual risk taking (Irwin, Morgenstern, Parsons, Wainberg, & Labouvie, 2006). Mustanski identified significant within- and between-subjects associations linking alcohol consumption with risky sexual behavior in a diary study of HIV-negative MSM (Mustanski, 2008). In this study alcohol use significantly increased the odds of engaging in sexual activity and also increased sexual risk. Further, age was identified as a significant moderator of this relationship: effects of alcohol on sexual behavior increase with age (Mustanski, 2008). That is, older MSM were more likely to engage in risky sexual behavior after consuming alcohol.

Event level studies are not, however, without their limitations. Such studies rely on participant recall and are subject to recall bias. Studies focusing on a single sexual event may not be representative of a person's typical sexual behavior. These studies also often suffer from poor response rates (Donovan & McEwan, 1995; Seage, et al., 1998).

Event level studies have historically focused on the event of sexual activity, rather than the event of intoxication. In doing so, these studies fail to fully examine the relationship between alcohol use and risky sexual behavior. By focusing on the drinking event, the predictive nature of alcohol use on sexual activity could more accurately be recorded. Further, with the focus on alcohol use, these study types would be improved through measurement of the level of intoxication required for risky sexual behavior to occur. Such studies would be strengthened from biological measures of intoxication.

Finally, such studies fail to address potential confounding from personality characteristics, like sex-related alcohol expectancies (Cooper, Skinner, & George, 1990). Sex-related alcohol expectancies are a moderator of intoxicated risky sex: a study of HIV-positive men indicated that alcohol use was more likely to result in unprotected sexual activity only when the person held sex-related alcohol expectancies (Kalichman, Weinhardt, DiFonzo, Austin, & Luke, 2002). Sex-related alcohol expectancies describe the motivation to drink in order to enhance sexual pleasure, decrease sexual inhibitions, or to increase sexual risk taking. Gay and bisexual men reporting unprotected anal receptive or insertive sex were significantly more likely to endorse sex-related alcohol expectancies (Bimbi, Nanin, Parsons,

Vicioso, Missildine, & Frost, 2006). Alcohol use was associated with greater sexual risk taking among those who held sex-related alcohol expectancies in a sample of adolescents (Dermen, Cooper, & Agocha, 1998).

EXPERIMENTAL STUDIES

Studies which alter alcohol consumption may have a direct effect on risky sexual behavior. In a natural experiment, small increases in alcohol taxation have reduced the rate of Sexually Transmitted Diseases (STDs) by reducing alcohol consumption (e.g. $0.20 increase per 6-pack decreases gonorrhea rate by 8.9%) (Chesson, Harisson, & Kassler, 2000).

Randomized controlled trials of alcohol interventions improve upon the explanatory power of other correlational studies by directly manipulating alcohol consumption. Conceptually, a reduction in alcohol consumption on a given night should theoretically result in reduction in unprotected sex. However, no such studies have been identified in the extant literature.

BRIEF INTERVENTIONS

Tailored brief feedback interventions have been used to alter many different types of health behaviors including: substance use, smoking, HIV risk, and diet/exercise (Dunn, Deroo, & Rivara, 2001). Such

interventions have been conducted in person, via mail, over the phone, and online (Walker, Roffman, Picciano, & Stephens, 2007; Brown, Saunders, Bobula, Mundt, & Koch, 2007).

The first clinical trial of a brief alcohol feedback intervention used liver enzymes as a screener and depended on a physician to administer the intervention (Kristenson, Ohlin, Hulten-Nosslin, Trell, & Hood, 1983). While the physician advice was brief, the intervention required monthly appointments with a nurse and quarterly appointments with the physician (Kristenson, Ohlin, Hulten-Nosslin, Trell, & Hood, 1983). Tailored brief alcohol feedback interventions have been successfully conducted in health care settings including primary care (Bertholet, Daeppen, Wietlisbach, Fleming, & Burnand, 2005) and emergency departments (D'Onofrio & Degutis, 2002). In these settings, brief interventions are typically administered by a health educator or nurse speaking on behalf of the physician and giving physician recommendations.

Screening, Brief Intervention and Referral to Treatment (SBIRT) is considered a model program in healthcare settings by the World Health Organization (WHO) and the US Department of Health and Human Service's Substance Abuse and Mental Health Services

Administration (SAMHSA). SBIRT is also recommended for use in primary care settings by the US Preventive Services Task Force.

SBIRT is highly effective and is currently implemented in trauma centers, emergency departments, and in primary care settings. According to SAMHSA, screening and brief interventions are designed to assess alcohol related problems in the non-dependent population using health care facilities; such non-dependent users represent nearly a quarter of all trauma center visits (SAMHSA, 2006). Brief interventions in trauma centers have been shown to reduce trauma center recidivism as well as driving under the influence (Gentilello & Rivara, 1999; Schermer & Moyers, 2006). On average, in primary care settings, SBIRT has been shown to reduce heavy drinking by 17.3% (Solberg, Maciosek, & Edwards, 2008). Such interventions rely on the teachable moment when an at-risk drinker is injured as a result of his/her drinking. The feedback focuses on negotiating reduced use in order to reduce risk for injury in the future.

Brief alcohol interventions, however, have been implemented in multiple non-clinical environments. Such interventions have been extensively explored in an attempt to reduce drinking by college students. Many brief alcohol interventions are based in part on the 'drinker's checkup' (Miller & Sovereign, 1989). Computer and web-

based screening and brief interventions based in part on the drinkers checkup have resulted in reduced consumption, reduced frequency of heavy episodic drinking, and a reduction in alcohol-related problems (Walters, Vader, Harris, Field, & Jouriles, 2009; Kypri, et al., 2004).

Brief Alcohol Screening and Intervention for College Students (BASICS) was also based in part on the drinkers check-up and is designated as a SAMHSA model program. A harm reduction approach, BASICS focuses on reduction of harmful consequences rather than reduction of heavy drinking (Dimeff, Baer, Kivlahan, & Marlatt, 1999). The BASICS program consists of two 50-minute appointments with a trained therapist. Similar to SBIRT, this tailored communication is informed by an assessment, which is conducted during the first session and individually tailored feedback is given during the second session (Dimeff, Baer, Kivlahan, & Marlatt, 1999). Follow-up after 2-years showed reduced consumption and reduced problems among high-risk student drinkers (Marlatt, et al., 1998).

These brief alcohol approaches are intensive and geared to reduce problems associated with abuse or dependence. Although heavier drinkers account for more *chronic* alcohol-related problems (liver disease, etc.), the majority of *acute* alcohol-related problems (DUI, trauma, injury, etc.) are experienced after excessive consumption

by persons who do not meet dependence criteria (Woerle, Roeber, & Landen, 2007). Therefore, targeting light and moderate drinkers for interventions is necessary to address *acute* alcohol-related problems. Using a less intensive intervention model occurring in close proximity temporally and contextually to the target behavior, in a context that represents a "leverage point" for two behaviors of interest (Stokols, 2001); brief tailored feedback interventions in natural drinking settings may be an appropriate way to reduce alcohol-related problems in the general population. To date, however, brief drinking interventions have not been conducted in natural drinking settings.

RATIONALE FOR THE STUDY

Bars afford access to alcohol and the opportunity to meet new sexual partners (Cooper & Orcutt, 2000). The gay bar environment can be conceptualized as a cue to action (drinking) that may lead to alcohol-related problems and HIV transmission. Patrons of gay bars often rely on these settings as locations to meet future sexual partners and are, therefore, at increased risk of alcohol-related problems (Green & Plant, 2007). Rhodes' definition of HIV risk environments is applicable to gay bars, although it was derived from injection drug use environments: "the space, whether social or physical, in which a variety of factors exogenous to the individual interact to increase vulnerability

to HIV [infection]" (Rhodes, Singer, Bourgois, Friedman, & Strathdee, 2005).

During the first decade of the HIV epidemic, MSM gay bar patrons in San Francisco showed high levels of low-risk sexual behaviors: 16.9% were celibate, 45.8% practices low risk sexual behaviors, 14.1% practiced moderate risk behaviors, and 23.2% practiced high risk sexual behaviors in the previous month; as compared to heterosexual male bar patrons, who reported 24.6% celibacy, 6.1% low risk, 39.2% moderate risk, and 30.1% high risk sexual behavior (Stall, Heurtin-Roberts, McKusick, Hoff, & Wanner Lang, 1990).

Gay bar attendance has been shown to be predictive of HIV risk among MSM with steady partners, even when controlling for alcohol consumption (Fergus, Lewis, Darbes, & Butterfield, 2005). The social and physical aspects of bar environments that contribute to the relationship between gay bar attendance and sexual behavior, however, are not completely clear.

The relationship between the bar environment and intoxication is better understood. In her ethnographic study of bars, Cavan describes the social and physical environment and how this environment influences intoxication (Cavan, 1966). Quantitative studies have demonstrated an association between loud music at bars and

increased alcohol consumption (Gueguen, LeGuellec, & LeGuellec, 2004; van de Goor, Knibbe, & Drop, 1990). Functions of alcohol access within the bar (e.g., drink specials, bar server training, and temporary bars) also impact consumption and alcohol-related problems (Clapp, et al., 2009; Howard-Pitney, Johnson, Altman, Hopkins, & Hammond, 1991; Saltz, 1997; Thombs, et al., 2008). It is important to note, however, that in a study of young-adult oriented bars, that person-level variables better predicted breath alcohol concentration than did bar-level variables (Clapp, et al., 2009). Consistent with the health belief construct, *readiness to act*, at the person-level, intention to get drunk was a key predictor of behavior (Clapp, et al., 2009). Plans to continue drinking also represented an important person-level predictor of BrAC (Clapp, et al., 2009). Intervening at the person-level with a brief intervention of drinking intentions is, based on this research, a potentially viable approach to reducing intoxication among MSM bar patrons.

THEORY

Some brief alcohol intervention approaches (e.g., SBIRT and BASICS) use a Motivational Interviewing (MI) approach coupled with Trans-Theoretical Model (TTM). The use of MI and TTM are appropriate for creating long-term change through more intensive interventions

based on a single or set of alcohol-related problems. Yet, such methodologies may not be amenable to *in vivo* interventions delivered outside of clinical settings wherein alcohol-related problems may not have yet occurred. In the context of creating change on a single night, Health Belief Model may be a more appropriate conceptual approach to guide a brief intervention. Health Belief Model was conceptualized for creating a onetime change in behavior (e.g., accepting a screening or immunization) (Rosenstock, 1974; Janz & Becker, 1984). As such, it may be better suited for field based interventions.

Health communication messages range in content from general to individually specific. Completion of an assessment is necessary in order to tailor health communication messages with personalized content; therefore, content can become increasingly individualized as assessment increases (see Figure 1 in Appendix B) (Kreuter, Strecher, & Glassman, 1999). It is worthwhile to note that tailored communications are conceptually similar to interpersonal communications, like motivational interviewing. Kreuter, Strecher, & Glassman note a five part logic sequence that supports the use of tailored communications:

> "(a) by tailoring materials, superfluous information is eliminated; (b) the information that remains is more personally relevant to the recipient; (c) people pay more attention to information they perceive to be personally relevant; (d) information that is attended to is more likely to have an effect than that which is

> not; and (e) when attended to, information that addresses the unique needs of a person will be useful in helping them become and stay motivated, acquire new skills, and enact and sustain desired lifestyle changes." (1999, p. 278).

Message development for tailored health communication should be based on an established theoretical model of behavioral health because theory allows us to test constructs amenable to modification while atheoretical approaches do not (Glasglow & Linnan, 2008). The Health Belief Model (HBM) is commonly used to guide general health communication messages (Eisen, Zellman, & McAllister, 1985; Vanlandingham, Suprasert, Grandjean, & Sittitrai, 1995; Witte, Stokols, Ituarte, & Schneider, 1993; Larson, Bergman, Heidrich, & al., 1982), as well as tailored health communication messages (Stein J. , Fox, Murata, & Morisky, 1992; Becker, 1974). HBM posits that health behavior results from readiness to act or intention to perform the behavior. Readiness to act is dependent on perceived threat (susceptibility and severity) of illness, a decisional balance of perceived benefits and barriers to the health behavior, and cues to action. Cues to action can directly influence perception of threat and decisional balance by addressing susceptibility or severity of disease and by addressing perceived barriers and benefits to making the needed behavioral change.

Tailored health communication messages guided by Health Belief Model are a cue to action and should also focus on increasing perception of susceptibility and severity of illness. Further, a tailored communication message should attempt to shift decisional balance by increasing perception of benefits of behavior change while reducing perception of barriers to behavior change. For example, in order to increase benefits associated with a reduction in BAC, a message would highlight reduced risk of hangover, injury, or DUI related to lower BAC. Further, such a message could emphasize calorie savings to increase perception of benefits to reducing drinking. In order to reduce perception of barriers, a message could also address factors like social pressure to drink by giving tips to avoid this social pressure, like ordering soda with garnishes so no one can tell that alcohol is missing from a drink.

The Health Belief Model was designed to and has continued to effectively describe health behaviors in a prevention context, specifically with easy to perform one-time behaviors like vaccination and screenings (Stein J. A., Fox, Murata, & Morisky, 1992; Rosenstock, 1974; Austin, Ahmad, McNally, & Stewart, 2002). The model was not designed to explain the etiology of human behavior or a specific disease. Despite this, the model identifies key aspects of targeted

behavior change amenable to modification for all health behaviors, including mammography, cervical cancer screening, HIV prevention, and alcoholism-treatment use (Brown, DiClemente, & Reynolds, 1991; Austin, Ahmad, McNally, & Stewart, 2002; Stein J. , Fox, Murata, & Morisky, 1992; Bardsley & Beckman, 1988).

Based on this model, persons who are performing unhealthy behaviors: (a) perceive barriers to performing healthy behaviors; (b) perceive few benefits to performing healthy behaviors; (c) may experience cues to action for the unhealthy behavior or fail to experience cues to action for healthy behavior; (d) fail to acknowledge the severity of threats for the unhealthy behavior; and/or (e) fail to acknowledge their susceptibility to risks for the unhealthy behavior.

Health Belief constructs have been applied to better understand alcoholism treatment, parental alcohol use, and alcohol use among college students (Hahn, 1993; Rees, 1985; Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). In an examination of Health Belief constructs on college students drinking, Von Ah and colleagues identified self-efficacy as the main predictor of alcohol use; only under conditions of high threat does threat moderate the relationship between self-efficacy and past month drinking. Further, barriers were shown to

moderate the relationship between self-efficacy and heavy episodic drinking (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004).

To apply this specifically to alcohol consumption, a person attending a bar with plans to drink heavily may perceive social barriers to reduced consumption while at the bar (e.g., friends making fun of them). Further, he may perceive that by reducing his drinking, he will reduce his ability to have fun or enjoy the night. As such, he does not perceive benefits for drinking less (e.g., lower risk of hangover, injury, etc.), or if he does perceive such benefits, he does not perceive them to outweigh the barriers for changing his behavior. The bar environment (designed to facilitate drinking) functions as a cue to drink alcohol; therefore, cues to action are present for harmful health behaviors (i.e., heavy drinking), not for health preventive behaviors. Given these cues, which occur proximal to the behavior, it is unlikely that the bar patron will perceive or acknowledge any threat related to his planned level of consumption because he does not believe that he is at risk for alcohol-related problems and/or that the risk is severe. The goal of a health belief intervention is to reframe perceptions in a way that shifts the decisional balance for alcohol-related problems in favor of health promotive behavior by increasing risk awareness, addressing barriers to reduce drinking, and increasing perception of benefits for behavior

change (see Figure 2 in Appendix B). Such an intervention may be enhanced by being conducted at the bar, given the environmental cues to action in these settings typically cannot be manipulated.

An intervention outside of the bar may interrupt this process by creating cues to positive or healthy action (drinking less) to compete or counter-balance the existing internal and external cues for heavy alcohol use. This intervention could introduce potential important benefits (e.g., stress reduction without hangover, lack of injury, etc.) to reducing planned alcohol consumption while addressing any perceived barriers to this action by giving tips on how to accomplish this reduced consumption goal.

CONCEPTUAL MODEL

The brief drinking intervention examined in this study hoped to act on perceived threat, decisional balance, and cues to action (see Figure 3 in Appendix B). Feedback to influence perceptions of susceptibility and severity of threat were personalized based on planned drinking behavior. Further, the behavioral outcome benefits for protective behaviors were stressed in tailored feedback. In this study, the intervention occurred immediately before the individual entered the risk environment, in an attempt to create cues to action. The

temporal nature of this intervention is important because it ensures that the individual is ready to act and prepared for the risk environment.

CHAPTER 3: METHODS

DESIGN

A randomized attention-placebo control trial design was used to test the efficacy of a brief tailored feedback intervention to reduce alcohol use among patrons attending a single gay bar in San Diego. Participants were randomly assigned to a brief alcohol feedback intervention or an attention-placebo control carbon footprint feedback intervention (see Table 1 in Appendix C). Patrons received tailored feedback based on responses to survey assessment measures and their level of risk for alcohol-related problems or on their current use of fossil fuels, respectively.

This portal methodology (Clapp, Holmes, Reed, Shillington, Freisthler, & Lange, 2007; Voas, Furr-Holden, Lauer, Bright, Johnson, & Miller, 2006; Kelley-Baker, Voas, Johnson, Furr-Holden, & Compton, 2007) has been used in an extensive study of young adult oriented bars and nightclubs (Clapp, et al., 2009) and has been piloted at two gay bars in the past year. The portal method is defined as "assessments occurring proximal to the entry point to a high-risk locale and immediately on exit" (Voas, Furr-Holden, Lauer, Bright, Johnson, & Miller, 2006)(p. 44). This method allows behavior at the bar to be examined independently of other drinking behavior during the night. For this study the portal

method has been adapted to provide bar patrons with a brief intervention. Bar patrons received personalized feedback based on their responses to the baseline entrance assessment.

The main outcome variable of interest is breath alcohol concentration (BrAC) of patrons as they exit the bar. Secondary outcome variables of interest include continued drinking after leaving the bar, whether the patron had a hangover the next day, if he drove after leaving the bar, and if the patron engaged in unplanned sexual activity after leaving the bar. An exploratory analysis of risky sexual behavior was also conducted.

The selection of the bar for the proposed study was based the bar management's willingness to allow a continuous recruitment research project. The bar management agreed to inform the principal investigator of any changes in drinks specials and promotional activities at the bar for each night of data collection; no changes occurred during the study period. Monday nights represent a major portion of the bar's business because of the $1 mixed drink special. During Monday nights, bar staff removed tables and barstools in order to allow room for the crowd and dancing. Bartenders had undergone responsible beverage service training. No food was available at this bar.

Data collection was not conducted during the week following the local gay pride parade because of the potential association with increased drinking behavior. Originally, I anticipated recruiting 25 - 30 patrons each Monday night for a period of 5 - 6 weeks; however, actual recruitment was 8 – 15 patrons per night over a period of 13 weeks beginning July 13th and ending October 12th.

Patrons were randomly assigned to condition in order to reduce threats to the internal validity (Shadish, Cook, & Campbell, 2002). Those who agreed to participate were randomized to receive a screening and brief intervention on alcohol use or an attention-placebo control alternative focusing on carbon footprint. This post-test only randomized controlled trial protects against several threats to internal validity, including: ambiguous temporal precedence, selection, maturation, regression, testing, and instrumentation (Shadish, Cook, & Campbell, 2002).

Although attempts were made to minimize differences at the bar from week to week, it is possible that events occurring concurrently with the study (at the bar or in the community at large) could cause an observed effect, although it is unlikely that this will occur differentially by group. The effect of week of data collection on dependent variables was controlled for statistically. Further, loss to attrition represents a

potential threat to internal validity if this loss is differential by group. Like similar studies, we experienced very low attrition between bar entrance and exit (<6%). In an attempt to keep attrition to a minimum, participants were given hospital style bracelets so that the research staff would recognize them. Further, participants did not receive their incentive until they completed the exit interview. Finally, this design does not account for whether the entrance questionnaire, the feedback, or the combination of questionnaire and feedback were responsible for the treatment effect.

RANDOM SYSTEMATIC SAMPLING METHOD

Patrons were sampled using a systematic random sampling protocol in order to protect against potential selection bias and to ensure that the sample drawn for the study was representative of patrons at the bar. Potential participants were selected through a systematic interval with a random start.

Sampling began with a random start using a random interval, as determined by the roll of a single virtual die. This die roll was conducted for each night of data collection at www.random.org. The result of this die roll determined the interval for recruitment (1 - 6). During the study, every K^{th} group of patrons entering the bar was approached.

In order to minimize contamination of the experimental and control groups, only one patron was recruited per group. Tape was placed on the sidewalk near the entrance to the bar in order to identify the patron to be sampled.

Systematic sampling began once the team was set up outside of the bar; this occurred no later than 9:30 at night. After the team was assembled, we began counting the interval as determined by the die roll. When the K^{th} group or individual patron approached the bar, the first male in the group (or the individual) who stepped on the tape was recruited.

If that person refused to participate or did not meet eligibility criteria, we approached the first male to step on the tape in the next group of patrons. This pattern continued until a patron was recruited into the study. After a patron was recruited into the study, the interval began again. We then approached the next K^{th} group.

The undergraduate research volunteer responsible for recruitment noted the date, approximate age, and race/ethnicity of those who refused to participate.

Patrons recruited based on the random systematic sampling method were approached before they entered the bar (e.g., while waiting in line, or when approaching the entrance). Briefly the

undergraduate volunteer research staff "recruiter" informed the individual that a study was being conducted at the bar (Recruitment Script can be found in the Appendix). The recruiter explained the time required of the participant: approximately 15 minutes that night and an additional 15-minute phone survey in the next week. Finally, the patron was informed that he was eligible to receive up to $30 in gift cards to either Starbucks or Rubios.

Approximately 6,000 persons attended the bar on Monday nights over the 13 weeks of data collection. We approached 853 individuals about participating in the study. Of the individuals approached, 320 refused to participate (a 37.5% refusal rate).

SCREENING

The 533 patrons who agreed to participate then underwent a brief screening to identify whether they were eligible to participate. The recruiter asked the potential participant to step out of line and away from others in his group in order to answer screening questions. Only male patrons were recruited and eligible to participate. For the purposes of this study, the male patron must have had sex with another man in the past year. The patron was also required to have plans to drink at the bar that night.

Patrons were then transferred to a graduate research assistant to confirm that the patron was clinically sober (e.g., a BrAC of less than 0.02). Only sober patrons were included because it would otherwise be impossible to ascertain the participant's point on the BrAC curve: that is whether the BrAC was on an upward or downward trajectory. A breath sample confirmed that participants' breath alcohol concentration (BrAC) was less than or equal to 0.02 percent. The pre-test breathalyzer was set to display the BrAC results. Due to human subjects concerns, under no circumstances did the research staff share the BrAC with an excluded patron. Patrons were only included in the study once (confirmed before inclusion by asking subjects whether they have participated before and after inclusion by checking for duplicate unique ID numbers).

Of the 533 individuals we approached who agreed to participate, 372 (69.8%) were excluded from the study. The majority of individuals screened out for drinking alcohol prior to bar attendance (n=205, 55.1%) or for not having sex with another man in the past year (n=94, 25.3%). Of the remaining persons: 31 individuals screened out because they did not plan to drink that night (8.3%), 33 had already participated in the study (8.9%), 2 were non-English speakers (0.5%), and 7 screened out for other or unrecorded reasons (1.9%).

RANDOM ASSIGNMENT

One-hundred sixty-one participants were randomly allocated to receive the brief alcohol intervention (n=82) or the brief carbon footprint intervention (n=79). Nine participants failed to complete the exit survey: five from the experimental condition and four from the attention-placebo control condition. The final sample is composed of 152 participants: 77 participants in the experimental condition and 75 participants in the attention-placebo control condition (Figure 4 in Appendix B).

The Consolidated Standards of Reporting Trials (CONSORT) statement includes precise information on proper randomization technique (Altman, et al., 2001). Simple randomization was used to allocate patrons to the experimental or attention-placebo control groups, as opposed to block or other stratified randomization procedure. Participants were allocated in equal numbers to each condition: a 1:1 randomization ratio.

As specified by the CONSORT statement, allocation of groups to conditions was concealed from the staff members responsible for recruiting, screening, and consenting participants (Altman, et al., 2001). Allocation concealment prevents selection bias by ensuring that the individual enrolling participants has no knowledge of the next

assignment in the sequence. The CONSORT statement specifies that third party assignment is desirable in order to keep allocation concealed (Altman, et al., 2001). The principal investigator created packets to be used during each night of data collection. For each participant, this packet included a consent form, recruitment into the follow-up study, and the appropriate questionnaire for the tailored feedback. A packet was not assigned to a participant until they were screened and had consented to participate in the study.

These packets were arranged in order based on the Random Allocation Schedule (see Appendix A) wherein each recruitment number corresponds to a treatment condition. The Random Allocation Schedule was generated using the list randomizer at www.random.org. This list randomizer was filled with a list that included 75 cases of the word "experimental" and 75 cases of the word "control." The Random Allocation Schedule was originally generated for 150 patrons. Prior to the last day of data collection, and randomization was conducted for an additional four cases, in order to ensure that 150 subjects completed the study (see Random Allocation Schedule - Additional Cases in Appendix A).

However, once the brief assessment was begun, the interviewer and the research participant both became aware of the condition

because the assessments differed by condition. The principal investigator also became aware of the condition of the research participant when the assessment was conducted, but she was not aware of allocation prior to that moment. This process help prevent bias during recruitment, screening, and the consent process.

INFORMED CONSENT PROCESS

Patrons who were met inclusion criteria were asked to give consent to participate. The informed consent document was presented to the participant. Patrons were informed of the voluntary nature of participation and of the confidential nature of all information collected during the study. Risks for participating in the study were presented to potential participants, as well as potential benefits to society. Patrons were encouraged to ask questions about participation prior to giving consent to participate. Participants were given the option to consent to participate verbally, rather than in writing. No participants chose to sign the informed consent document. A copy of the consent form (see Appendix A), with instructions for withdrawing consent was offered to each participant. This study received human subjects approval from the SDSU and UCSD Institutional Review Boards.

DATA MANAGEMENT

A unique personal identifier was used to identify each participant and link his data; this ten digit code was composed of the day and month of birth, last four digits of the phone number, and the number of siblings. This unique identifier was used to match the entrance, exit, and follow-up surveys. The unique identifier was written on a wrist band, which helped study staff to identify participants as they exited the bar (Clapp, et al., 2009).

The participant's first name, unique identifier and phone number were collected on a confidential form for recruitment into the follow-up study. This information was never entered into a computer. The paperwork was kept in a locked cabinet and was shredded after completion of the follow-up interview.

BRIEF TAILORED FEEDBACK

Tailored feedback was shared with participants immediately following completion of the entrance assessment and prior to entering the bar. The tailored feedback interventions were based on the Health Belief Model and attempted to increase perceived susceptibility to, and severity of, harmful consequences of drinking behavior or fossil fuel use. Further, this tailored feedback intervention attempted to increase perceived benefit for the health behavior (e.g. reduction in calories

consumed, and reduced risk of alcohol related problems) while decreasing perceived barriers to performing the behavior (e.g. addressing social pressure to drink). Conceptually, this feedback represents a cue to action to increase readiness to act prior to entering the bar.

EXPERIMENTAL ALCOHOL FEEDBACK

For those in the experimental alcohol feedback condition, we generated an estimate of the participant's blood alcohol concentration (eBAC) at exit based on planned length of the drinking occasion, planned alcohol consumption, and body weight. A set of printed tables was used to quickly calculate eBAC. These estimates correspond directly with alcohol risk level and were used to allocate subjects into one of three categories: no/low risk, at risk, and high risk (Figure 4 in Appendix B).

This experimental alcohol feedback intervention attempted to increase perceived susceptibility and severity of threat through presentation of screening results (e.g., risk category: no/low, at risk, high risk) and risks associated with use at this level (e.g., driving after leaving the bar, increasing risk of injury, increasing risk of hangover, and unplanned sexual behavior). The intervention also attempted to increase beneficial outcome perception for performing the behavior

(no/low risk drinking) through advice, goal setting, and encouragement. Readiness to perform the behavior (no/low risk drinking) was assessed as part of the goal setting negotiation, but was not recorded.

Participants with estimated exit BACs of .000-.0049 were classified as no/low-risk and those with eBACs of .05 - .0079 were classified as at-risk. All exit BAC estimates of .08 and higher were classified as high risk and received the most extensive feedback session. These categories were established based on similar programs (Johnson, Voas, Lauer, & Watson, 2007), and based on the literature, which suggests that individuals with BACs of at or above 0.05 were at increased risk for DUI (Hingson, Heeren, & Winter, 1999). The high-risk drinking category is established as the legal limit for driving under the influence of alcohol in many states, including California (Hingson, Heeren, & Winter, 1999). The feedback script is presented below.

SCRIPT

Thank you for answering those questions. I am now looking up your risk for alcohol related problems based on your drinking plans.

Results

No/Low Risk - Based on the information you gave me, you are at no/low-risk for having alcohol related problems tonight.

At Risk - Based on the information you gave me, you are at-risk for having alcohol related problems tonight.

High Risk - Based on the information you gave me, you are high-risk for having alcohol related problems.

Risks

No/Low Risk - You may still experience problems associated with drinking, including falls, injury, and hangovers.

At Risk - You are likely to experience problems associated with drinking, including falls, injury, and hangover.

High Risk - You are very likely to experience problems associated with drinking, including falls, injury, hangover, and problems with friends.

Advice for Drivers

No/Low Risk, if planning to drive - Our advice to you tonight, is not to drive after you leave this bar. Your drinking puts you at a much higher risk for accident and injury.

At Risk, if planning to drive - Our advice to you tonight, is not to drive after you leave this bar. Your drinking plan puts you at a much higher risk for accident and injury.

High Risk, if planning to drive -Our advice to you tonight, is not to drive. You plan to drink at a rate that will put you over the legal limit. You are at a much higher risk for accident and injury.

ALL - There are also caloric intake to consider. Based on your drinking plans, you'll consume ___ calories (refer to Table 2 in Appendix C) in alcohol alone tonight. That's about the same amount as:

- Grande Cappuccino at Starbucks - 120 calories
- Grande Latte at Starbucks - 190 calories
- Rubio's fish taco - 270 calories
- Venti Vanilla Latte at Starbucks- 320 calories
- Hamburger at In & Out - 390 calories
- Fries at In & Out - 400 calories
- Cheeseburger at In & Out - 480 calories
- Venti Mocha Frappuccino at Starbucks - 500 calories
- 2 Rubio's fish tacos - 540 calories
- Double Double at In & Out - 670 calories
- Rubio's bean and cheese burrito - 700 calories

Advice for all

In order to reduce your risk of alcohol-related problems tonight and tomorrow, we advise that you reduce the amount of alcohol you plan to drink tonight.

Commitment

Now that we have gone over this information, how willing would you be to try to change how you drink at the bar tonight? Would you say you are not at all willing, somewhat willing, or extremely willing?

Goal Setting

If not at all willing - Okay, I can understand you saying that you are "not at all willing" to change your drinking plans. You might not have considered the costs associated with your drinking. Would you consider changing any part of your drinking plan tonight?

If somewhat willing - Okay, I can understand you saying that you are "somewhat willing" to change your drinking plans. While it is up to you to decide, would you consider changing any part of your drinking plan tonight?

If extremely willing - Okay, I can understand you saying that you are "extremely willing" to change your drinking plans. It sounds like you have thought about reducing your drinking before. While it is up to you to decide, would you consider changing any part of your drinking plan?

FOR ALL:

If no - What if you just spent a little more time inside without drinking? OR What if you drank one drink less when you're in the bar tonight?

If still no - Document that participant is unwilling to change current drinking plan

If yes - What do you think you could change about your plan?

(Negotiate a reduction in number of drinks or a longer time period, as appropriate. If participant doesn't volunteer a number, then start with half of the number of drinks they plan to consume.)

Encouragement

If unwilling to change drinking plan: I understand that you have a plan in place for tonight. I'd like to give you a few tips we've learned from our research at these bars:

If willing to change: I'd like to give you some specific techniques we've learned from our research at these bars. For example, you can:

1. Save calories tonight by drinking less.
    a. Many of the good looking guys here watch the calories they consume -- it means less time at the gym later.
2. You can space out the time between drinks; it's easier to do that with drinks that take longer to drink, for example, a beer takes longer to drink than a shot.

3. You can order drinks that look just like the cocktails you love - get a diet coke with a lime, or a tonic and orange. No one will be the wiser and you'll save on calories!

4. Remember that you have things to do tomorrow - you don't want to spend your day feeling miserable or hungover!

If planning to drive: Get a cab, walk home, or have a friend pick you up!

Thanks for your time, have a great night and we'll see you when you leave!

ATTENTION-PLACEBO CONTROL CARBON FOOTPRINT FEEDBACK

In drug studies, placebo controls allow identification of the physiological mechanism of action absent nonspecific psychological mechanisms of action (Bootzin, 1985). Similarly, the use of an attention-placebo control group enables distinction of the specific theoretically-predicted mechanisms absent nonspecific mechanisms of brief interventions in general (e.g. personal interest in behavior, feedback, etc.). In other words, the use of an attention-placebo control group allows one to control for the amount of time spent receiving the intervention, as well as other nonspecific variables associated with receiving brief feedback.

This attention-placebo control feedback intervention was structured similarly to the experimental alcohol feedback. Participants allocated to the carbon footprint brief intervention received feedback tailored to increase perceived susceptibility and severity of threat through presentation of screening results (e.g., footprint category: low footprint, average footprint, high footprint) and benefits/barriers associated with current carbon footprint behaviors (e.g., ability to lower monthly SDG&E bill). The intervention attempted to increase weight on the benefits for performing the behavior through advice, goal setting, and encouragement. Intention to perform the behavior was assessed as part of the goal setting negotiation.

Participants with scores of up to15,999 were classified as having very low/low carbon footprints. Scores of 16,000 - 22,000 pounds per year were classified as having an average carbon footprint and those with scores of 22,000 pounds per year or greater were classified in the high carbon footprint group. The appropriate script below was read to participants.

SCRIPT

Thank you for that information. I'd like to share some information with you about your carbon footprint. Your carbon footprint is an estimate of the greenhouses gases you produce each year.

Results

Very Low/Low Footprint- Based on the information you gave me, you have a low carbon footprint. You produce ___ [actual number given in the range: 6,000 - 15,999] pounds of carbon per year, which is less than the average American. Congratulations on using so few fossil fuels each year.

Average Footprint - Based on the information you gave me, you have an average carbon footprint. You produce ___ [actual number given in the range: 16,000 - 22,000] pounds of carbon per year, which is roughly the same amount of carbon as the average American.

High Footprint - Based on the information you gave me, you have a high carbon footprint. You produce ___ [actual number given: over 22,000] pounds of carbon per year, which is more than the average American.

Benefits

Very Low/Low Footprint- You probably enjoy benefits of having a low carbon footprint, like a low monthly SDG& E bill. And you're also creating benefits to the planet, like reductions in global warming.

Average Footprint - You should take steps to reduce your footprint. A lower carbon footprint will result in benefits like a lower

monthly SDG& E bill. And you would also create benefits to the planet, like reductions in global warming.

High Footprint - You should take steps to reduce your footprint. A lower carbon footprint will result in benefits like a lower monthly SDG& E bill. And you would also create benefits to the planet, like reductions in global warming.

Advice

Very Low/Low Footprint- We highly recommended that you continue to use fossil fuels at your current rate. But, there are always things we can do to reduce our dependence on the use of fossil fuels and to further reduce our carbon footprint: small changes can add up.

Average Footprint - We highly recommend that you reduce your use of fossil fuels. There are always things we can do to reduce our dependence on the use of fossil fuels and to further reduce our carbon footprint: small changes can add up.

High Footprint - We highly recommend that you reduce your use of fossil fuels. There are always things we can do to reduce our dependence on the use of fossil fuels and to further reduce our carbon footprint: small changes can add up.

Commitment

Now that we have gone over this information, how important is it to you to reduce your carbon footprint? Would you say it's not at all important, somewhat important, or extremely important?

Goal Setting

If not at all important - Okay, I can understand that it is "not at all important" to reduce your carbon footprint. You may not have thought about reducing your carbon footprint before today. Would you consider taking a first step to reduce?

If somewhat important - Okay, I can understand that it is "somewhat important" to reduce your carbon footprint. It sounds like you have thought about reducing your footprint before. While it is up to you to decide, would be willing to reduce your carbon footprint?

If extremely important - That's great to hear that it's "extremely important" to reduce your carbon footprint. It sounds like you have been thinking seriously about reducing your carbon footprint before. Would be willing to reduce your footprint?

If yes - How much would you be willing to reduce your carbon footprint? (Negotiate a reduction. Small changes are under 500 pounds/year, mid-level changes are less than 1,000 pounds per year, and big changes are greater than 1,000 pounds per year.)

If no - What if it was just a few simple things you could do tonight, like only using a single paper towel to dry your hands in the bathroom tonight?

If still no - Document that participant is unwilling to change current carbon consumption level

If yes - How much do you want to reduce your carbon footprint?

(Negotiate a reduction. Small changes are under 500 pounds/year, mid-level changes are less than 1,000 pounds per year, and big changes are greater than 1,000 pounds per year.)

Encouragement

If unwilling to change carbon footprint: Okay, it doesn't sound like it's the right time for you to reduce your carbon footprint. I'd like to give you a few tips in case you change your mind:

If willing to change: Congratulations. I'm so glad you've made the choice to reduce. I'd like to give you some specific techniques to help you reduce your carbon footprint. You can:

1) Use only one paper towel to dry your hands inside the bar tonight.

2) Eat locally grown foods (5,000 pounds/year)and/or organic foods (1,000 pounds/year)

3) Eat less meat (4,000 pounds/year)

4) Recycle (3,600 pounds/year).

5) Buying vintage clothes (800 pounds/year)

6) Getting a refillable water bottle (saves 110 pounds per year by not using water bottles)

Thanks for your time, have a great night and we'll see you when you leave!

MEASUREMENT

Participants were asked to complete a brief assessment which was used to directly inform the tailored feedback intervention at entrance. Upon exit, participants were asked to complete a brief interview and to give a breath sample. The exit interview included items assessed at entrance so that measurement across conditions is similar (Table 3 in Appendix C).

BREATH SAMPLES

Alcohol consumption was measured directly in the field using handheld breathalyzers (CMI Intoxilizer-400). Breathalyzers were calibrated every other week during the study period. Breath samples were taken at entrance and exit from the bar. At entrance, in order to

be included in the study, participants were required to blow a confirmatory value of less than 0.02% breath alcohol concentration (BrAC); therefore, the mean range for entrance BrACs was restricted to 0.00% – 0.02%. The mean BrAC at entrance was 0.001% (SD=0.005%). This entrance value was displayed on the breathalyzer.

At exit from the bar, the breathalyzer stored or passively recorded the value of the BrAC, which was later downloaded in the research office. The interviewer recorded the breathalyzer unit number and sample number on the data collection form in order to link the BrAC result to the form once the result had been downloaded from the machine. Breathalyzer data were downloaded and stored with unit and sample numbers. Thus breathalyzer data were matched to intervention data, but never linked to identifying information.

Validity of Breath Samples

Blood samples are the gold standard for measuring blood alcohol concentrations (BAC). Breath samples can be assessed for blood alcohol concentration because a fraction of alcohol in the bloodstream is expelled through breath. A ratio of 2,100:1 is generally accepted as the ratio of blood to breath alcohol and has been used to calibrate breathalyzers. This blood to breath ratio varies within and between individuals during the absorptive, distribution, and elimination

stages of alcohol metabolism (Alobaidi, Hill, & Payne, 1976; Dubowski, 1974; Emerson, Hollyhead, Isaacs, Fuller, & Hunt, 1980). This research indicates that the actual ratio varied between 2,200:1 and 2,300: 1; therefore, breathalyzers represent a conservative estimate of blood alcohol concentration. When taken simultaneously, blood and breath samples are highly correlated (r = 0.95-0.98) (Jones, 2000; Harding & Laessig, 1990). Breath samples are considered to be as specific as blood samples: both are 100% specificity markers (Marques & Voas, 2005).

In order to be sure that the breathalyzer measured metabolized alcohol in the lungs, it was important to confirm that no alcohol remained in the mouth from a recent drink (Gullberg, 1992; Wigmore & Leslie, 2001). Participants were asked to estimate the time of their last drink. For validity of samples, the breathalyzer was not used until 10 minutes had passed from time of last drink, as this time period has been determined acceptable for clearing alcohol remaining in the mouth (Wigmore & Leslie, 2001).

ASSESSMENT TO INFORM TAILORED FEEDBACK

The entrance survey was used to guide tailored feedback. In order to reduce participant burden and to avoid reactivity, only items required for tailored feedback were included. Because questions in

each assessment were targeted to a specific behavior, the number of assessment items is dependent on the intervention condition. The experimental condition's assessment was composed of 24 items and for participants in the attention-placebo control condition the assessment was composed of 17 items; the entrance assessments are located in the Appendix.

Demographic Items

Demographic measures that may covary with alcohol consumption were included in the entrance assessment in order to reduce burden of questions on the exit survey. Participants were asked to give their age, ethnicity (Hispanic/Latino, or not Hispanic/ Latino), race (white, black/African American, Asian, Native American/Hawaiian, Pacific Islander, or Other), and sexual orientation with which they most closely identify (gay, bisexual, straight). These items were included for use as covariates only in the event that there was a randomization failure.

Alcohol Assessment

Weight was included in the experimental condition entrance assessment in order to allow for an estimation of BAC (eBAC) at exit. This eBAC enabled personalized feedback based on estimated level of intoxication and risks associated with such intoxication levels. Several

items were dedicated to assessing planned drinking behaviors. Participants were asked to identify planned level of intoxication: not buzzed, a slight buzz, a little drunk, or really drunk. This single item has been used in previous research and is highly correlated with BrAC (Clapp, et al., 2009). This item was used to prompt participants for a number of drinks that it would take to reach that level of intoxication. The number of drinks, weight, and planned time inside the bar allowed the PI to estimate the exit BAC. This information was used to categorize participants into risk categories which correspond to specific levels of the intervention. The entrance assessment also identified the specific types of alcohol the participant planned to drink, plans to continue drinking after leaving the bar, and plans to drive. All of these items were used to personalize the feedback intervention.

Health Belief Items: These items were created specifically for this study and are based on specific guidelines for measurement of health behavior constructs (Champion, 1984). Champion suggests that health belief scales should measure benefits, barriers, susceptibility, and seriousness sub-scales on a 5-point Likert scale ranging from (1) not at all to (5) very much so. Champion developed the following conceptual definitions in regard to Health Belief Item scale development:

> "Perceived benefit focuses on belief regarding the effectiveness of a specific new behavior or alternate behavior in preventing or detecting disease, maintaining health, and curing or lessening undesirable consequences of a diseased state. Perceived barriers are the negative components of an anticipated behavior, which would be undertaken to prevent or detect disease, maintain health, and cure or lessen undesirable consequences of a disease state. The negative aspects might involve problems such as monetary consequences, pain, changing habits, inconvenience, embarrassment, side effects, or need for new patterns of behavior. Perceived susceptibility refers to the subjective risks of contacting a specific condition within a specified time period. Perceived seriousness is concerned with the degree of personal threat related to a specific condition. Threat is defined as perceived harmful consequences to altering personal physical health, role, and social status and ability to complete desired tasks." (1984, pages 77-78).

Benefits and *barriers* to safer alcohol consumption were assessed to inform the intervention and again of all participants at exit from the bar. Four items measured benefits and barriers of reducing alcohol consumption (Table 4 in Appendix C).

Threat was assessed by 4 items measuring perceived susceptibility and 4 items measuring perceived severity of threat. Participants were asked to report the likelihood and severity of injury, hangover, DUI, and weight gain on a 5-point Likert scale ranging from (1) not at all to (5) very much so (Table 4 in Appendix C).

All sub-scales suffer from poor reliability with alpha scores below 0.5 (Table 5 in Appendix C). The poor reliability was likely due to an inability to capture the latent variable with only 2 - 4 items per sub-scale

(DeVellis, 2003). For this reason, each item is presented individually in Table 6 in Appendix C. Participants responded most positively to the benefits of behavior change items: strongly endorsing that monitoring drinking would lead to reductions in injury and that the individual has much to gain from drinking at safe levels. Barriers to behavior change and susceptibility to threat were negatively endorsed: participants did not seem to identify these items as drawbacks of drinking. Of the severity of threat items, one item was strongly endorsed by participants: "problems I would experience from a DUI would last a long time." The mean rating for this item was 4.6 on a 5-point Likert scale with 5 anchored as "very much."

Carbon Footprint Assessment

Information was collected to assess participant's carbon footprint. These items were modified from Shimo-Barry & Maron's 8-item formula (Shimo-Barry & Maron, 2008). The modified scale consists of five items. The original survey asked independently about gas and electric bills, because those who live in San Diego receive a single bill for gas and electricity these two items were reduced into a single item. An additional item on the use of heating oil was removed because those living in San Diego do not use oil for heating. Finally, two recycling items

were merged into one, because the relative weight of recycling is a low contributor to carbon footprint (e.g. 350 points out of an average of 16,000). The items can be found in the appendix. Carbon footprint calculations were used to inform feedback for the attention-control group.

Health Belief Items: A health belief scale was constructed for carbon footprint behaviors, as specified by Champion and explained above (Champion, 1984). *Benefits* and *barriers* to carbon footprint reduction were assessed to inform the intervention and of all participants at exit from the bar. Four items measured benefits and barriers of reducing carbon footprint. Participants were asked to state the degree to which the statement applied to them on a 5-point Likert scale ranging from (1) not at all to (5) very much so. *Threat* was assessed by two items measuring perceived susceptibility and two items measuring perceived severity of threat. Participants were asked to report the susceptibility to and severity of harmful chemicals and pollution. A 5-point Likert scale response items was anchored at (1) not at all and (5) very much so.

Two items were included for reliability analysis on each sub-scale. These sub-scales suffer from poor reliability with alpha scores below 0.3 (Table 7 in Appendix C). The poor reliability was likely due to an inability

to capture the latent variable with only two items per subscale (DeVellis, 2003). These items are presented individually in Table 8 in Appendix C. Benefits to behavior change items were strongly endorsed. In addition, one item in the susceptibility to threat sub-scale was strongly endorsed: "I worry about exposing myself to harmful chemicals." And, one severity to threat item was strongly endorsed: "Problems I would experience from a pollutant would last a long time."

EXIT SURVEY

The exit survey was composed of 26 items; these are listed in the Appendix. Items were included to assess threat perception, barriers and benefits to behavior change, alcohol consumption at the bar, and use of paper towels inside the bar. Detailed descriptions of these items are below:

Alcohol Consumption

Several self-reported measures of alcohol consumption were also recorded. Participants were asked to rate their level of intoxication: not buzzed, slight buzz, a little drunk, or very drunk. This item was strongly correlated with BrAC in studies of college students in previous unpublished research (Clapp and Trim, in progress). Participants were also asked to report the number and types of drinks they consumed and whether this drinking was as they intended. Participants were

asked about plans to continue drinking. These self-report measures have been used in previous studies of bar patron behavior (Clapp, et al., 2009). Midanik notes that validity of self-reported alcohol use is dependent on the context of the interview and highlights the importance of self-report measures being coupled with biochemical markers (Midanik, 1988), as was done in this study. The validity of self-reported measures of consumption in bar field studies is suggested by the moderate correlation between BrAC and self-reported consumption (Clapp J. D., et al., 2009).

Towel Use

The exit survey included an item to measure the use of paper towels in the restroom at the bar. Participants were then asked whether they intended to use that number of paper towels.

Health Belief Measures

Twelve items assessed perceived benefits and barriers for safe drinking and carbon footprint, as described in the alcohol and carbon assessment sections above. Eight items assessed perceived threat for alcohol related problems, as described in the alcohol assessment section above. Eight items assessed perceived threat for fossil fuel use. These items were described in their respective assessment questionnaires.

Since the full sample completed all health belief items at exit from the bar, reliability is presented for the health belief items at exit in Table 9 in Appendix C. Again, the reliability scores prove too low to use the sub-scales. Each item is explored individually in Table 10 in Appendix C. Participants strongly endorsed two items: "problems I would experience from a DUI would last a long time," and "I have a lot to gain from reducing my carbon footprint," with mean scores of 4.51 (SD=1.16) and 4.13 (SD=1.22), respectively. Many of the alcohol health belief items were weakly endorsed by participants, including all of the barriers to change and susceptibility of threat sub-scales, and one item in the severity of threat sub-scale: "I'm afraid to even think about being hungover tomorrow." Only one carbon footprint health belief item was weakly endorsed: "my friends would make fun of me if I only used one paper towel to dry my hands," with a mean score of 1.33 (SD=0.97).

As a test of criterion-related or predictive validity, bivariate comparisons of the scores on the health belief items were explored by condition and by baseline alcohol risk category (Table 10 and Table 11 in Appendix C) (DeVellis, 2003). Thus, between group analyses were run to establish differences between the experimental and attention-placebo control condition. And within the experimental alcohol condition, a between-groups analysis of the baseline alcohol risk

categories was run. In order to establish criterion-related or predictive validity, for example, participants in the brief alcohol intervention would more strongly endorse items in the alcohol health belief items, and participants in the brief carbon footprint attention-placebo control condition would more strongly endorse items in the carbon footprint health belief items.

By treatment condition, four items reached statistical significance (α=0.05): one in the alcohol health belief items, and three in the carbon footprint health belief items. Contrary to criterion-related validity, the alcohol-use severity of threat sub-scale item, "when I think about being injured, my heart beats faster" was endorsed more strongly by those in the control group at exit than those in the experimental group. The criterion-related validity for these three carbon footprint health belief items is established because all items that were statistically significant were more strongly endorsed by the attention-placebo control group.

Within the experimental condition, as theoretically predicted, there were no differences on entrance measures of the alcohol health belief items. A single item was significantly different at exit from the bar. The item measuring susceptibility to DUI risk was endorsed more strongly by those in the high-risk group than those in the low-risk group. The

criterion-related validity of this single alcohol health belief items was established only when explored within the experimental condition.

TELEPHONE FOLLOW-UP SURVEY

Participants were recruited into the follow-up survey immediately after giving consent to participate in the field study prior to the entrance assessment and feedback. Volunteer undergraduate research assistants asked participants to provide first name, phone number, and the best time to call for the follow-up survey.

Phone calls were made by the PI through a voice over internet protocol (VoIP) with the use of an online survey software, Qualtrics. Initial phone contact was attempted on the time and day specified by the research participant. Up to four attempts were made to contact the participant. An online survey software, Qualtrics, was used to guide the phone interview.

The survey was administered on a secure internet site. Data were stored on a secure server, hosted by the Qualtrics offices in Utah. No personally identifying information was entered into the online survey; rather, the participant's unique identifier was entered into the survey. In this way, compromised security at the Utah offices would not compromise the identity of the research participants. The unique identifier (numeric code for randomization) was used to link data

collected in the field to data collected at follow-up. At the end of the survey, participants were asked for a mailing address for the incentive. No records of this address were kept. All identifying information was destroyed after data were collected.

Nineteen participants opted not to participate in the follow-up phone survey, the remaining133 signed up for the follow-up survey (see Figure 5 in Appendix B). An additional 20 participants couldn't be reached in the week following the field portion of the survey. I achieved an 85% response rate for the follow-up survey, completing with 113 participants of the 133 that enrolled.

Of the 104 participants with time stamp data the time range for completing the survey was 6 – 34 minutes. The interview took a mean of 13.4 minutes to complete (SD=5.6 minutes).I was unable to calculate completion time for 9 participants. These 9 participants agreed to complete the survey when first contacted, and then rescheduled the survey for later in the week, resulting in calculated completion times that were days long.

The follow-up phone survey assessed history of alcohol use, alcohol-related problems after the drinking event, recommended carbon footprint reduction behaviors, the sex-related alcohol expectancy scale, and sexual history.

History of Alcohol Use

Quantity-frequency (QF) questionnaires are a common measurement of alcohol consumption. Beverage-specific (beer, wine, and liquor) QF estimates tend to be higher than global QF estimates, however, these estimates are highly correlated (r=.75) (Russell, Welte, & Barnes, 1991). A QF questionnaire allows for a reliable estimate of total consumption and the number of drinking days in the past month (Sobell & Sobell, 1992). Two items were used to assess global quantity and frequency of alcohol use (Cahalan, Cisin, & Crossley, 1969). Participants were asked to report the typical number of drinks they consume when they drink and how often they drank in the past month. These items were included for use as covariates in the event that randomization failed.

Alcohol Related Problems

The follow-up questionnaire included items to assess problems associated with alcohol use, including, continued drinking, hangover, driving under the influence, and risky sexual behavior. These data were collected within one-week following the tailored feedback intervention in order to reduce recall bias. These items were not tested on this sample for reliability and validity but are based on common measures

found in the literature and have been previously used with bar patrons (Clapp, et al., 2009).

Carbon Footprint Reduction Behaviors

The follow-up questionnaire included items to assess behaviors recommended to reduce carbon footprint for those in the attention-placebo control treatment condition. The assessment asked participants to recall several behaviors since the field interview, including, eating locally grown or organic food, recycling, purchasing vintage clothes, and using a refillable water bottle. If participants reported conducting one of these behaviors in the time since the field interview, they were asked to compare the frequency of this behavior in the time since the interview to how often they usually perform the behavior; response options included: less than usual, the same as usual, and more than usual.

Alcohol Expectancies Related to Sexual Behavior

Sex-related alcohol expectancies describe the motivation to drink in order to enhance sexual pleasure, decrease sexual inhibitions, or to increase sexual risk taking. This 13-item scale was included to measure beliefs about alcohol. The Sex-Related Alcohol Expectancy Scale demonstrated strong reliability (α=0.91) in a previous study (Leigh B. C., 1990) and in the current study (α=0.91). Principal components

analysis with varimax rotation identified three factors: enhanced sex, decreased nervousness, and increased riskiness (Leigh B. C., 1990). The factor labeled "enhanced sex" consists of five items, including "when I drink enough alcohol to feel the effects, I enjoy sex more." The enhanced sex items were highly reliable in a previous study (α=0.87) (Leigh B. C., 1990) and show strong reliability in this study (α=0.83). The "decreased nervousness" factor included six items, including "when I drink enough alcohol to feel the effects, I become more sexually forward;" reliability of this sub-scale was high in the previous study (α=0.88) (Leigh B. C., 1990) and in this study (α=0.85). Finally, the factor labeled "increased riskiness" consisted of two items with adequate reliability in the previous study (α=0.77) (Leigh B. C., 1990) and strong reliability in this study (α=0.81). Among MSM in the previous study, sex-related alcohol expectancies showed criterion-related or predictive validity in accounting for the percentage of sex acts that occur under the influence (R^2=0.33, $p<0.0001$) (Leigh B. C., 1990).

The Sex-Related Alcohol Expectancies scale was included as a potential covariate in the event that randomization failed. Sex-related alcohol expectancies are considered static traits; it was not expected that either intervention would cause changes in these traits.

Sexual History

Past month sexual risk measurement is based on the sexual behavior questions in the Seropositive Urban Men's Health Intervention Trial (SUMIT) (Parsons, et al., 2005). Although SUMIT was used to assess sexual risk behavior among HIV-positive MSM, the questions are appropriate to assess sexual risk for those who may not be infected with HIV. Participants were asked to report on behaviors directly related to their risk of acquiring HIV; specifically, their frequency engaging in two sexual behaviors: receptive and insertive anal intercourse in the previous month. Participants were asked to report the frequency of participating in that behavior with and without the use of condoms. In cases where condoms were not used, participants were asked to disclose the frequency of sex with and without ejaculation. These questions were asked separately for main sexual partners and casual sexual partners. In addition, participants were asked to report on their HIV serostatus and any history of sexually transmitted diseases in the past year. Validity of this scale was confirmed for HIV-positive MSM; however, validity is unknown for other populations. Self-reported sexual behavior can be considered reliable for periods up to three months (Weinhardt, Forsyth, Carey, Jaworski, & Durant, 1998).

RANDOMIZATION CHECK

A randomization check was conducted to ensure that potential covariates were evenly distributed between the experimental and attention-placebo control groups and is presented in Table12 in Appendix C. Bivariate comparisons were conducted using t-tests and ANOVA for continuous data and chi-squared analysis for ordinal and nominal data. Specifically, from the field survey, I examined the differences in age, race, ethnicity, sexual orientation, entrance BrAC, and student status by intervention condition. Note that straight and bisexual sexual identities were combined because only a single participant identified as straight. Additionally, I explored HIV status, past year STD status, and past two-week heavy episodic drinking (HED) from the follow-up survey. There were no significant differences between groups on ethnicity, race, sexual orientation, student status, age, HIV status, history of an STD in the past year, or heavy episodic drinking in the past 2 weeks (Table 12 in Appendix C).

Breath Alcohol Concentration (BrAC) at entrance to the bar was statistically significant between groups, with those in the experimental group reporting a mean BrAC of 0.002% alcohol and those in the attention-placebo control group reporting a mean BrAC of 0.000%. Although this difference is statistically significant, it is not clinically

significant; further, the level of intoxication of all participants was limited to being at or below 0.02%. Based on these analyses randomization was successful.

Attrition Check

I assessed for potential bias due to attrition. The same bivariate procedure was used for the randomization check. Potential covariates were examined, including treatment condition, ethnicity, race, sexual orientation, college student status, age, and BrAC at entrance to the bar; these descriptive statistics are presented in Table 13 in Appendix C. There were no statistically significant differences between groups for any of these variables. Based on these analyses, attrition did not occur differentially for any particular sub-group.

Analysis

Frequency and descriptive information was calculated for all items on each assessment (alcohol and carbon footprint) and on each survey (exit and follow-up). Based on successful randomization and poor psychometrics of the theoretical mediators, no covariates were included in the analyses.

Hypothesis 1

The distribution of exit BrAC was examined, as it was the dependent variable of interest for hypothesis 1 and is involved in the

calculation of the dependent variable for hypothesis 2 (Table 14 in Appendix C). The mean exit BrAC was 0.056 (SD=0.051). Skewness of exit BrAC was 1.108 (SE=0.203) and kurtosis was 1.037 (SE=0.403). Liberally interpreted, skewness and kurtosis should be less than 1.0 (Morgan, Griego, & Gloeckner, 2001; George & Mallery, 2003). The exit BrAC evaluated for outliers could potentially inflate the skewness and kurtosis statistics. Outliers were considered any values above or below 2.5 standard deviations of the mean (Hair, Anderson, Tatham, & Black, 1998). Three outliers were identified and removed from the exit BrAC variable: two from the experimental group and one from the control group. The revised skewness statistic for exit BrAC is 0.794 (SE=0.205) and the revised kurtosis statistic is -0.245 (SE=0.407). The mean exit BrAC reduced to 0.52 (SD=0.46) (Table 16 in Appendix C). Exit BrAC with outliers removed was used for all analyses.

A t-test was first run to determine whether BrAC differed significantly by treatment condition. Regardless of the result of that bivariate analysis, a multivariate analysis was run in order to account for the potential nesting of cases by night of data collection. Marginal likelihood based models, in the general linear model class, can account for the potential nesting of cases (Aerts, Geys, Molenberghs, &

Ryan, 2002). A variant of the linear models (LM), linear mixed models (LMM) include variables which are treated randomly rather than as a constant (McCulloch & Searle, 2001).

The assumptions which underlie the use of fixed and random effects are different. Fixed effects represent a pre-decided treatment level (McCulloch & Searle, 2001); in this model, treatment condition is the only fixed effect included in the model. Random effects can be used to specify or make inferences about the population from which the sample was drawn (McCulloch & Searle, 2001); in this model, each night of data collection represented a unique population from which part of the total sample was drawn.

In statistical notation, the different meanings of random and fixed effect model parameters are represented through the use of Roman letters for random effects and Greek letters for fixed effects (McCulloch & Searle, 2001). A full factorial of the LMM to test hypothesis one is represented by a single fixed effect (condition), and a single random effect (week of data collection). Such a model would be

$$\mu_{ij} = \mu + \alpha_i + \beta_j$$

where α_i represents effects due to week *i,* and β_j represents effects due to treatment condition *j*. This main-effect model was conducted using SPSS version 16.0 and is presented in the results section. Health belief

items were not included as covariates in this model due to the unreliable nature of these variables.

HYPOTHESIS 2

For hypothesis 2, I explored whether baseline alcohol risk category was significantly related to the difference between the estimated exit BAC and the actual measured BrAC. Due to the design of this study, this was a within-group analysis of the experimental alcohol intervention.

The difference between the estimated exit BAC and the actual exit BrAC for the three risk categories in the experimental brief alcohol intervention condition was created via a two-fold calculation. First, estimated BAC (eBAC) at exit from the bar was calculated based on self-reported weight, number of drinks the participant planned to consume, and the amount of time the participant planned to stay in the bar. These values were calculated using Hustad & Carey's (2005) adaptation of Matthews and Miller's (1979) formula:

$$eBAC = [(c/ 2) \times (GC / w)] - [\beta 60 \times t]$$

As calculated blood alcohol concentration is expressed in grams per deciliter. In the formula, c represents the number of standard drinks planned for consumption; GC is a gender constant and was set to 7.5 because all participants were male; w is the participant's weight; β60 is

the metabolic rate for processing alcohol per hour (.017 g/dl); and *t* is planning amount of time drinking, in hours (Hustad & Carey, 2005; Matthews & Miller, 1979). With constants entered, this formula reduces to:

$$eBAC = ((c/2)(7.5/w)) - (0.17t)$$

Next, the actual exit BrAC was subtracted from this estimated exit value based on responses given prior to the intervention. Participants who reduced drinking from their planned drinking given at entrance have higher values on this change score than those who increased drinking from plan given at entrance. Seventy cases of this calculated variable are included for analysis. Overall, the mean value is -0.0061 (SD=0.052). Skewness and kurtosis are within acceptable range, -0.336 (SE=0.287) and 0.582 (SE=0.566), respectively, indicating that data are normally distributed.

An ANOVA was first run to determine whether the difference between BrAC and estimated BAC varied significantly by baseline risk condition. Regardless of the result of that bivariate analysis, a multivariate analysis was run in order to account for the potential nesting of cases by night of data collection.

As in hypothesis one, this analysis was conducted with a linear mixed model (LMM). The difference between actual and estimated

BAC is the dependent variable in this model. A full factorial of the LMM to test hypothesis one is represented by a single fixed effect (baseline risk category), and a single random effect (week of data collection). Such a model would be

$$\mu_{ij} = \mu + \alpha_i + \beta_j$$

where α_i represents effects due to week *i,* and β_j represents effects due to baseline risk category *j*. This main-effects model was conducted using SPSS version 16.0 and is presented in the results section. Health belief items were not included as covariates in this model due to the poor reliability values for these measures.

HYPOTHESES 3 AND 4

Multiple chi-square analyses were first run to determine whether continued drinking, driving after leaving the bar, having a hangover, getting sick, falling or being injured, and engaging in unplanned sexual activity varied significantly by treatment condition. Regardless of the result of those bivariate analyses, a multivariate analysis was run in order to account for the potential nesting of cases by night of data collection.

An extension of the general linear models, generalized estimating equations (GEE) use a quasi-likelihood approach and can account for the potential clustering of cases by week of data collection (Aerts,

Geys, Molenberghs, & Ryan, 2002). The GEE method is particularly useful for correlated binary response data (Hanley, Negassa, deB. Edwardes, & Forrester, 2003). Given the binary responses of hypotheses 3 and 4, and the potential clustering by night of data collection, a binary logistic regression using GEE method was used to analyze the data.

The GEE method or Delta method estimator allows application to multiple correlation structures; thereby adjusting the variance estimates for the inherent correlation, however small, which may arise from collecting data across 13 nights (Morel, Bokossa, & Neerchal, 2003; Aerts, Geys, Molenberghs, & Ryan, 2002; Hanley, Negassa, deB. Edwardes, & Forrester, 2003). This estimating approach, however, can lead to inflations in Type I error rates when there are few clusters in the data (Morel, Bokossa, & Neerchal, 2003). Morel's adjustment of the GEE estimator reduces the rate of Type I error when there are few clusters present; this adjustment vanishes as the number of clusters increases (Morel, Bokossa, & Neerchal, 2003). Morel's adjustment is available in SAS using the PROC SURVEYLOSITIC command.

Four binary logistic models using Morel's adjustment of the GEE method were conducted in SAS version 9.2 to assess the dependent variables related to: continued drinking, driving after leaving the bar,

having a hangover, and engaging in unplanned sexual activity. Treatment condition was included as the predictor of interest. Significant health belief items were not included as covariates due to the unreliable nature of these items.

EXPLORATORY HYPOTHESIS 1

For exploratory hypothesis 1, I conducted extensive bivariate analyses of all data in regard to sexual activity on the night of data collection. Due to the low frequency of such behaviors, multivariate analyses were not conducted.

EXPLORATORY HYPOTHESIS 2

Finally, in response to exploratory hypothesis 2, I conducted a LMM of the number of paper towels used while in the bar. A full factorial of the LMM to test hypothesis one is represented by a single fixed effect (treatment condition), and a single random effect (week of data collection). Such a model would be

$$\mu_{ij} = \mu + \alpha_i + \beta_j$$

where α_i represents effects due to week *i,* and β_j represents effects due to baseline risk category *j*. This main-effects model was conducted using SPSS version 16.0 and is presented in the results section. Health belief items were not included as predictors due to the unreliable nature of these measures.

POWER & SAMPLE SIZE CALCULATIONS

Power was calculated based on the primary specific aim: to detect two-sided significance of a difference in mean breath alcohol concentration between conditions. The power calculation was based on a similar portal study wherein the mean exit BrAC was 0.040% with a standard deviation of 0.041%. A sample of 67 people per group allowed detection of a mean difference of 0.020% blood alcohol (which translates to a 1 drink reduction for a 200-pound man), powered at α=0.05 and β=0.80. For this study, I planned to recruit 75 participants per group in order to achieve sufficient power to detect a difference of 0.020% blood alcohol. Power for the follow-up survey was calculated with an expected attrition rate of 10 - 15% and a final sample of 63 - 67 participants per group. The actual attrition rate was much higher (26%), resulting in a final sample of 55 participants in the experimental condition and 58 participants in the attention-placebo control condition.

CHAPTER 4: RESULTS

SAMPLE CHARACTERISTICS

Sample characteristics are presented in Table 15 in Appendix C. Of those who participated in the study, one-third were of Latino/Hispanic origin. Forty percent of the sample was white. The majority of the sample identified as gay (n=131, 87.3%). Many college students participated in the study (n=61, 42.4%). The mean age of participants was 27.02 (SD=6.10).

ALCOHOL ENTRANCE ASSESSMENT

The alcohol entrance assessment was administered only to those allocated to the brief drinking intervention. The items on this assessment were used to tailor the brief feedback to the individual and are presented in Table 16 in Appendix C. Participant's received feedback based on estimated exit BAC, calculated from number of planned drinks, planned time drinking, and weight. Based on this estimated exit BAC, participants were categorized into three categories: low risk (n= 29; 37.7%), at-risk (n=24, 31.2%), and high-risk (n=24, 31.2%).

The majority of participants (n=54, 70%) reported having work or personal plans the next day; this item was used to negotiate lowered drinking rates in order to avoid hangover so that these plans could be realized.

Participants were also asked to report the level of intoxication they hoped to reach that night. Half of the sample (n=39, 51.3%) reported planning to drink enough to get a slight buzz. Over a quarter of the sample (n=21, 27.6%), however, reported plans to drink enough to get a little drunk. Discussion of planned intoxication was used to cue more specific questions about planned drinking rates. Participants reported planning to drink a mean of 3.91 (SD=2.39) drinks over a period of a mean of 2.35 (SD=0.81) hours. And very few people (n=5, 6.5%) planned to drink after leaving the bar. Nearly one-third planned to drive home after leaving the bar (n=23, 30.3%). While drinking at the bar, the overwhelming majority planned to have mixed drinks (n=65, 97.0%).

CARBON FOOTPRINT ENTRANCE ASSESSMENT

The carbon footprint entrance assessment was administered only to those allocated to the carbon footprint intervention. Five items on this assessment were used to calculate carbon footprint and to tailor the brief feedback to the individual and are presented in Table 17 in Appendix C. The calculated carbon footprint was used to assign participants to three feedback categories: low carbon footprint (n=38, 50.7%), average carbon footprint (n=13, 17.3%), and high carbon footprint (n=24, 32.0%).

EXIT SURVEY

The descriptive results of the exit survey are presented in Table 18 in Appendix C. The majority of participants reported feeling not buzzed or slightly buzzed when they left the bar (37.6% and 32.9%, respectively). Most participants (56.2%) drank as intended, and most (67.6%) used paper towels as intended. Few people reported drinking shots, beer, or wine: all of these have a mean use of below 1. Mixed drinks, however, were consumed by most participants. The mean reported mixed drink consumption while in the bar was 3.24 drinks (SD=2.47).

FOLLOW-UP SURVEY

The descriptive results of the follow-up survey are presented in Table 19 in Appendix C. Nineteen participants (12.5%) opted-out of the follow-up survey, and another 20 participants (13.2%) could not be reached to complete the follow-up survey. The final response rate for the follow-up survey was 74% (n=113). The majority (n=95, 84%) of follow-up survey participants reported drinking once or more per week. Over half (n=66, 58.4%) of the sample reported engaging in heavy episodic drinking (consuming 5 or more drinks) in the past two weeks.

Alcohol-related problems were also measured with the follow-up survey. A third of the sample reported driving home from the bar (n=45, 33.8%). Further, nearly 16% of participants were hungover the next day

(n=18). Very few participants reported alcohol-related injury and illness. Reports of being sick from drinking were less than 2% (n=2), reports of injury from drinking were less than 1% (n=1). Approximately 6% (n=7) reported unplanned sexual activity after leaving the bar.

Outcomes for the carbon footprint attention-placebo control condition were also measured at follow-up. Over one-third (n=41, 36.3%) of the sample reported eating locally grown food, and nearly two-thirds (n=70, 61.9%) reported eating organic food in the time since the field interview. An overwhelming majority (n=97, 85.9%) reported recycling in the time since the field interview. Only 6.2% reported purchasing vintage clothes in the time since the interview (n=7). And over half (n=68, 60.2%) reported using a refillable water bottle in the time since the interview.

HYPOTHESIS 1: *BrACs will be lower among those in the brief alcohol intervention group than those in the attention placebo control group.*

Between groups bivariate comparisons of the experimental and attention placebo control groups were conducted to assess several items from the exit survey, including BrAC with outliers removed, difference in BrAC from entrance to exit with outliers removed, and the self-reported number of drinks consumed. These results are presented in Table 20 in Appendix C. Those in the experimental condition had a

mean exit BrAC of 0.055 (SD=0.046) and those in the control condition had a mean exit BrAC of 0.049 (SD=0.046). Such mean exit BrACs would result from a 150 pound man consuming 2 drinks in one hour or a 220 pound man consuming 3 drinks in one hour. There were no statistically significant differences between conditions on the BrAC variables or in the self-reported number of drinks consumed.

Although the bivariate relationship between BrAC at exit from the bar and condition was non-significant, this test failed to account for the potential effect of nesting by night of data collection. A linear mixed model (LMM) was used to assess whether BrAC at exit from the bar was statistically different between groups. Typically, use of a model adjusting for additional variables tends to make results less significant than the bivariate analysis.

One-hundred and forty individual records were included in the analysis. Nine were missing BrAC exit values due to problems with breathalyzers or errors in sample reporting. Three were excluded as outliers.

The parameter estimate of treatment condition, the fixed effect, is presented in Table 21 in Appendix C; note that random effects govern the variance-covariance structure and parameters of the random effects are not estimated. Those in the experimental condition

had an adjusted mean exit BrAC of 0.055 (95% CI: 0.043 - 0.066) and those in the control condition had an adjusted mean exit BrAC of 0.050 (95% CI: 0.037 - 0.062). No significant differences in BrAC at exit from the bar were detected between conditions, even after adjusting for nesting by week of data collection ($F=0.40$, $p \geq 0.5$). Overall, there was no difference in the exit BrACs of participants by treatment condition.

HYPOTHESIS 2: *Among those in the experimental condition, difference between estimated exit BrAC and actual exit BrAC will be largest for those in the high-risk and at-risk groups.*

The dependent variable for this analysis is the difference between the estimated exit BAC and the actual exit BrAC. Participants who did not drink at levels as reported during the entrance assessment had higher values for this dependent variable; while those who increased drinking from reports during the entrance assessment have lower or negative values.

ANOVA was used to compare the difference on the calculated difference score across the three risk groups in the experimental brief alcohol intervention condition; a post-hoc ANOVA using Bonferroni adjusted values was conducted to examine pair-wise differences in the dependent variable. These comparisons are presented in Table 22 in Appendix C. Participants were nearly evenly distributed between risk

categories: 26 participants were classified as no/low risk, 22 participants were classified as at risk, and 24 participants were classified as being at high risk for alcohol related problems. Those in the low risk group had a mean difference score of -0.030 (SD=0.048), those in the at-risk group had a mean difference score of -0.018 (SD=0.045), and those in the high risk group had a mean difference score of 0.030 (SD=0.041). Participants in the high risk group had a mean exit BrAC 0.03 lower than their planned behavior, while those in the no/low and at-risk groups had mean alcohol percentages that were 0.03 and 0.018 higher than estimated at entrance, respectively.

These risk groups differed significantly on the difference between estimated and actual BrAC at exit from the bar ($F=12.2$, $p\leq0.001$). Specifically, there was a mean difference of 0.048 ($p\leq0.01$) between the high risk group and the at-risk group and a mean difference of 0.06 ($p\leq0.001$) between the high risk group and the low risk group. There was no significant difference between scores for those in the at-risk category as compared to those in the low-risk category.

Because these bivariate comparisons fail to account for the potential effect of nesting by night of data collection, a linear mixed model (LMM) was used to assess whether the calculated difference between estimated and actual BrAC at exit from the bar was

statistically different between the risk groups while adjusting for the effect of nesting.

The parameter estimates by risk category, the fixed effect, are presented in Table 23 in Appendix C; note that random effects govern the variance-covariance structure and parameters of the random effects are not estimated. Those in the low-risk group had an adjusted mean difference score of -0.030 (95% CI: -0.048 - -0.013), those in the at-risk group had an adjusted mean difference score of -0.018 (95% CI: -0.037 - 0.001) and those in the high risk group had an adjusted mean difference score of 0.034 (95% CI: 0.016 - 0.053). Risk category remained a significant predictor of the difference score ($F=13.9$, $p \leq 0.001$). Those in the high risk category had significantly higher difference scores than those in the no/low risk category while adjusting for week of data collection. There was no significant difference between scores for those in the at-risk category as compared to those in the low-risk category.

A within-experimental condition post-hoc exploratory analysis of six alcohol-related problems between alcohol risk category groups was conducted. Specifically, continued drinking, driving after leaving the bar, sickness from drinking, hangover, injury due to drinking, and unplanned sexual activity were assessed. Continued drinking after

leaving the bar approached significance, with 21.1% of those in the high-risk group reporting continued drinking as compared to 0% of those in the low-risk group (χ^2=5.4, p≤0.10). Those in the high-risk group reported driving after leaving the bar at the lowest rate (4.5%) as compared to those in the at-risk group (28.6%) and those in the low-risk group (42.3%; χ^2=8.9, p≤0.05).

Overall, participants in the high risk category had a positive mean difference between estimated/planned exit BAC and actual BrAC, while those in the low-risk and at-risk categories had a negative mean difference between estimated/planned exit BAC and actual BrAC. These results indicate that participants in the high-risk category reduced drinking from their original plan while those in the low-risk and at-risk categories drank more than planned. Finally, an exploratory post-hoc analysis indicates that rates of driving were lowest among those in the high-risk category.

HYPOTHESIS 3: *Those in the experimental group are less likely to continue drinking after leaving the bar than those in the control group.*

Several alcohol-related problems were assessed in the follow-up survey, including continued drinking after the exit interview. A chi-square analysis was conducted to compare continued drinking by experimental condition. There was no statistically significant difference

between continued drinking in the experimental and control groups (Table 24 in Appendix C).

Although the bivariate relationship between continued drinking and condition was non-significant, this test failed to account for the potential effect of clustering by night of data collection. A binary logistic regression using Morel's adjustment for the generalized estimating equation (GEE) method assessed whether continued drinking varied by condition. Treatment condition was included as the single predictor of continued drinking.

The parameter estimate of condition is presented in Table 25 in Appendix C. When adjusting for the clusters of data collection by night, the relationship between treatment condition and continued drinking remains non-significant (Wald χ^2= 1.55, p≤0.25).

HYPOTHESIS 4: *Participants in the experimental group will be less likely to experience alcohol-related problems in the day following the drinking occasion than those in the control group.*

Several alcohol-related problems were assessed in the follow-up survey. Bivariate comparisons between the experimental and attention placebo control groups were conducted to assess differences in the frequency of the following alcohol-related problems: driving after leaving the bar, being hungover the next day, getting sick due to

drinking, falling or being injured as a result of drinking, and unplanned sexual activity. These results are presented in Table 24 in Appendix C. No statistically significant difference between treatment conditions were detected; although, reported driving after leaving the bar, hangover, and being sick from drinking approached significance ($p \leq 0.15$).

These bivariate calculations fail to take into consideration the potential effect of clustering by night of data collection. A binary logistic regression using Morel's adjustment for the generalized estimating equation (GEE) method assessed whether these alcohol-related problems differ by condition after adjusting for clustering by week of data collection. Treatment condition was included as the primary predictor variable of each alcohol-related problem.

Given the extremely low frequency of reported sickness (n=2) and falls/injury due to drinking (n=1), models predicting these alcohol-related problems were not included in the analyses.

Parameter estimates for models of driving after leaving the bar, hangover the next day, and unplanned sexual activity are presented in Table 26 in Appendix C. Although the bivariate relationship approached significance, after adjusting for the effects of clustering, driving after leaving the bar is not significantly different between

treatment conditions (Wald χ^2=2.19, p≤0.15). Further, post-hoc exploratory analysis of exit BrACs of drivers did not reveal significant differences by group: mean exit BrAC of drivers in the experimental group was 0.023 (SD=0.025) and the mean exit BrAC of drivers in the control group was 0.027(SD=0.032; F=0.92, p≤0.35).

After adjusting for clustering by night of data collection, rates of hangover were not statistically significant between treatment conditions (Wald χ^2=2.62, p≤0.15).

Unplanned sexual activity remained non-significant, even when the model adjusted for nesting by night of data collection (Wald χ^2=1.41, p≤0.25). Additional analyses of sexual behavior were conducted for exploratory hypothesis 1 and are presented below.

Overall, analyses between treatment groups failed to reveal statistically significant differences between groups on five acute alcohol-related problems.

EXPLORATORY HYPOTHESIS 1: *During the night of the study, the brief alcohol intervention will result in greater reductions in risky sexual behavior than the brief carbon-footprint intervention.*

Bivariate comparisons between groups were made with follow-up data on sex-related alcohol expectancies (Table 27 in Appendix C) and on past month sexual history (Table 28 in Appendix C). As

predicted, because this intervention did not act on expectancies, there are no differences between groups on sex-related alcohol expectancies. Thirteen sexual behaviors were significantly different between groups. The control group reported a larger mean number of sexual behaviors than the experimental group on 12 of the 13 significant sexual behaviors. The experimental group reported significantly more insertive anal sex without a condom and without ejaculation (mean 0.33, SD=1.43) than the control group (mean 0.07, SD=0.41; $p \leq 0.05$).

Because of these differences in past month sexual history, further analyses were restricted to bivariate relationships. Overall, frequency of sexual behavior on the night of data collection was very low. Frequencies of hand-genital contact, and oral sex and anal sex with and without condoms are presented in Table 29 in Appendix C. Hand-genital contact was most frequent, with 14 cases, or 12.4% of the sample reporting it at follow-up. No participants reported in engaging in oral sex with a condom. There were no statistically significant differences between groups on these frequencies, however, those in the control group did engage in unprotected sexual behaviors (oral and anal) at approximately twice the rate of those in the experimental group.

EXPLORATORY HYPOTHESIS 2: *The number of paper towels used to dry hands inside the bar will be lower among those in the attention-placebo control group than those in the brief alcohol intervention group.*

The bivariate comparison (t-test) of the number of paper towels used inside the bar varied significantly by treatment condition (Table 20 in Appendix C). Those in the attention placebo control group used significantly fewer paper towels while inside the bar. The experimental group used a mean of 2.91 (SD=3.89) paper towels while inside the bar, while those in the attention placebo control group used a mean of 1.51 (SD=1.97) paper towels while inside the bar.

This t-test, however, fails to account for nesting by night of data collection. A linear mixed model (LMM) was used to assess whether number of paper towels used inside the bar was statistically different between groups. As in previous linear mixed models, the night of data collection was included as a random effect and the treatment condition was included as a fixed effect predictor of paper towel use.

The parameter estimate of treatment condition is presented in Table 30 in Appendix C. Condition remains a significant predictor of paper towel use inside the bar ($F=7.54$, $p \leq 0.01$). Those in the experimental condition used an adjusted mean of 2.87 paper towels

(95% CI: 2.05 - 3.70), while those in the attention-placebo control group used an adjusted mean of 1.49 paper towels (95% CI: 0.39 - 2.37).

Post-hoc bivariate comparisons were conducted on several other outcomes of the carbon footprint brief intervention, including consumption of locally grown food, consumption of organic food, recycling, purchase of vintage clothing, and use of a refillable water bottle. These comparisons are presented in Table 31 in Appendix C. No statistically significant differences were found between groups.

Overall, those in the attention-placebo control group used fewer paper towels than those in the experimental treatment condition. However, no other differences on carbon footprint items were noted between groups.

CHAPTER 5: DISCUSSION

This study tested the efficacy of a brief alcohol intervention to reduce alcohol use and alcohol-related problems in a bar environment. As an exploratory aim, the study also hoped to identify a reduction in risky sexual behavior. This discussion will address the key findings, strengths, and limitations of this study. This section will conclude with recommendations for future research.

KEY FINDINGS

The primary aim for this research study was to identify if the brief alcohol intervention resulted in a reduction in BrAC among those in the intervention as compared to those receiving an attention-placebo control brief intervention on carbon footprint. No statistically significant differences in BrAC were detected between groups even when adjusting for potential nesting from the night of data collection.

The secondary aim of this research was to explore differences between the risk categories in the brief alcohol condition on the difference between actual exit BrAC and estimated exit BAC based on drinking plans. Participants in the high risk category achieved lower BrAC than planned, while those in the at-risk and low risk groups achieved higher BrACs than planned.

The tertiary aim of this research was to compare rates of continued drinking between those in the brief alcohol condition and those in the attention-placebo control condition. Condition was not predictive of continued drinking after the exit interview.

The quaternary aim of this research was to compare rates of alcohol-related problems by condition. No significant relationship was identified between condition and alcohol-related problems, even after adjusting for the effects of clustering by night of data collection.

The primary exploratory aim of this study was to assess differences in sexual activity that may have resulted from the intervention. Perhaps due to the low rate of sexual activity during the night of data collection, no significant differences were identified between conditions.

The secondary exploratory aim of this study was to assess differences in carbon footprint outcome variables from the attention-placebo control group. Participants in the attention-placebo control group used significantly fewer paper towels while in the bar than those in the brief alcohol condition.

Health belief items on alcohol use and carbon footprint were specifically constructed for this study. Sub-scales on these health belief items demonstrated poor reliability. Treatment conditions only differed

on a single alcohol health belief item at exit from the bar. Theoretically, the brief alcohol intervention, based on the health belief model, should have resulted in higher endorsement of benefits and lower endorsement of barriers related to behavior change compared to the attention-placebo control group. No such differences were noted. Those in the brief alcohol intervention should also have more strongly endorsed items on the susceptibility and severity of threat; however, on the one item that differed between groups, the attention-placebo control group more strongly endorsed the severity of threat item, indicating that the theory did not act as anticipated.

STRENGTHS & LIMITATIONS

Based on existing peer reviewed literature, this is the first study which has attempted to clarify relationship between alcohol use and risky sexual behavior through a randomized attention-placebo control design. Participants included in this trial were at-risk for experiencing alcohol-related problems and drawn from a population at increased risk for HIV. This study is unique in its attempt to modify behavior for a single night with an intervention occurring proximal to the risk behavior. The study is strengthened by the use of portal methodology with biomarker measurement of alcohol consumption. The telephone follow-up allowed for measurement of alcohol-related problems,

including risky sexual behavior, within one week of intervention to reduce recall bias.

A major limitation of this study was the poor reliability of the health belief items. Without strong measurement tools, it remains unclear if the failure to reduce BrAC among those in the experimental group at exit from the bar is a failure in the Health Belief Model-based intervention, the dose, or any number of other variables. Although these items followed guidelines for the measurement of health belief constructs (Champion, 1984), they must be refined for use in future studies.

In order to evaluate hypothesis 2, an estimate of planned exit BAC was calculated. Several studies have identified the weakness of this calculated variable when compared directly to BrAC (Hustad & Carey, 2005; Clapp J. , Min, Shillington, Reed, Lange, & Holmes, 2006; Clapp, et al., 2009). This study, however, calculated eBAC from planned drinking, rather than calculating eBAC from drinking reports. It remains unclear how accurately such drinking plans might predict actual BrAC. Specifically, is drinking plan representative of actual drinking? That is, if no intervention had been conducted, would the eBAC, based on drinking plans, accurately reflect exit BrAC? Such questions might be addressed with a Solomon four-group design,

wherein alcohol assessment items are given to participants without feedback in order to test the predictive validity of eBAC on actual BrAC.

The bar and night of data collection selected for this research may not have been the best match for preventing alcohol related problems. The specific environment on Monday nights at this bar was set up to encourage high levels of alcohol consumption. Low cost drink specials ($1 mixed drinks) increase access to alcohol within the bar (Clapp, et al., 2009). No food items are offered as a means to curb the absorption of alcohol. Further, within the bar, chairs and tables were removed on Monday nights. The removal of tables is especially important as it forces patrons to hold their drinks, which increases the frequency of consumption. Overall, this environment has many strong cues for drinking behavior which override this intervention.

Cross-contamination may have occurred during this study. Participants were warned not to discuss their feedback with others; however, participants in the study might have identified each other by the bracelets and discussed their personalized feedback. Cross-contamination is considered a theoretically feasible source of bias (Cook & Campbell, 1979; Keirse & Hanssens, 2000); although it has been argued that there are no empirical data available to support this

theoretical supposition (Lang, DiClemente, Hardin, Crosby, Salazar, & Hertzberg, 2009). Theoretically, such a cross-contamination could wash out the effects differences between groups and may have lead to a reduction in consumption for both groups (Cook & Campbell, 1979; Keirse & Hanssens, 2000). Further, recent research suggests that behavioral outcomes may be resistant to effects from cross-contamination; in fact, it has been suggested that contamination may actually strengthen the effect in the experimental group by allowing the participants to rehearse important information (Lang, DiClemente, Hardin, Crosby, Salazar, & Hertzberg, 2009). Contamination effects were not measured for this study. Because the control condition differed significantly on use of paper towels from the experimental condition, it is unlikely that contamination of this intervention occurred. If contamination occurred, one would expect it to occur from the control condition to the experimental condition and vice versa, not differentially by condition. It is, therefore, unlikely that contamination occurred for this study.

Further, it is possible that a bias due to engaging in another intervention during the same time period could have caused treatment effects to be inflated or could wash out the effects of the experimental intervention (Hartman, Forsen, Wallace, & Neely, 2002). Such bias could

only affect the outcome of the study if it were differentially distributed between groups. It is possible that participants in the experimental or attention-placebo control group were more likely to attend alcoholics anonymous; but it is unlikely that this occurred, given that all measured variables were evenly distributed between treatment conditions.

RECOMMENDATIONS FOR FUTURE RESEARCH

THEORY

The scarcity of statistically significant findings on alcohol health belief items and the alcohol-related outcomes suggests that the Health Belief Model may not be the appropriate theoretical approach for a brief field intervention to reduce alcohol use. It appears that the *threats* associated with alcohol consumption are insufficient to outweigh the *benefits* associated with alcohol consumption; particularly in a context wherein the *benefits* are temporally proximal and the *threats* are temporally distal. An operant learning approach suggests that proximal *benefits* will outweigh distal *threats* (Skinner, 1938).

Further, some of the *threats* associated with alcohol use (hangover, getting sick, falls, or unplanned sex) may not be severe enough to trigger a response. Health Belief threats typically include a severe threat (death) associated with a preventable health screening, like for HIV, cancer, or hepatitis (Brown, DiClemente, & Reynolds, 1991;

Austin, Ahmad, McNally, & Stewart, 2002; Wai, et al., 2005; Stein J. , Fox, Murata, & Morisky, 1992). Similarly, sanctions theory suggests that punishment must be sufficiently severe in order to deter deviant behavior (Rubington, 1991). Based on Health Belief Model and Sanctions Theory, it may be appropriate to add police presence in order to increase perception of *threat* and to deter public intoxication and driving under the influence.

This intervention seemed to work best for those who were at high-risk of alcohol-related problems based on their drinking plans. Participants at high-risk for alcohol-related problems may have more experience with alcohol-related problems; therefore, these participants may be more receptive to the brief alcohol intervention as it attempts to increase perception of alcohol-related risks. For example, a high-risk participant may have more recently experienced hangover than those in the low-risk or at-risk groups. By virtue of this recent experience, the high-risk participant may do more to deter hangover than low-risk or at-risk participants. Improvement on health belief measures in future studies will help to clarify this relationship.

MEASUREMENT

Despite following guidelines (Champion, 1984), the health belief items showed poor reliability. It is possible that this is because the scale

development guidelines were geared toward typical behaviors addressed by health belief, like cancer screening. When applying these guidelines to cancer screening, items in each sub-scale tended to identify a single benefit, barrier, or threat, as appropriate, and ask multiple questions about that benefit, barrier, or threat. For example, health belief items for the susceptibility to threat subscale of a breast cancer study might ask about susceptibility to cancer in the following six ways:

> "1. My chances of getting breast cancer are great.
>
> 2. My physical health makes it more likely that I will get breast cancer.
>
> 3. I feel that my chances of getting breast cancer in the future are good.
>
> 4. There is a good possibility that I will get breast cancer.
>
> 5. I worry a lot about getting breast cancer.
>
> 6. Within the next year, I will get breast cancer." (Champion, 1984, page 81)

To more closely approximate these items, a single benefit, barrier, and threat must be selected. In administering a minimum of six-items per sub-scale, as presented above, participants would need to respond to 24 items at entrance assessment and 48 items at exit from the bar. Such

scales would have taken a prohibitively long time to administer and would be limited in scope to the single benefits, barriers, and threats. In this study, twenty alcohol and carbon footprint health belief items administered at exit represented the bulk of participant burden.

The number of items per sub-scale was limited in an attempt to reduce participant burden. The reliability of these sub-scales may have suffered as a result of this limited number of items (DeVellis, 2003). Similar studies assessing alcohol health belief constructs use 23-item scales (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). Further, the health belief measures presented in this study addressed multiple benefits, barriers, and threats associated with alcohol consumption. Unlike with breast cancer, there is not a single benefit, barrier, or threat associated with alcohol use. Refinement of health belief items should be considered for future studies, taking into consideration the importance of balancing reliability and the short time span allotted to administering these items.

PRIMARY AIM

The brief alcohol intervention failed to achieve the primary aim of reducing alcohol consumption inside the bar. This failure may have occurred because the benefits presented during the brief intervention

failed to outweigh the benefits presented within the bar for consuming alcohol.

Brief interventions administered in clinical settings (SBIRT) are often effective at reducing alcohol consumption. In this effective SBIRT model, a health related *threat* places participants in a clinical setting. Although this *threat* may not be directly related to alcohol use, it does generally increase perception of susceptibility and severity of *threats*. In contrast, this brief intervention occurred temporally proximal to the drinking behavior, in an environment absent of cues to increase perceived susceptibility and severity of *threats*. Further, it is possible that because alcohol-related risks often occur several hours after the drinking behavior, individuals fail to associate the risks with the drinking behavior. In such a situation, it is difficult, if not impossible, to motivate an individual to avoid a risk that they do not perceive as being present. Perhaps, alcohol-related problems must first occur in order to motivate a change in drinking behavior.

SECONDARY AIM

It was hypothesized that those in the high-risk category of the experimental treatment condition would achieve a lower BrAC than originally planned because these participants had a greater ability to negotiate drinking reduction. Further, post-hoc exploratory analyses

indicate that individuals at high-risk for alcohol related problems were the least likely to drive after leaving the bar (χ^2=8.9, p≤0.05). This finding suggests that the brief alcohol intervention is best targeted to those who are at high-risk for alcohol related problems; implications for DUI prevention are discussed under the heading "Quaternary Aim: Driving". Additional research is needed to clarify this relationship; however, future studies may be successful at reducing BrACs if only high-risk participants are included in the study.

TERTIARY AIM

The brief alcohol intervention failed to identify significant differences between groups on continued drinking after leaving the bar. The base rate of this behavior, however, was low: less than 15% of the sample continued drinking after leaving the bar. This low rate likely reflects characteristics of the bar on the night of data collection: data were collected on a weeknight (Monday), when most people have work or academic responsibilities the following day.

QUATERNARY AIM

Driving

Although not statistically significant, nearly half as many participants drove after leaving the bar in the experimental group as in the control group. This study may have been underpowered to detect

differences in alcohol-related problems, including DUI. Power analysis based on the results of this trial indicate that 152 participants are needed to achieve power of .80 with an alpha of .05. This analysis included 113 participants.

The intervention appears to have acted as a cue to action to reduce driving among those in the brief alcohol condition. Among those in the high-risk category in the alcohol condition, rates of driving (4.5%) were significantly lower than rates of driving in the low-risk category (42.3%; χ^2=8.9, p≤0.05). The overall effects could be strengthened in order to improve upon the ability to detect an effect. Significant results were identified in a similar portal study at the US-Mexico border, wherein drivers were cued specifically about police enforcement. BACs of drivers were significantly reduced compared to a control group who did not receive such a cue to action (Johnson, Voas, Lauer, & Watson, 2007). The present study was conducted on a population with relatively low rates of driving after leaving the bar. Given the serious public safety threat of DUI, interventions similar to this should be targeted to high-risk populations and/or take place at bars with high rates of DUI.

The driving under the influence (DUI) prevention component of this brief alcohol intervention suggests utility for use in other populations

and among those at high-risk for alcohol related problems. Future studies which are needed to apply this component of the intervention to broader populations.

Hangover

Although not statistically significant, the relationship between treatment condition and reported hangover approaches significance ($p \leq 0.15$). This study may have been underpowered to detect differences in alcohol-related problems, including hangover. Power analysis based on the results of this trial indicate that 125 participants are needed to achieve power of .80 with an alpha of .05. This analysis included 113 participants.

Participants in the experimental treatment condition reported hangovers at nearly 2.5 times the rate (OR 2.42, 95% CI: 0.83 - 7.05). It is possible that the brief alcohol intervention acted as a cue to participants to recall alcohol related problems, like hangover, instead of deterring drinking to avoid this consequence. The intervention increased perception of the alcohol-related risk (hangover); which in turn may have increased the measurement error for alcohol-related problems. Such measurement error is inherent in current alcohol-related problem measures (Devos-Comby & Lange, 2008).

> "This approach requires that respondents infer causal connection between drinking and problems, and thus responses are influenced by the respondent's perceptions and assumptions about drinking. Drinking problems may be minimized or exaggerated to the extent the individual perceives and/or admits a causal connection to drinking." (Devos-Comby & Lange, 2008, pages 349-350).

A second brief intervention session added during follow-up could improve the utility of this intervention for alcohol use reduction. The follow-up brief intervention would act similarly to SBIRT, in that the intervention would act proximally to a health risk (hangover) during a "teachable moment" (Bien, Miller, & Tonigan, 1995). Future studies should assess the utility of pairing a field intervention which increases perception of risks with a follow-up intervention to reduce future use.

PRIMARY EXPLORATORY AIM

It was hypothesized that the intervention would result in a lowered rate of alcohol use, which would in turn reduce risky sexual behavior in the experimental treatment condition. However, no differences between groups were measured for alcohol use or sexual activity. Future alcohol-reduction interventions should continue to measure subsequent sexual activity, even with low base-rates, in an

attempt to clarify the relationship between alcohol use and risky sexual behavior.

SECONDARY EXPLORATORY AIM

The brief carbon footprint intervention was effective in reducing use of paper towels inside the bar: use was four times greater by those in the brief alcohol condition than those in the brief carbon footprint intervention. The effectiveness of the intervention at creating a simple behavioral change inside the bar demonstrates theoretical validity for the paper towel use behavior.

Differences in the ability of the treatment conditions to elicit behavior change should be explored. Although not originally considered a part of the Health Belief Model, later versions of the theory have included a motivation component. Adding this component to the experimental condition in future research studies might be of some use. It is possible that the brief carbon footprint intervention was able to reduce paper towel use because there were no strong competing motivations; however, the brief alcohol use intervention was unable to reduce BrAC at exit from the bar because participants had competing motivations to consume alcohol.

Cross-Contamination Bias

Future studies might measure potential cross-contamination bias at follow-up with two items: the first item would ask participants to indicate whether they spoke with anyone else at the bar that night who was involved in the research project. The second would ask participants to describe the conversation they had with the other person in the project.

Summary

Field studies of alcohol use allow temporally proximal measurement of behavior and reduce bias. Such studies have utility for prevention work, as intervention can occur immediately prior to risk behavior. Reductions in intoxication and/or alcohol-related risks have the ability to reduce illness, injury, and save lives from reductions in motor vehicle accident from DUI. This brief alcohol intervention shows promise for use as a DUI prevention intervention, although the present study may not have been powered to detect such differences. It remains unclear whether Health Belief is the appropriate theoretical approach for a field-based alcohol-prevention program. Future studies should focus on scale development for alcohol-related health belief items in order to better assess the fit of health belief constructs in the field setting.

APPENDIX A:

FIELD DOCUMENTS

RANDOM ALLOCATION SCHEDULE

1.	Control	51.	Expt'l	101.	Control
2.	Control	52.	Control	102.	Expt'l
3.	Expt'l	53.	Expt'l	103.	Expt'l
4.	Control	54.	Control	104.	Expt'l
5.	Control	55.	Expt'l	105.	Control
6.	Control	56.	Expt'l	106.	Expt'l
7.	Expt'l	57.	Expt'l	107.	Control
8.	Control	58.	Control	108.	Expt'l
9.	Control	59.	Expt'l	109.	Control
10.	Control	60.	Expt'l	110.	Control
11.	Control	61.	Control	111.	Control
12.	Control	62.	Expt'l	112.	Expt'l
13.	Control	63.	Expt'l	113.	Expt'l
14.	Control	64.	Expt'l	114.	Expt'l
15.	Expt'l	65.	Expt'l	115.	Expt'l
16.	Expt'l	66.	Expt'l	116.	Expt'l
17.	Expt'l	67.	Expt'l	117.	Control
18.	Expt'l	68.	Control	118.	Expt'l
19.	Expt'l	69.	Control	119.	Control
20.	Expt'l	70.	Control	120.	Expt'l
21.	Expt'l	71.	Control	121.	Control
22.	Control	72.	Control	122.	Control
23.	Control	73.	Expt'l	123.	Control
24.	Control	74.	Control	124.	Expt'l
25.	Expt'l	75.	Expt'l	125.	Control
26.	Expt'l	76.	Expt'l	126.	Control
27.	Expt'l	77.	Control	127.	Control
28.	Expt'l	78.	Expt'l	128.	Expt'l
29.	Expt'l	79.	Expt'l	129.	Control
30.	Control	80.	Control	130.	Control
31.	Expt'l	81.	Expt'l	131.	Expt'l
32.	Expt'l	82.	Expt'l	132.	Control
33.	Expt'l	83.	Expt'l	133.	Expt'l
34.	Expt'l	84.	Expt'l	134.	Expt'l
35.	Expt'l	85.	Control	135.	Expt'l
36.	Control	86.	Control	136.	Control
37.	Control	87.	Control	137.	Expt'l
38.	Expt'l	88.	Control	138.	Expt'l
39.	Expt'l	89.	Expt'l	139.	Control
40.	Control	90.	Control	140.	Expt'l
41.	Control	91.	Expt'l	141.	Control
42.	Control	92.	Control	142.	Expt'l
43.	Control	93.	Control	143.	Expt'l
44.	Control	94.	Control	144.	Expt'l
45.	Control	95.	Control	145.	Control
46.	Control	96.	Expt'l	146.	Control
47.	Expt'l	97.	Expt'l	147.	Control
48.	Expt'l	98.	Control	148.	Expt'l
49.	Control	99.	Control	149.	Control
50.	Control	100.	Control	150.	Expt'l

RANDOM ALLOCATION SCHEDULE - ADDITIONAL CASES

151.	Expt'l
152.	Expt'l
153.	Control
154.	Control

SCREENING

1. Have we surveyed you in the past three months? (if yes, exclude from study)

2. Have you had sex with another man in the past year? (if no, exclude from study)

3. Have you had anything to drink tonight? (if yes, exclude from study)

4. Do you plan to drink tonight? (if no, exclude from study)

5. Are you at least 18 years of age? (if no, exclude from study)

INFORMED CONSENT DOCUMENT

Informed Consent Document

Before you give your consent to be a volunteer, it is important that we give you following information so that you understand what you will be asked to do.

Investigators: Julie M. Croff, MPH, CHES , Joint Doctoral Program in Public Health, San Diego State University and University of California at San Diego and John D. Clapp, Ph.D., Professor, School of Social Work, San Diego State University.

Purpose of the Study: We are testing whether brief interviews paired with personalized feedback results in behavior change for patrons attending this bar.

Description of Study: Your interview and feedback today will last less than 10 minutes and be conducted here outside the bar. When you leave the bar tonight, we will ask you a few more questions. You will be asked for a breath sample to confirm you are sober when you enter the bar. You will be asked for another breath sample when you leave the bar. We will ask questions about yourself, your use of alcohol and drugs, and your sexual behaviors. We will also give you the option of participating in a follow-up phone survey. If you wish to participate in the phone survey, you will be asked for your contact information, so that we can contact you for a brief phone interview during the week.

What is Experimental in this Study: The feedback portion of this research project is an experimental procedure.

Risks and Discomforts: You may experience some slight psychological discomfort due to the nature of the questions. To minimize this potential discomfort, please remember that your answers tonight are completely anonymous. You may refuse to answer any question and you may end your participation in the study at any time.

Benefits of the Study: We hope the data collected during this study will benefit the surrounding community and will inform future prevention projects.

Costs & Incentives: For your time today, we will provide you with a gift certificate valued at $15.00. Should you chose to participate in the confidential follow-up survey, we will provide you with an addition $15.00 in one week. You will incur no costs for your participation in this study.

Voluntary Nature of Participation: Participation in this study is voluntary. Your choice of whether or not to participate will not influence your future relations with San Diego State University or the University of California at San Diego. If you decide to participate, you are free to withdraw your consent and stop your participation at any time without penalty or loss of benefits to which you are allowed.

If you have any questions about the research now, please ask. If you have any questions about the research at a later time, you may contact Ms. Croff at 619.315.5563 or jcroff@projects.sdsu.edu. If you have any questions regarding your rights as a human subject and participation in this study, you may call the SDSU Institutional Review Board at 619.594.6622 or the UCSD IRB at 858.455.5050.

Agreement: The San Diego State University Division of Research Affairs and the University of California at San Diego Human Research Protections Program have approved this consent form as signified by the Committees' stamps. The consent form must be reviewed annually and expires on the date indicated on the stamp.

If you agree to participate, you will be given a copy of this agreement. You may use this information to request that your responses be withdrawn from the study if you choose.

Your signature below indicates that you have read the information in this document and have had a chance to ask any questions you have about the study. Your signature also indicates that you agree to be in the study and have been told that you can change your mind and withdraw your consent to participate at any time. You have been given a copy of this consent form. *You have also been given a copy of "The Research Participant's Bill of Rights." You have been told that by signing this consent form you are not giving up any of your legal rights.

_____ _____

Signature of Participant Date

CONFIDENTIAL FORM

_____ _____

First name (please print) Unique Identifier

_____

Phone number

_____

Best day/time to call

ENTRANCE SURVEY FOR ALCOHOL INTERVENTION

DEMOGRAPHICS

1. What is your weight? _____

2. What is your age? _____years old

3. What is your ethnicity?
   Hispanic/Latino
   Not Hispanic/Latino

4. What is your race?
   White
   Black/African American
   Asian
   Native American/Hawaiian
   Pacific Islander
   Other (please specify): _____

5. With which of the following sexual orientations do you most closely identify?
   Gay
   Bisexual
   Straight

PLANS

6. Do you have any work or personal plans for tomorrow?
   Yes
   No

ALCOHOL USE QUESTIONS

7. How much do you intend to drink at this bar?
   Not enough to get buzzed
   Enough to get a slight buzz
   Enough to get a little drunk
   Enough to get very drunk

8. About how many drinks will it take to reach that level of intoxication?
   _____

9. What type(s) of alcohol are you planning to drink? (check all that apply)
    Shots
    Mixed drinks
    Beer
    Wine

10. About how long do you plan to be here? _____ hours

11. Do you plan to continue drinking when you leave this bar?
    Yes
    No

TRANSPORTATION QUESTIONS

12. How do you plan to get home tonight?
    Drive myself
    Ride with someone else
    Walk
    Bike/skateboard
    Public transportation
    Taxi
    Other:_____

BENEFITS/BARRIERS

Rate the following from (1) not at all– (5) very much so

13. If I monitor my drinking I am less likely to get hurt.

14. I have a lot to gain from drinking at safe levels.

15. My friends would make fun of me if I only had a one drink.

16. I won't have fun tonight if I drink less.

THREAT ASSESSMENT

Rate the following from (1) not at all– (5) very much so

17. My chances of being injured tonight are great.

18. I feel that my chances of being hungover in the morning are good.

19. I will get a DUI tonight.

20. I worry about weight gain from drinking.

Rate the following from (1) not at all – (5) very much so

21. When I think about being injured tonight, my heart beats faster.

22. I'm afraid to even think about being hungover tomorrow.

23. Problems I would experience from a DUI would last a long time.

24. The thought of weight gain from drinking scares me.

ENTRANCE SURVEY FOR CARBON FOOTPRINT FEEDBACK INTERVENTION

DEMOGRAPHICS

1. What is your age? _____years old

2. What is your ethnicity?
   Hispanic/Latino
   Not Hispanic/Latino

3. What is your race?
   White
   Black/African American
   Asian
   Native American/Hawaiian
   Pacific Islander
   Other (please specify): _____

4. With which of the following sexual orientations do you most closely identify?
   Gay
   Bisexual
   Straight

CARBON FOOTPRINT CALCULATION

5. What is your portion of your monthly SDG&E bill (e.g. bill/number of people in household)? (multiply by 105)

6. How far do you drive in a typical week? (multiply by 41)

7. How many flights do you take each year that are under 4 hours long? (multiply by 1,100)

8. How many flights do you take each year that are over 4 hours long? (multiply by 4,400)

9. Do you recycle regularly? (No = +350)

BENEFITS/BARRIERS

Rate the following from (1) not at all– (5) very much so

10. I have a lot to gain from reducing my carbon footprint.

11. Carpooling prevents future problems for me.

12. In order to be green, I have to give up a lot.

13. My friends would make fun of me if I only used one paper towel to dry my hands.

THREAT ASSESSMENT

Rate the following from (1) not at all– (5) very much so

14. I worry about exposing myself to harmful chemicals.

15. I will pollute tonight.

16. When I think about being exposed to harmful chemicals, my heart beats faster.

17. Problems I would experience from a pollutant would last a long time.

EXIT SURVEY

ALCOHOL & ALCOHOL-RELATED QUESTIONS

1. What time did you finish your most recent drink? _____

2. Rate how you feel now:
   Not buzzed
   Slight buzz
   A little drunk
   Very drunk

3. Are you a college student?
   Yes
   No

4. How many of each kind of drink did you consume at this bar?
   ____ shot(s)

   ____ mixed drink(s)

   ____ beer(s)

   ____ glasses of wine

5. Did you intend to have that many drinks?

CARBON FOOTPRINT

6. How many paper towels did you use inside the bar?

7. Did you intend to use that many towels?

BENEFITS/BARRIERS

Rate the following from (1) not at all– (5) very much so

7. If I monitor my drinking I am less likely to get hurt.

8. I have a lot to gain from drinking at safe levels.

9. I have a lot to gain from reducing my carbon footprint.

10. Carpooling prevents future problems for me.

11. My friends would make fun of me if I only had a one drink.

12. I won't have fun tonight if I drink less.

13. In order to be green, I have to give up a lot.

14. My friends would make fun of me if I only used one paper towel to dry my hands.

THREAT ASSESSMENT

Rate the following from (1) not at all– (5) very much so

15. My chances of being injured tonight are great.

16. I feel that my chances of being hungover in the morning are good.

17. If I drive tonight, I will get a DUI.

18. I worry about weight gain from drinking.

19. I worry about exposing myself to harmful chemicals.

20. I will pollute tonight

21. When I think about being injured tonight, my heart beats faster.

22. I'm afraid to even think about being hungover tomorrow.

23. Problems I would experience from a DUI would last a long time.

24. The thought of weight gain from drinking scares me.

25. When I think about being exposed to harmful chemicals, my heart beats faster.

26. Problems I would experience from a pollutant would last a long time.

FOLLOW-UP BRIEF CONSENT

Thanks for agreeing to participate in this phone survey. Before we proceed, it is important that we give you following information so that you understand what you will be asked to do.

Description of Study: This follow-up phone survey will take approximately 15 minutes. You will be asked questions about yourself and your experiences since we last spoke.

Risks and Discomforts: It may be possible that during the interviews, embarrassing, dangerous or illegal issues may be discussed concerning your use of alcohol or drugs and your participation in sexual activity. To minimize this potential discomfort, please remember that your answers are completely confidential. You may refuse to answer any question and you may end your participation in the study at any time. All information collected will be reported in aggregate (grouped) form; no individual responses will be reported. If you would like to discuss substance abuse, you may access resources at Stepping Stone at www.steppingstonesd.org or 619.395.3995.

Benefits of the Study: We hope the data collected during this study will benefit the surrounding community and will inform future prevention projects.

Costs & Incentives: For your time today, we will provide you with a gift certificate valued at $15.00. You will incur no costs for your participation in this study.

Voluntary Nature of Participation: Participation in this study is voluntary. If you have any questions about the research now, please ask.

Agreement: Do you understand what is required of you and agree to participate in this phone survey?

FOLLOW-UP SURVEY

QUANTITY-FREQUENCY

1. How often do you have a drink containing alcohol?

   Never
   Less than once/month
   1 time/month
   2 times /month
   3 times/month
   4 times/month or 1 time/week
   2 times/week
   3 times/week
   4 times/week
   5 times/week
   6 times/week
   7 times/week

2. How many drinks containing alcohol do you have on a typical day when you are drinking? _____drinks

HEAVY EPISODIC DRINKING

3. In the **past two weeks**, on how many occasions, if any, did you have 5 or more drinks in a row?

   _____

ALCOHOL USE

4. Did you continue drinking after we interviewed you that night?

   yes
   no

5. How many drinks did you consume after you left the bar?

   _____ drinks

6. At how many locations did you consume alcohol after you left the bar?

   _____ locations

7. At what time did you finish your last drink?

   ___:___ am/pm

8. How did you feel when you went to bed that night?

   Not buzzed
   A slight buzz
   A little drunk
   Very drunk

9. How did you get home that night?

   Drove myself
   Rode with someone else
   Walk
   Bike/skateboard
   Public transportation
   Taxi
   Other:_____

10. Did you get sick due to your drinking?

11. Did you feel hungover the next day?

12. Did you fall or get injured due to your drinking?

13. Did you engage in unplanned sexual activity?

SEXUAL ACTIVITY

14. Did you engage in any of the following at or after leaving the bar that night:

    Hand-genital contact

    Gave or received oral sex with a condom

    Anal sex with a condom

    Received oral sex without a condom

    Gave oral sex without a condom

    Unprotected insertive anal sex (top)

    Unprotected receptive anal intercourse (bottom)

15. If yes to any of the above, how did you meet the person you engaged in this activity with?

    In monogamous relationship

    Someone I'd had sex with before (friend with benefits/fuck buddy)

    Friend or acquaintance I'd met before, but never had sex with

    Someone I met that night

16. Do you know the HIV sero-status of that person?

    Yes - HIV-positive

    Yes-HIV-negative

    No, I don't know

CARBON FOOTPRINT ITEMS

In the time since we interviewed you, have you...

17. Eaten locally grown food?
    No
    Yes

    18. If yes, compared to how you usually eat, would you say you're eating:
        - less locally grown food than usual
        - the same amount of locally grown food as usual
        - more locally grown food than usual

19. Eaten organic food?
    No
    Yes

    20. If yes, compared to how you usually eat, would you say you're eating:
        - less organic food than usual
        - the same amount of organic food as usual
        - more organic food than usual

21. recycled?
    No
    Yes

    22. If yes, compared to how you usually recycle, would you say you're recycling:

- less than usual
- the same amount as usual
- more than usual

23. Purchased vintage clothes?
    No
    Yes

    24. If yes, compared to how you usually shop, would you say your purchasing is:
        - less than usual
        - the same amount as usual
        - more than usual

25. used a refillable water bottle?
    No
    Yes

    26. If yes, compared to how you usually drink water, would you say you're using your water bottle:
        - less than usual
        - the same amount as usual
        - more than usual

ALCOHOL EXPECTANCIES - SEX RELATED (LEIGH, 1990)
When I drink enough alcohol to feel the effects, I:

[4-item likert: Not at all, a little, some, very much]

27. feel less self-conscious

28. feel closer to a sexual partner

29. am a better lover

30. am more sexually responsive

31. am less nervous about sex

32. am more self-confident

33. become more forward

34. feel less shy

35. get horny (i.e., want sex)

36. enjoy sex more

37. have sex with people that I wouldn't have sex with when I was sober

38. am more likely to do something sexually that is risky

39. lose my inhibitions

PAST MONTH SEXUAL HISTORY

I'd like to ask you about the frequency in which you have engaged in five sexual behaviors in the past month. We'll start with any sexual behaviors you've engaged in with your main partner, or someone you would call your boyfriend, spouse, significant other, or life partner.

		With Condoms	Without Condoms	
			With Ejaculation	Without Ejaculation
31	Insertive Oral			
32	Receptive Oral			
33	Insertive Anal (Top)			
34	Receptive Anal (Bottom)			
35	Vaginal Sex			

Now let's go through that same information for any other sexual partners you've had in the past month.

		With Condoms	Without Condoms	
			With Ejaculation	Without Ejaculation
36	Insertive Oral			
37	Receptive Oral			
38	Insertive Anal (Top)			
39	Receptive Anal (Bottom)			
40	Vaginal Sex			

41. If reports sexual behavior with main partner but not with casual partners: Are you currently in a mutually-monogamous relationship?

Yes

No

SEXUAL HISTORY

42. What is your HIV sero-status?

positive

negative

unsure

43. Have you been diagnosed with a sexually transmitted disease in the past year? (check all that apply)

Yes, Syphilis

Yes, Gonorrhea

Yes, Chlamydia

Yes, HPV

Yes, Herpes

Yes, Other_____

No

APPENDIX B:

FIGURES

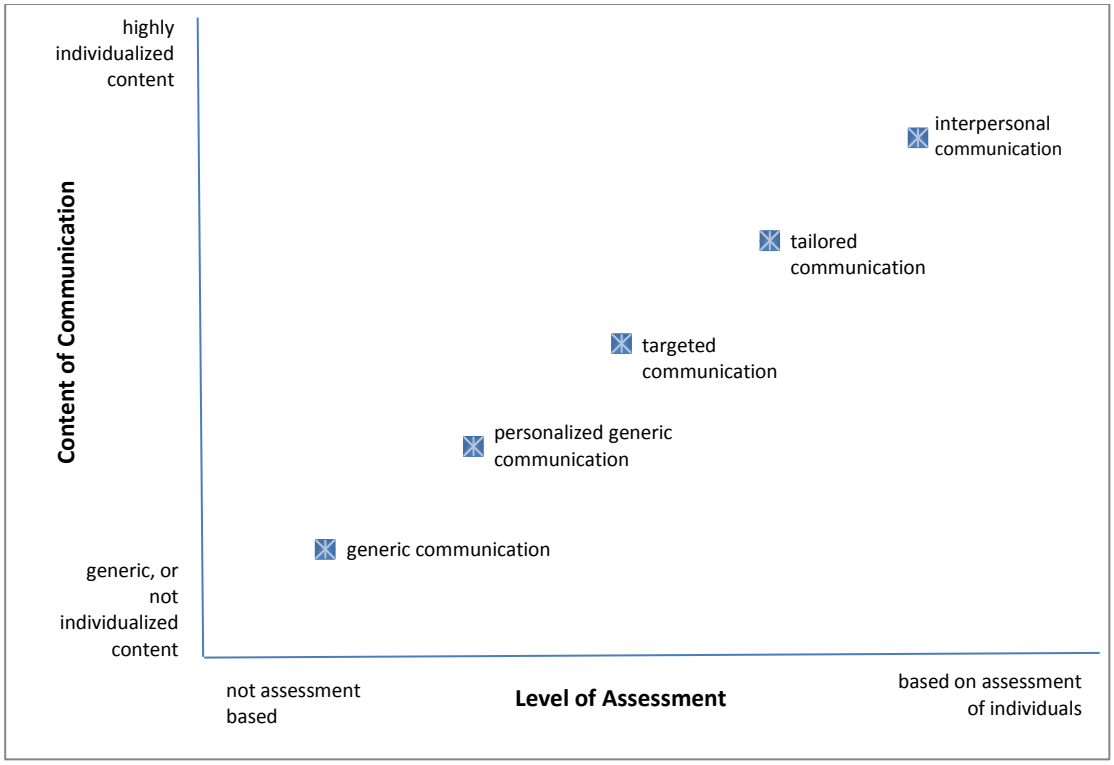

Figure 1: Continuum of feedback interventions (Kreuter, Strecher, & Glassman, 1999)

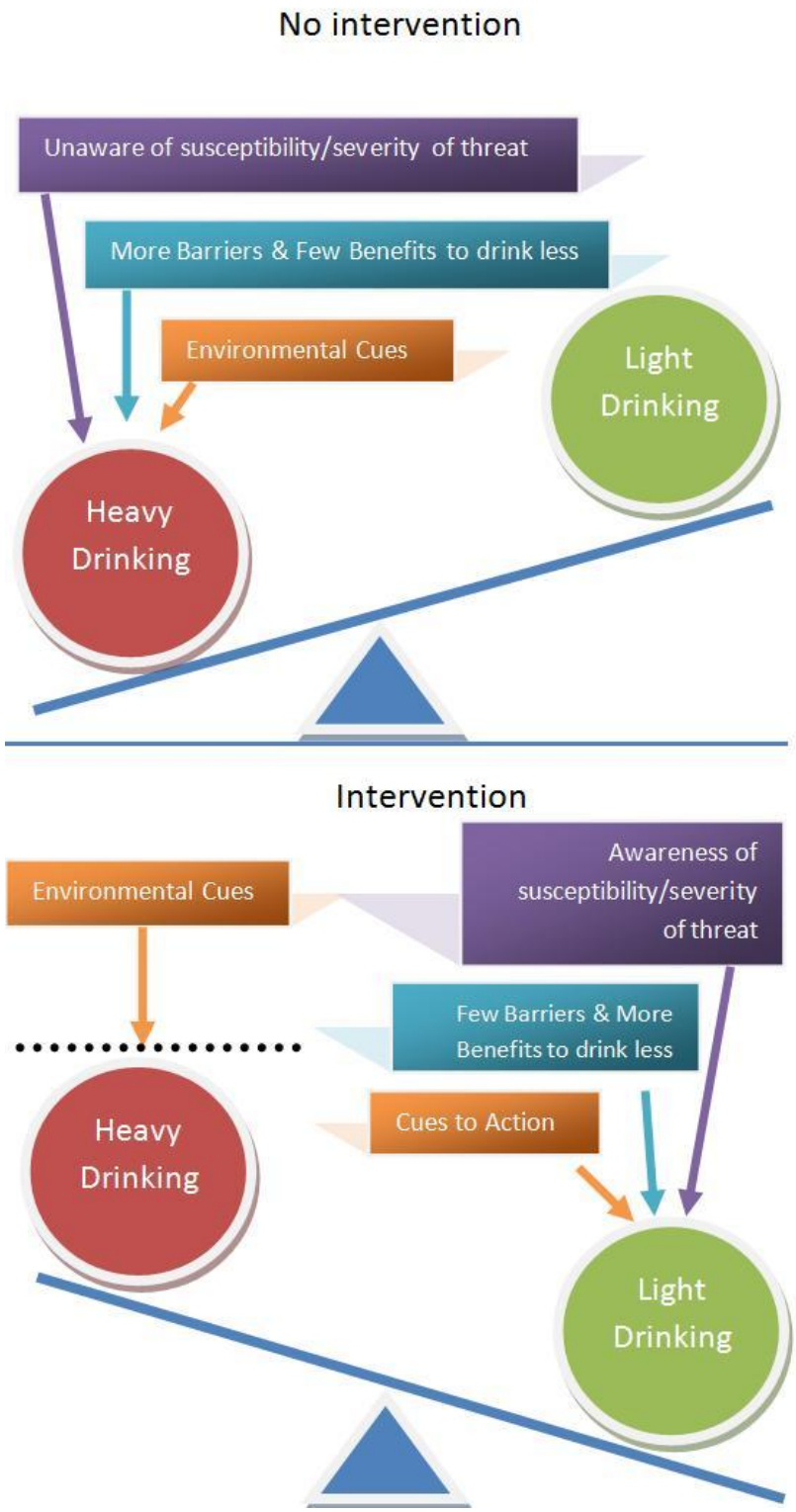

Figure 2: Theoretical Mechanism of Behavior Change

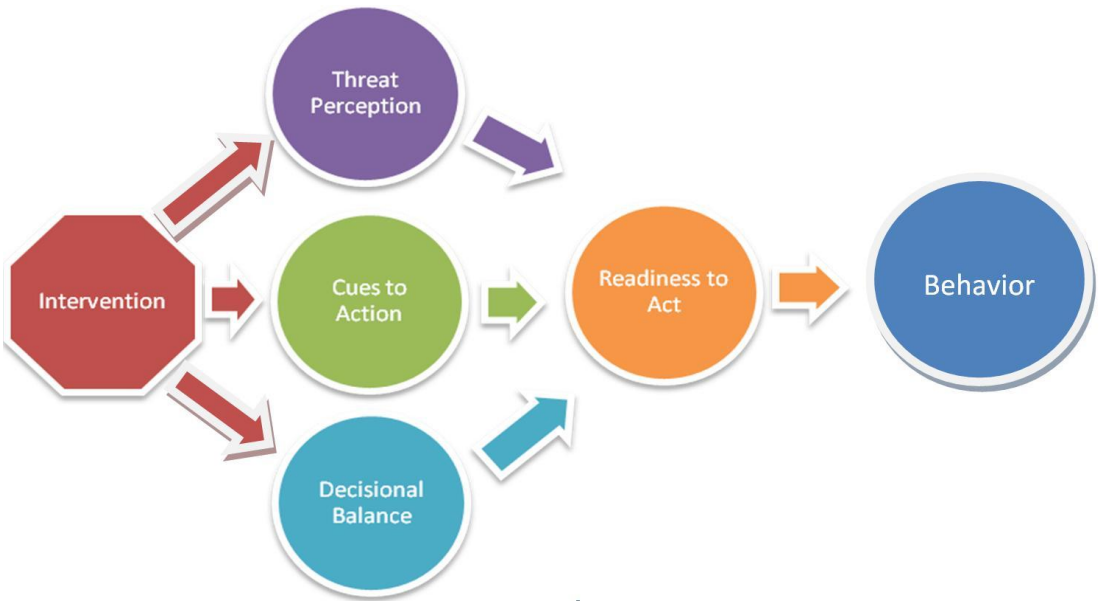

Figure 3: Conceptual Intervention Model

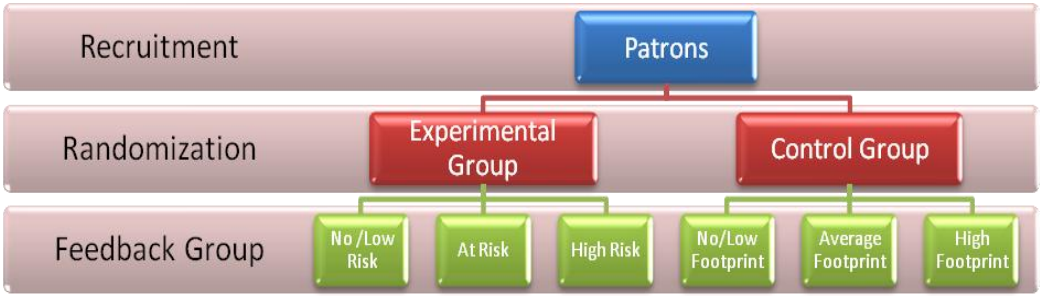

Figure 4: Allocation to Feedback

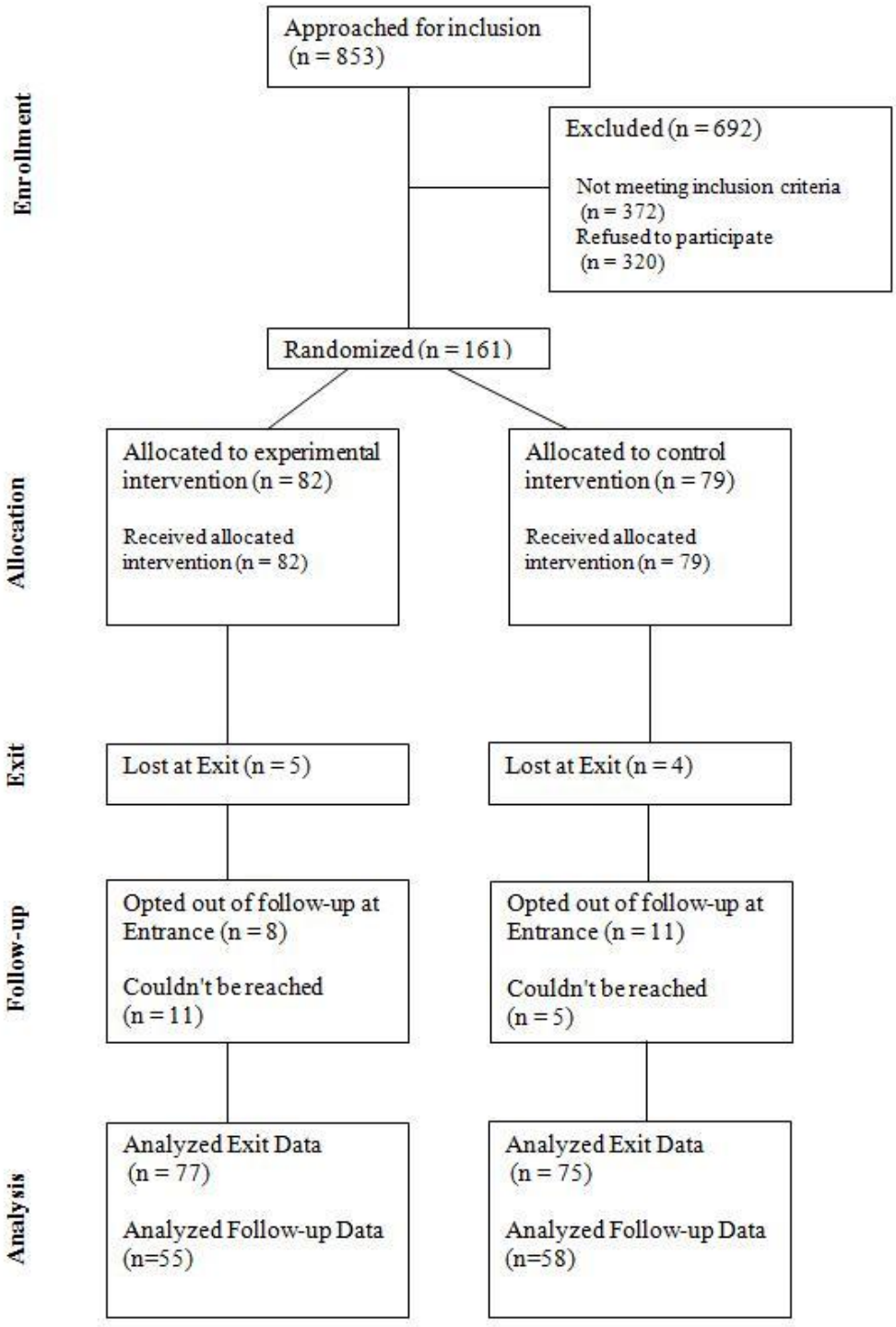

Figure 5: CONSORT Flow Diagram

APPENDIX C:

TABLES

Table 1: Research Design

R:	X_e	O_1	O_2
	X_{apc}	O_1	O_2

Table 2: Caloric Intake from Alcohol

Number of Drinks	Type of Alcohol			
	Regular Beer	Light Beer	Hard Alcohol	Liqueurs
1	150	110	100	188
2	300	220	200	376
3	450	330	300	564
4	600	440	400	752
5	750	550	500	940
6	900	660	600	1128
7	1050	770	700	1316
8	1200	880	800	1504
9	1350	990	900	1692
10	1500	1100	1000	1880

Table 3: Table of Measurement

Measurement/Question Type	Alcohol Condition	Carbon Condition
BrAC	Ent.* & Exit	Ent.* & Exit
Estimated exit BAC	Ent.	
Demographics	Ent.	Ent.
Perceived susceptibility: Alcohol	Ent. & Exit	Exit
Perceived severity: Alcohol	Ent. & Exit	Exit
Intentions: Alcohol	Ent. & Exit	Exit
Alcohol-Benefits	Ent. & Exit	Exit
Alcohol-Barriers	Ent. & Exit	Exit
Carbon Footprint	Exit	Ent. & Exit
Perceived susceptibility: Carbon Footprint	Exit	Ent. & Exit
Perceived severity: Carbon Footprint	Exit	Ent. & Exit
Intentions: Carbon Footprint	Exit	Ent. & Exit
Carbon-Benefits	Exit	Ent. & Exit
Carbon-Barriers	Exit	Ent. & Exit
Drinking at Bar	Exit	Exit
Quantity-Frequency	Follow-up	Follow-up
Continued Drinking	Follow-up	Follow-up
Alcohol-related problems after leaving the bar	Follow-up	Follow-up
Sexual Activity after leaving the bar	Follow-up	Follow-up
Alcohol Expectancies – Sex Related	Follow-up	Follow-up
Past Month Sexual History	Follow-up	Follow-up
Co-intervention & Contamination	Follow-up	Follow-up

*screener only

Table 4: Mapping Health Belief Constructs to Intervention Activity Targets and Measurement

Construct	Specific Topic	Item
Benefits to behavior change	Removal of Threats	If I monitor my drinking, I am less likely to get hurt.
	Missed Appointments	I have a lot to gain from drinking at safe levels.
Barriers to behavior change	Peer Pressure	My friends would make fun of me if I only have one drink.
	Having fun	I won't have fun tonight if I drink less.
Susceptibility to threat	Hangover	I feel that my chances of being hungover in the morning are good.
	Injury	My chances of being injured tonight are great.
	DUI	If I drive tonight, I will get a DUI.
	Caloric Intake	I worry about weight gain from drinking.
Severity of threat	Hangover	I'm afraid to even think about being hungover tomorrow.
	Injury	When I think about being injured tonight, my heart beats faster.
	DUI	Problems I would face from a DUI would last a long time.
	Caloric Intake	The thought of weight gain from drinking scares me.
***measures are exact wording on a 5-point anchored Likert scale**		

Table 5: Entrance Alcohol Health Belief Reliability Given ONLY to Alcohol Intervention Group

Item	Reliability (α)
Benefits to behavior change	0.34
If I monitor my drinking, I am less likely to get hurt.	
I have a lot to gain from drinking at safe levels.	
Barriers to behavior change	0.45
My friends would make fun of me if I only had a one drink.	
I won't have fun tonight if I drink less.	
Susceptibility to threat	0.03
My chances of being injured tonight are great.	
I feel that my chances of being hungover in the morning are good.	
If I drive tonight, I will get a DUI.	
I worry about weight gain from drinking tonight.	
Severity of threat	0.19
When I think about being injured tonight, my heart beats faster.	
I'm afraid to even think about being hungover tomorrow.	
Problems I would experience from a DUI would last a long time.	
The thought of a weight gain from drinking scares me.	

Table 6: Entrance Alcohol Health Belief Measures Given ONLY to Alcohol Intervention Group

Health Belief Construct Items	Mean (SD)	Range	Sample Size
Benefits to behavior change:			
If I monitor my drinking, I am less likely to get hurt.	4.0 (1.4)	1 – 5	77
I have a lot to gain from drinking at safe levels.	3.4 (1.5)	1 – 5	77
Barriers to behavior change:			
My friends would make fun of me if I only had a one drink.	1.9 (1.5)	1 – 5	77
I won't have fun tonight if I drink less.	2.0 (1.3)	1 – 5	77
Susceptibility to threat:			
My chances of being injured tonight are great.	1.3 (0.7)	1 – 5	77
I feel that my chances of being hungover in the morning are good.	1.7 (1.1)	1 – 5	77
If I drive tonight, I will get a DUI.	1.0 (0.0)	1 – 1	77
I worry about weight gain from drinking tonight.	2.0 (1.4)	1 – 5	77
Severity of threat:			
When I think about being injured tonight, my heart beats faster.	1.7 (1.0)	1 – 5	77
I'm afraid to even think about being hungover tomorrow.	1.5 (1.1)	1 – 5	77
Problems I would experience from a DUI would last a long time.	4.6 (1.1)	1 – 5	77
The thought of a weight gain from drinking scares me.	1.8 (1.2)	1 – 5	77

Likert scale (1 – 5) anchored at 1 – Not at All; 3 – Somewhat; 5 – Very Much

Table 7: Entrance Carbon Footprint Health Belief Reliability Given ONLY to Placebo Control Group

Item	Reliability (α)
Benefits to behavior change	0.27
I have a lot to gain from reducing my carbon footprint.	
Carpooling prevents future problems for me.	
Barriers to behavior change	0.25
In order to be green, I have to give up a lot.	
My friends would make fun of me if I only used one paper towel to dry my hands.	
Susceptibility to threat	-0.62
I worry about exposing myself to harmful chemicals.	
I will pollute tonight.	
Severity of threat	0.01
When I think about being exposed to harmful chemicals, my heart beats faster.	
Problems I would experience from a pollutant would last a long time.	

Table 8: Entrance Carbon Footprint Health Belief Measures Given ONLY to Placebo Control Group

Health Belief Construct Items	Mean (SD)	Range	Sample Size
Benefits to behavior change:			
I have a lot to gain from reducing my carbon footprint.	3.8 (1.4)	1 – 5	75
Carpooling prevents future problems for me.	3.7 (1.5)	1 – 5	75
Barriers to behavior change:			
In order to be green, I have to give up a lot.	2.7 (1.5)	1 – 5	75
My friends would make fun of me if I only used one paper towel to dry my hands.	1.5 (1.1)	1 – 5	75
Susceptibility to threat:			
I worry about exposing myself to harmful chemicals.	3.6 (1.5)	1 – 5	75
I will pollute tonight.	2.6 (1.4)	1 – 5	75
Severity of threat:			
When I think about being exposed to harmful chemicals, my heart beats faster.	2.4 (1.4)	1 – 5	75
Problems I would experience from a pollutant would last a long time.	3.8 (1.2)	1 – 5	75

Likert scale (1 – 5) anchored at 1 – Not at All; 3 – Somewhat; 5 – Very Much

Table 9: Reliability of Exit Health Belief Items

Item	Reliability (α)
Benefits to behavior change (alcohol)	0.40
If I monitor my drinking, I am less likely to get hurt.	
I have a lot to gain from drinking at safe levels.	
Barriers to behavior change (alcohol)	0.62
My friends would make fun of me if I only had a one drink.	
I won't have fun tonight if I drink less.	
Susceptibility to threat (alcohol)	0.35
My chances of being injured tonight are great.	
I feel that my chances of being hungover in the morning are good.	
If I drive tonight, I will get a DUI.	
I worry about weight gain from drinking tonight.	
Severity of threat (alcohol)	0.44
When I think about being injured tonight, my heart beats faster.	
I'm afraid to even think about being hungover tomorrow.	
Problems I would experience from a DUI would last a long time.	
The thought of a weight gain from drinking scares me.	
Benefits to behavior change (carbon footprint)	0.54
I have a lot to gain from reducing my carbon footprint.	
Carpooling prevents future problems for me.	
Barriers to behavior change (carbon footprint)	0.31
In order to be green, I have to give up a lot.	
My friends would make fun of me if I only used one paper towel to dry my hands.	
Susceptibility to threat (carbon footprint)	0.21
I worry about exposing myself to harmful chemicals.	
I will pollute tonight.	

Table 9 (Cont'd)

Item	Reliability (α)
Severity of threat (carbon footprint)	0.52
When I think about being exposed to harmful chemicals, my heart beats faster.	
Problems I would experience from a pollutant would last a long time.	

Table 10: Health Belief Items at Exit

Item	Overall Mean (SD)	Experimental Mean (SD)	Control Mean (SD)
Benefits to behavior change			
If I monitor my drinking, I am less likely to get hurt.	3.87 (1.52)	3.93 (1.40)	3.80 (1.64)
I have a lot to gain from drinking at safe levels.	3.85 (1.47)	3.62 (1.60)	4.08 (1.30)
Barriers to behavior change			
My friends would make fun of me if I only had a one drink.	1.84 (1.38)	1.78 (1.41)	1.84 (1.37)
I won't have fun tonight if I drink less.	1.89 (1.32)	1.77 (1.20)	2.00 (1.43)
Susceptibility to threat			
My chances of being injured tonight are great.	1.37 (0.86)	1.37 (0.81)	1.37 (0.88)
I feel that my chances of being hungover in the morning are good.	1.68 (1.19)	1.70 (1.19)	1.65 (1.19)
If I drive tonight, I will get a DUI.	2.12 (1.62)	2.08 (1.59)	2.16 (1.66)
I worry about weight gain from drinking tonight.	2.07 (1.51)	1.97 (1.44)	2.16 (1.59)
Severity of threat			
When I think about being injured tonight, my heart beats faster.	2.09 (1.37)	1.72 (1.13)	2.45 (1.49)***
I'm afraid to even think about being hungover tomorrow.	1.42 (1.02)	1.33 (0.94)	1.51 (1.10)
Problems I would experience from a DUI would last a long time.	4.51 (1.16)	4.59 (1.03)	4.44 (1.28)
The thought of a weight gain from drinking scares me.	2.07 (1.51)	1.87 (1.31)	2.27 (1.67)
Benefits to behavior change			
I have a lot to gain from reducing my carbon footprint.	4.13 (1.22)	4.03 (1.39)	4.24 (1.01)
Carpooling prevents future problems for me.	3.88 (1.46)	3.92 (1.50)	3.84 (1.42)

Table 10 (Cont'd)

Item	Overall Mean (SD)	Experimental Mean (SD)	Control Mean (SD)
In order to be green, I have to give up a lot.	2.41 (1.32)	2.37 (1.34)	2.45 (1.32)
My friends would make fun of me if I only used one paper towel to dry my hands.	1.33 (0.97)	1.29 (0.92)	1.37 (1.02)
Susceptibility to threat			
I worry about exposing myself to harmful chemicals.	2.41 (1.59)	1.97 (1.45)	2.85 (1.62)***
I will pollute tonight.	2.23 (1.42)	2.05 (1.38)	2.41 (1.45)
Severity of threat			
When I think about being exposed to harmful chemicals, my heart beats faster.	2.13 (1.34)	1.87 (1.14)	2.40 (1.47)*
Problems I would experience from a pollutant would last a long time.	3.42 (1.39)	3.20 (1.42)	3.64 (1.33)*

Likert scale (1 – 5) anchored at 1 – Not at All; 3 – Somewhat; 5 – Very Much

*$p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

Table 11: Alcohol Health Belief Items at Entrance & Exit by Alcohol Risk Condition

Item	Overall Mean (SD)	No/Low Risk Mean (SD)	At Risk Mean (SD)	High Risk Mean (SD)
Entrance: Benefits to behavior change				
If I monitor my drinking, I am less likely to get hurt.	4.03 (1.39)	4.14 (1.46)	4.08 (1.14)	3.83 (1.55)
I have a lot to gain from drinking at safe levels.	3.42 (1.48)	3.07 (1.56)	3.75 (1.48)	3.50 (1.35)
Entrance: Barriers to behavior change				
My friends would make fun of me if I only had a one drink.	1.88 (1.50)	1.72 (1.44)	1.54 (1.06)	2.42 (1.82)
I won't have fun tonight if I drink less.	1.97 (1.29)	1.86 (1.22)	1.88 (1.30)	2.21 (1.38)
Entrance: Susceptibility to threat				
My chances of being injured tonight are great.	1.29 (0.72)	1.17 (0.47)	1.33 (0.70)	1.38 (0.97)
I feel that my chances of being hungover in the morning are good.	1.68 (1.07)	1.45 (1.10)	1.58 (0.83)	2.04 (1.23)
If I drive tonight, I will get a DUI.	1.0 (0)	1.0 (0)	1.0 (0)	1.0 (0)
I worry about weight gain from drinking tonight.	2.00 (1.38)	2.14 (1.41)	1.96 (1.37)	1.88 (1.39)

Table 11 (Cont'd)

Item	Overall Mean (SD)	No/Low Risk Mean (SD)	At Risk Mean (SD)	High Risk Mean (SD)
Entrance: Severity of threat				
When I think about being injured tonight, my heart beats faster.	1.73 (0.98)	1.66 (0.94)	1.79 (0.98)	1.75 (1.07)
I'm afraid to even think about being hungover tomorrow.	1.53 (1.13)	1.55 (1.27)	1.46 (0.98)	1.58 (1.14)
Problems I would experience from a DUI would last a long time.	4.58 (1.13)	4.55 (1.12)	4.75 (0.90)	4.46 (1.35)
The thought of a weight gain from drinking scares me.	1.79 (1.27)	2.10 (1.40)	1.58 (1.10)	1.62 (1.25)
Exit: Benefits to behavior change				
If I monitor my drinking, I am less likely to get hurt.	3.93 (1.40)	3.96 (1.43)	4.04 (1.27)	3.79 (1.53)
I have a lot to gain from drinking at safe levels.	3.62 (1.60)	3.29 (1.76)	4.08 (1.38)	3.54 (1.56)
Exit: Barriers to behavior change				
My friends would make fun of me if I only had a one drink.	1.78 (1.41)	1.57 (1.20)	1.62 (1.31)	2.17 (1.69)
I won't have fun tonight if I drink less.	1.77 (1.20)	1.68 (1.19)	1.71 (1.08)	1.96 (1.36)

Table 11 (Cont'd)

Item	Overall Mean (SD)	No/Low Risk Mean (SD)	At Risk Mean (SD)	High Risk Mean (SD)
Exit: Susceptibility to threat				
My chances of being injured tonight are great.	1.32 (0.81)	1.36 (0.99)	1.50 (0.83)	1.25 (0.53)
I feel that my chances of being hungover in the morning are good.	1.70 (1.19)	1.86 (1.56)	1.38 (0.77)	1.83 (1.00)
If I drive tonight, I will get a DUI.	2.08 (1.59)	1.68 (1.34)	1.88 (1.51)	2.75 (1.78)*
I worry about weight gain from drinking tonight.	1.97 (1.44)	2.19 (1.50)	1.62 (1.25)	2.08 (1.56)
Exit: Severity of threat				
When I think about being injured tonight, my heart beats faster.	1.72 (1.13)	1.57 (1.07)	1.67 (1.00)	1.96 (1.30)
I'm afraid to even think about being hungover tomorrow.	1.33 (0.94)	1.26 (0.86)	1.17 (0.64)	1.58 (1.21)
Problems I would experience from a DUI would last a long time.	4.59 (1.03)	4.43 (1.17)	4.65 (0.98)	4.71 (0.91)
The thought of a weight gain from drinking scares me.	1.87 (1.31)	2.21 (1.37)	1.50 (1.02)	1.83 (1.44)

Likert scale (1 – 5) anchored at 1 – Not at All; 3 – Somewhat; 5 – Very Much

*$p \leq 0.05$

Table 12: Randomization Check

Variable	Overall	Condition	
		Experimental	Control
Ethnicity			
Hispanic/Latino	50 (33.3%)	26 (34.2%)	24 (32.4%)
Not Hispanic/Latino	100 (66.7%)	50 (65.8%)	50 (67.6%)
Race			
White	56 (40.0%)	31 (43.7%)	25 (36.2%)
Black/African American	13 (9.3%)	7 (9.9%)	6 (8.7%)
Asian	15 (10.7%)	5 (7.0%)	10 (14.5%)
Native American/Hawaiian	1 (0.7%)	1 (1.4%)	0 (0%)
Pacific Islander	12 (8.6%)	5 (7.0%)	7 (10.1%)
Other	43 (30.7%)	22 (31.0%)	21 (30.4%)
Sexual Orientation			
Gay	131 (87.4%)	66 (85.7%)	66 (89.2%)
Bisexual / Straight	19 (12.6%)	11 (14.3%)	8 (10.8%)
College Student			
Yes	62 (42.8%)	33 (45.8%)	29 (39.7%)
No	83 (57.2%)	39 (54.2%)	44 (60.3%)
HIV Status			
Positive	10 (8.8%)	6 (10.9%)	4 (6.9%)
Negative	98 (86.7%)	46 (83.6%)	52 (89.7%)
Unsure	5 (4.4%)	3 (5.5%)	2 (3.4%)
STD past year			
Yes	21 (18.6%)	9 (16.4%)	12 (20.7%)
No	93 (81.4%)	46 (83.6%)	46 (79.3%)
Heavy Episodic Drinking (HED) in past two weeks			
Yes	66 (58.4%)	34 (61.8%)	32 (55.2%)
No	47 (41.6%)	21 (38.2%)	26 (44.8%)
	Mean (SD)	**Mean (SD)**	**Mean (SD)**
Age	27.02 (6.10)	26.66(5.66)	27.39(6.54)
BrAC at Entrance	0.001 (0.005)	0.002(0.005)	0.000(0.003)***

***p<.0001

Table 13: Attrition Check

Variable	Overall	Follow-up Completion Status		
		Opted-Out	Didn't Complete	Completed
Condition				
Experimental	77 (50.7%)	8 (42.1%)	14 (70.0%)	55 (48.7%)
Control	75 (49.3%)	11 (57.9%)	6 (30.0%)	58 (51.3%)
Ethnicity				
Hispanic/Latino	100 (66.7%)	15 (78.9%)	13 (65.0%)	72 (64.9%)
Not Hispanic/Latino	50 (33.3%)	4 (21.1%)	7 (35.0%)	39 (35.1%)
Race				
White	56 (40.0%)	8 (44.4%)	7 (38.9%)	41 (39.4%)
Black/African American	13 (9.3%)	3 (16.7%)	2 (11.1%)	8 (7.7%)
Asian	15 (10.7%)	3 (16.7%)	1 (5.6%)	11 (10.6%)
Native American/ Hawaiian	1 (0.7%)	0 (0.0%)	0 (0.0%)	1 (1.0%)
Pacific Islander	12 (8.6%)	1 (5.6%)	3 (16.7%)	8 (7.7%)
Other	43 (30.7%)	3 (16.7%)	5 (27.8%)	35 (33.7%)
Sexual Orientation				
Gay	132 (87.4%)	14 (73.7%)	16 (80.0%)	102 (91.1%)
Bisexual / Straight	19 (12.6%)	5 (26.3%)	4 (20.0%)	10 (8.9%)
College Student				
Yes	62 (42.8%)	8 (44.4%)	10 (52.6%)	44 (40.7%)
No	83 (57.2%)	10 (55.6%)	9 (47.4%)	64 (59.3%)
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Age	27.02 (6.10)	26.63 (8.07)	26.40 (4.88)	27.19 (6.10)
BrAC at Entrance	0.001 (0.005)	0.000 (0.000)	0.001 (0.004)	0.002 (0.005)

n.s.

Table 14: Analyses by Hypothesis

Hypothesis	Analysis Technique	Dependent Variable	Independent Variable(s)
1: BrACs will be lower among those in the brief alcohol intervention group than those in the attention-placebo control group.	LMM	BrAC	Fixed: Tx Condition Random: Night Covary: HB item(s)
2: Among those in the alcohol intervention, difference between estimated exit BAC and actual exit BrAC will be greatest for those in the high-risk and at-risk groups, as compared to the low-risk group	LMM	Difference between eBAC and BrAC	Fixed: Baseline condition Random: Night Covary: HB item(s)
3: Those in the experimental group will be less likely than those in the control group to participate in continued drinking after leaving the bar.	Binary Logistic Regression (GEE approach)	Continued Drinking	IV: Condition Nesting by Night Covary: HB item(s)
4: Those in the experimental group will be less likely than those in the control group to drive after drinking.	Binary Logistic Regression (GEE approach)	DUI	IV: Condition Nesting by Night Covary: HB item(s)
4: Those in the experimental group will be less likely than those in the control group to experience hangover.	Binary Logistic Regression (GEE approach)	Hangover	IV: Condition Nesting by Night Covary: HB item(s)
4: Those in the experimental group will be less likely than those in the control group to engage in unplanned sexual activity.	Binary Logistic Regression (GEE approach)	Unplanned Sexual Activity	IV: Condition Nesting by Night Covary: HB item(s)

Table 14 (Cont'd)

Hypothesis	Analysis Technique	Dependent Variable	Independent Variable(s)
Exploratory 1: The brief alcohol intervention is as successful results in reductions in risky sexual behavior	Bivaraite explorator y analyses	Sexual Activity after Bar attendance	IV: Condition
Exploratory 2: Number of paper towels used to dry hands inside the bar will be lower among those in the attention-placebo control group than those in the brief alcohol intervention group.	LMM	Towels used in bar	Fixed: Tx Number of paper towels used Random: Night Covary: HB item(s)

Table 15: Descriptive characteristics of sample participating in the field portion of the study

Variable		Frequency	Percentage
Ethnicity			
	Hispanic/Latino	50	33.3
	Not Hispanic/Latino	100	66.7
Race			
	White	56	40.0
	Black/African American	13	9.3
	Asian	15	10.7
	Native American/Hawaiian	1	0.7
	Pacific Islander	12	8.6
	Other	43	30.7
Sexual Orientation			
	Gay	131	87.3
	Bisexual	18	12.0
	Straight	1	0.7
College Student			
	Yes	61	42.4
	No	83	57.6
Condition			
	Experimental	77	50.7
	Control	75	49.3
Variable	**Mean (SD)**	**Range**	**N**
Age	27.02 (6.10)	21-48	152
BrAC at Entrance	0.001 (.005)	0.000-0.020	152

Table 16: Entrance alcohol assessment given only to experimental alcohol intervention group

Variable	Frequency	Percentage
Work or Personal Plans Tomorrow		
Yes	54	70.1
No	23	29.9
Intend to reach what level of intoxication:		
Not buzzed	12	15.8
Slight buzz	39	51.3
A little drunk	21	27.6
Very drunk	4	5.3
Plan to continue drinking after leaving the bar		
Yes	5	6.5
No	72	93.5
Driving home?		
Yes	23	30.3
No	53	69.7
Intend to drink:		
Shots	12	15.6
Mixed Drinks	65	97.0
Beer	12	15.6

Variable	Mean (SD)	Range	N
Number of Drinks Intends to Drink	3.91 (2.39)	1-12	77
Hours plans to stay at bar	2.35 (0.81)	1.0-5.0	77

Table 17: Entrance carbon footprint assessment for those in the attention-placebo control condition only

Variable		Frequency	Percentage
Recycle			
	Yes	51	68.0
	No	24	32.0
Variable	**Mean (SD)**	**Range**	**N**
SDG&E Bill	50.4 (56.9)	0-300	69
Driving Distance	219.1 (149.3)	0-1000	75
Flights <4 hours	2.7 (4.5)	0-30	75
Flights >4 hours	1.8 (2.4)	0-12	75

Table 18: Descriptive statistics of items on the exit survey

Variable	Frequency	Percentage
Rate how you feel now		
Not buzzed	56	37.6
Slight buzz	49	32.9
A little drunk	33	22.1
Very drunk	11	7.4
Intend to drink that much		
Yes	81	56.2
No	63	43.8
Intend to use that many paper towels		
Yes	100	67.6
No	48	32.4

Variable	Mean (SD)	Range	N
Shots consumed	0.32 (0.89)	0-7	152
Beers consumed	0.26 (0.75)	0-5	152
Mixed drinks consumed	3.24 (2.47)	0-15	152
Wine consumed	0.03 (0.23)	0-2	149
Number of paper towels used	2.20 (3.15)	0-20	149
BrAC at Exit	0.056 (0.051)	0.000-0.251	143
BrAC at Exit+	0.052 (0.046)	0.000-0.176	140
BrAC difference	0.054 (0.050)	0.000-0.234	143
BrAC difference+	0.051 (0.045)	0.000-0.176	140

+with 3 outliers removed (outliers defined as ≥2.5 SD over the mean)

Table 19: Descriptive statistics from items in the follow-up survey

Variable	Frequency	Percentage
Follow-up completion status		
Opt-out	19	12.5
Not Reached	20	13.2
Complete	113	74.3
Frequency of Drinking		
Less than once/month	1	0.9
Once/month	5	4.4
Twice/month	10	8.8
3 times/month	2	1.8
Once/week	25	22.1
Twice/week	23	20.4
3 times/week	24	21.2
4 times/week	10	8.8
5 times/week	11	9.7
6 times/week	1	0.9
7 times/week	1	0.9
Heavy episodic drinking in past two weeks		
Yes	66	58.4
No	47	41.6
Continued drinking after exit survey		
Yes	15	13.3
No	98	86.7
Drove home after left bar		
Yes	45	33.8
No	88	66.2
Hungover the next day		
Yes	18	15.9
No	95	84.1
Sick from drinking		
Yes	2	1.8
No	111	98.2
Fall or injury due to drinking		
Yes	1	0.9
No	112	99.1
Unplanned sex after left bar		
Yes	7	6.2
No	106	93.8

Table 19 (Cont'd)

Variable	Frequency	Percentage
Eaten locally grown food since interview		
Yes	41	36.3
No	72	63.7
Eaten Organic food since interview		
Yes	70	61.9
No	43	38.1
Recycled since interview		
Yes	97	85.8
No	16	14.2
Purchased vintage clothes since interview		
Yes	7	6.2
No	106	93.8
Used refillable H2O bottle since interview		
Yes	68	60.2
No	45	39.8

Table 20: Bivariate comparison between treatment conditions of outcomes from both treatment conditions from the exit survey

Variable	Condition	
	Experimental Mean (SD)	Control Mean (SD)
BrAC at Exit	0.055 (0.046)	0.049 (0.046)
BrAC difference (Exit BrAC – Entrance BrAC)	0.054 (0.045)	0.049 (0.046)
Number of drinks	3.84 (2.34)	3.89 (2.83)
Number of paper towels used	2.91 (3.89)	1.51 (1.97)**

**p≤0.01

Table 21: Conditional univariate linear mixed model of BrAC at exit from bar, adjusted for nesting by week of data collection, n=140

Variable	Estimate (SE)	Odds Ratio (95% CI)
Intercept	0.050 (0.0060)	
Condition (Expt'l)	0.005 (0.0078)	1.00 (0.90 - 1.02)
Condition (Control)	-	-

n.s.

Table 22: ANOVA and Post-Hoc Between-Groups comparisons of the difference between estimated and actual exit BrAC by entrance risk group within the experimental condition

Risk Category	Estimated Exit BAC – Actual Exit BrAC Mean (SD)	n
No/Low Risk	-0.030 (0.048)	26
At Risk	-0.018 (0.045)	22
High Risk	0.030 (0.041)	24

F =12.21 * p≤0.001

Post-Hoc Comparisons Using Bonferroni Adjustment		
		Mean Difference
High Risk	At Risk	0.048**
	Low Risk	0.060***
At Risk	High Risk	-0.048**
	Low Risk	0.012
Low Risk	High Risk	-0.060***
	At Risk	-0.012

** p≤0.001

*** p≤0.0001

Table 23: Conditional Univariate Linear Mixed Model of difference between estimated exit BAC and actual exit BrAC by baseline alcohol risk category among participants in the experimental condition, adjusting for week of data collection as a random effect, n=140

Variable	Estimate (SE)	Odds Ratio (95% CI)
Intercept	-0.030 (0.0087)	
Risk Category (No/Low Risk)	-	-
Risk Category (At Risk)	0.012 (0.013)	1.01 (0.99 - 1.04)
Risk Category (High Risk)	0.065 (0.013)	1.07 (1.04 - 2.46)***

***p≤0.001

Table 24: Bivariate comparison between treatment conditions on alcohol-related problems as measured in the follow-up survey

Variable	Condition	
	Experimental	Control
Continued Drinking		
Yes	5 (9.1%)	10 (17.2%)
No	50 (90.9%)	48 (82.8%)
Drove Home		
Yes	18 (37.2%)	27 (42.2%)
No	37 (67.3%)	31 (53.4%)
Hungover		
Yes	12 (21.8%)	6 (10.3%)
No	43 (78.2%)	52 (89.7%)
Get Sick		
Yes	2 (3.6%)	0 (0%)
No	53 (96.4%)	58 (100%)
Fall or Get Injured		
Yes	1 (1.8%)	0 (0%)
No	54 (98.2%)	58 (100%)
Unplanned Sex		
Yes	5 (9.1%)	2 (3.4%)
No	50 (90.9%)	56 (96.6%)

n.s.

Table 25: Binary Logistic Regression using Morel's adjustment for the GEE method to predict continued drinking adjusted for clustering by week of data collection as measured at follow-up, n=113

Variable	Estimate (SE)	Odds Ratio (95% CI)
Intercept	1.94 (0.29)	
Condition (experimental)	-0.37 (0.29)	0.48 (0.15 - 1.52)
Condition (control)	-	-

n.s.

Table 26: Binary Logistic Regression using Morel's adjustment for the GEE method to predict alcohol-related problems adjusted for week of data collection as measured at follow-up, n=113

Dependent Variable Model Variable	Estimate (SE)	Odds Ratio (95% CI)
Drove		
Intercept	0.43 (0.20)	
Condition (experimental)	-0.29 (0.20)	0.56 (0.26 - 1.21)
Condition (control)	-	-
Hangover		
Intercept	1.72 (0.27)	
Condition (experimental)	0.44 (0.27)	2.42(0.83 - 7.05)
Condition (control)	-	-
Unplanned Sex		
Intercept	2.82 (0.43)	
Condition (experimental)	0.52 (0.43)	2.80 (0.50 - 15.31)
Condition (control)	-	-

n.s.

Table 27: Descriptive statistics and bivariate comparison between treatment conditions of sex-related alcohol expectancies, as measured in the follow-up survey

Variable: When I drink enough alcohol to feel the effects, I...	Overall	Condition	
		Experimental	Control
Average of Enhanced Sex Items	0.92 (0.77)	1.59 (0.74)	1.71 (0.83)
Feel closer to a sexual partner	0.96 (1.06)	0.84 (1.05)	1.07 (1.07)
Am a better lover	0.55 (0.87)	0.49 (0.86)	0.60 (0.88)
Am more sexually responsive	1.04 (1.02)	0.96 (0.98)	1.10 (1.05)
Get horny	1.32 (0.99)	1.22 (1.07)	1.41 (0.92)
Enjoy sex more	0.72 (0.82)	0.60 (0.83)	0.83 (0.80)
Average of Decreased Nervousness Items	1.65 (0.79)	1.59 (0.74)	1.71 (0.83)
Feel less self-conscious	1.56 (1.13)	1.49 (1.07)	1.62 (1.20)
Am less nervous about sex	1.33 (1.15)	1.18 (1.12)	1.47 (1.16)
Am more self-confident	1.79 (1.05)	1.76 (1.04)	1.81 1.07)
Become more forward	2.02 (1.00)	2.02 (0.99)	2.02 (1.01)
Feel less shy	1.97 (0.97)	1.96 (0.94)	1.98 (1.00)
Lose my inhibitions	1.24 (1.02)	1.13 (1.00)	1.34 (1.04)
Average of Increased Riskiness Items	0.96 (0.98)	0.98 (0.95)	0.93 (1.02)
Have sex with people that I wouldn't have sex with when I was sober	0.86 (1.06)	0.95 (1.10)	0.78 (1.03)
Am more likely to do something sexually that is risky	1.05 (1.08)	1.02 (0.99)	1.09 (1.17)

n.s.

Table 28: Descriptive statistics and bivariate comparison between treatment conditions of past month sexual activity, as measured in the follow-up survey

Item	Overall	Experimental	Control
	Mean (SD)	Mean (SD)	Mean (SD)
With Main Partner:			
Received Oral Sex			
With condom	0.08 (0.60)	0.00 (0.00)	0.16 (0.83)**
Without condom and with ejaculation	2.55 (6.43)	1.78 (5.51)	3.28 (7.17)*
Without condom and without ejaculation	1.54 (4.41)	1.22 (4.25)	1.84 (4.57)
Gave Oral Sex			
With condom	0.10 (0.76)	0.00 (0.00)	0.19 (1.05)**
Without condom and with ejaculation	2.76 (7.46)	1.93 (5.66)	3.55 (8.82)*
Without condom and without ejaculation	1.44 (4.29)	0.96 (3.15)	1.90 (5.13)*
Insertive Anal Sex			
With condom	0.69 (2.80)	0.22 (1.12)	1.14 (3.72)***
Without condom and with ejaculation	1.17 (4.69)	1.33 (5.76)	1.02 (3.42)
Without condom and without ejaculation	0.19 (1.04)	0.33 (1.43)	0.07 (0.41)*
Receptive Anal Sex			
With condom	1.21 (3.77)	1.16 (3.81)	1.26 (3.76)
Without condom and with ejaculation	1.16 (4.64)	0.84 (2.81)	1.47 (5.89)
Without condom and without ejaculation	0.48 (2.16)	0.33 (1.17)	0.62 (2.80)
Vaginal Sex			
With condom	0.02 (0.19)	0.00 (0.00)	0.03 (0.26)*
Without condom and with ejaculation	0.04 (0.38)	0.00 (0.00)	0.07 (0.53)*
Without condom and without ejaculation	0.04 (0.38)	0.00 (0.00)	0.07 (0.53)*

Table 28 (Cont'd)

Item	Overall Mean (SD)	Experimental Mean (SD)	Control Mean (SD)
With Main Partner:			
Received Oral Sex			
With condom	0.08 (0.60)	0.00 (0.00)	0.16 (0.83)**
Without condom and with ejaculation	2.55 (6.43)	1.78 (5.51)	3.28 (7.17)*
Without condom and without ejaculation	1.54 (4.41)	1.22 (4.25)	1.84 (4.57)
Gave Oral Sex			
With condom	0.10 (0.76)	0.00 (0.00)	0.19 (1.05)**
Without condom and with ejaculation	2.76 (7.46)	1.93 (5.66)	3.55 (8.82)*
Without condom and without ejaculation	1.44 (4.29)	0.96 (3.15)	1.90 (5.13)*
Insertive Anal Sex			
With condom	0.69 (2.80)	0.22 (1.12)	1.14 (3.72)***
Without condom and with ejaculation	1.17 (4.69)	1.33 (5.76)	1.02 (3.42)
Without condom and without ejaculation	0.19 (1.04)	0.33 (1.43)	0.07 (0.41)*
Receptive Anal Sex			
With condom	1.21 (3.77)	1.16 (3.81)	1.26 (3.76)
Without condom and with ejaculation	1.16 (4.64)	0.84 (2.81)	1.47 (5.89)
Without condom and without ejaculation	0.48 (2.16)	0.33 (1.17)	0.62 (2.80)
Vaginal Sex			
With condom	0.02 (0.19)	0.00 (0.00)	0.03 (0.26)*
Without condom and with ejaculation	0.04 (0.38)	0.00 (0.00)	0.07 (0.53)*
Without condom and without ejaculation	0.04 (0.38)	0.00 (0.00)	0.07 (0.53)*

*p ≤ 0.05
** p ≤ 0.01
*** p ≤ 0.001

Table 29: Descriptive statistics and bivariate comparison between treatment conditions of reported sexual activity on night of intervention, as measured in the follow-up survey

Variable	Overall	Condition	
		Experimental	Control
Hand-genital contact			
Yes	14 (12.4%)	5 (9.1%)	9 (15.5%)
No	99 (87.6%)	50 (90.9%)	49 (84.9%)
Oral sex with condom			
Yes	0 (0%)	0 (0%)	0 (0%)
No	113 (100%)	55 (100%)	58 (100%)
Received oral sex without condom			
Yes	12 (10.6%)	4 (7.3%)	8 (13.8%)
No	101 (89.4%)	51 (92.7%)	50 (86.2%)
Gave oral sex without condom			
Yes	12 (10.6%)	4 (7.3%)	8 (13.8%)
No	101 (89.4%)	51 (92.7%)	50 (86.2%)
Anal sex with condom			
Yes	6 (5.3%)	3 (5.5%)	3 (5.2%)
No	107 (94.7%)	52 (94.5%)	55 (94.8%)
Unprotected insertive anal sex			
Yes	4 (3.5%)	1 (1.8%)	3 (5.2%)
No	109 (96.5%)	54 (98.2%)	55 (94.8%)
Unprotected receptive anal sex			
Yes	1 (0.9%)	0 (0%)	1 (1.7%)
No	112 (99.1%)	55 (100%)	57 (98.3%)

n.s.

Table 30: Conditional univariate linear mixed model of number of paper towels by condition, adjusting for week of data collection as a random effect, n=149

Variable	Estimate (SE)	Odds Ratio (95% CI)
Intercept	1.49 (0.40)	
Condition (Expt'l)	1.38 (0.50)	3.99 (1.47 – 10.70)**
Condition (Control)	-	-

** $p \leq 0.01$

Table 31: Bivariate comparison between treatment conditions of carbon footprint items as measured in the follow-up survey

Variable	Condition	
	Experimental	Control
Locally grown food since intervention		
Yes	16 (29.1%)	25 (43.1%)
No	39 (70.9%)	33 (56.9%)
Organic food since intervention		
Yes	30 (54.5%)	40 (69.0%)
No	25 (45.5%)	18 (31.0%)
Recycled since intervention		
Yes	47 (85.5%)	50 (86.2%)
No	8 (14.5%)	8 (13.8%)
Purchased Vintage Clothes since intervention		
Yes	3 (5.5%)	4 (6.9%)
No	52 (94.5%)	54 (93.1%)
Used refillable H2O bottle since intervention		
Yes	29 (52.7%)	39 (67.2%)
No	26 (47.3%)	19 (32.8%)

n.s.

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