Year : 2016

ALCOHOL HARM-REDUCTION APPROACHES ACROSS DIFFERENT POPULATIONS

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GRAZIOLI Véronique, 2016, ALCOHOL HARM-REDUCTION APPROACHES ACROSS DIFFERENT POPULATIONS

Originally published at : Thesis, University of Lausanne

Posted at the University of Lausanne Open Archive http://serval.unil.ch
Document URN : urn:nbn:ch:serval-BIB_318AC1283EE90

UNIL | Université de Lausanne
Faculté de biologie
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Département Universitaire de Médecine et de Santé Communautaires

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Thèse de doctorat ès sciences de la vie (PhD)

présentée à la

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par

Véronique S. GRAZIOLI

Master en psychologie de l'Université de Genève

Jury

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Prof. Jean-Bernard Daeppen, Directeur de thèse
Prof. Mary Larimer, Co-directrice
Prof. Susan Collins, Co-directrice
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UNIVERSITY of WASHINGTON

UNIL | Université de Lausanne
Faculté de biologie et de médecine

Ecole Doctorale
Doctorat ès sciences de la vie

Imprimatur

Vu le rapport présenté par le jury d'examen, composé de

Président·e	Monsieur Prof. Alexandre **Berney**
Directeur/rice	Monsieur Prof. Jean-Bernard **Daeppen**
Co-directeurs/rices	Madame Prof. Mary **Larimer**
	Madame Prof. Susan **Collins**
Expert·es	Madame Dre Barbara **Broers Kayser**
	Monsieur Prof. Jacques **Besson**

le Conseil de Faculté autorise l'impression de la thèse de

Madame Véronique Grazioli

Titulaire d'un "Master" en psychologie de l'Université de Genève

intitulée

ALCOHOL HARM-REDUCTION APPROACHES ACROSS DIFFERENT POPULATIONS

Lausanne, le 23 mai 2016

pour le Doyen
de la Faculté de biologie et de médecine

A. Berney

Prof. Alexandre Berney

Table of Contents

Acknowledgements

First, I would like to particularly thank Prof. Jean-Bernard Daeppen for his trust, constant enthusiasm, support and guidance and for all his scientific and publication insights. My gratitude extends to Prof. Mary Larimer for warmly welcoming me in her lab and offering the opportunity to immerse myself in the world of research in a highly supportive environment. I am deeply grateful for her constant support, training and mentoring. I would like to express my deep gratitude to Prof. Susan Collins for tremendous efforts from the beginning to the end of this work. Her constant support, training, mentoring and dedication as well as her enthusiasm made the completion of this dissertation possible. I also want to thank both Profs. Mary Larimer and Susan Collins for sharing data making four out of the five studies comprised in this work possible.

I want to thank Prof. Melissa Lewis for her training, inspiring mentoring and her scientific and publication insights. I would like to acknowledge all colleagues within the Department of Psychiatry and Behavioral Sciences at the University of Washington with whom I could daily exchange ideas and who were always willing to help: Tiara Dillworth, Nicole Fossos, Tim Pace, Christine Lee, Jason Kilmer, Seema Clifasefi and Emily Taylor. I also want to acknowledge Sophie Paroz for her support, her advice and for her careful draft editing, and Caroline Graap for her remarkable humanistic and clinical skills that made the study at the drop-in center possible. My acknowledgements extends to all other colleagues I have not previously cited who have co-authored papers comprised in this work: Jennifer Hicks, Greta Kaese, James Lenert, Katie Witkiewitz, Claes Andersson, Haley Carroll, Mats Berglund and Lisa Garberson. I also want to thank Samantha Chalker, Laura Haelsig, Gail Hoffman, Jennifer Holttum, Ami Kanagawa, Maya Nehru, Anthony Olds, and Morgan Quick for their help with data entry and management; and Drs. Mark Duncan and Brian Smart for their assessment and management of the data collection.

This dissertation would not have been possible without the support of the funding agencies: The Swiss Alcohol Research Foundation (FSRA 229), the Swiss National Science Foundation (SNSF; grant # PP1LAP3 – 148418) and the *Commission de Promotion de la Santé et de la Lutte contre les Addictions (CPSLA)*. I am highly grateful to all participants who spent time answering questionnaires. I also thank the staff at the drop-in center for their collaboration on the study. I want to thank Profs. Jacques Besson and Barbara Broers who carefully followed progress of my PhD and Professor Alexandre Berney who was willing to participate in my final defense committee at the last moment.

I am deeply grateful to all my friends and particularly to Anne-Julie, Alicia and Marianne, and my sister Viviane for their constant support and for the source of motivation they represent in my life. I am particularly thankful to my parents for always believing in me, for their unconditional support and for all the hours of baby-sitting they offered allowing me to make progress on my work. My deepest gratitude extends to my husband Serge and my two children Romain and Camille. I am grateful to my children for having accepted to share me with research these past years and for representing inexhaustible sources of inspiration and motivation every day. Finally I am deeply grateful to Serge who has been a real coach in this PhD adventure from beginning to the very end. His endless patience, his wisdom, his tremendous energy and his commitment highly contributed to make this work possible.

Summary

Context. Certain populations, such as socially marginalized individuals and late adolescents (i.e., aged 17-19), are more prone than others to experience severe alcohol-related harm. However, these populations are often not interested in attaining alcohol abstinence or reducing alcohol consumption to moderate levels. Thus, their needs are not met within traditional primarily abstinence-based service options. In response, harm-reduction approaches have begun to be applied with these populations. The overall aim of this thesis was to contribute to the research on alcohol-related harm reduction in these populations by conducting 5 distinct studies. The two first studies were conducted with chronically homeless individuals with alcohol problems in the US: Study 1 examined their perceptions of twelve-step mutual-help groups (TMGs) and their association with treatment attendance, motivation and alcohol outcomes, whereas study 2 examined this population's use of safer-drinking strategies. Study 3 evaluated substance-use and related problems following exposure to a harm-reduction drop-in center that allows alcohol consumption onsite among socially marginalized alcohol and other drug (AOD) users in Switzerland. Studies 4 and 5 were conducted among US and Swedish high school seniors and prospectively tested a) the moderating effect of drinking intentions on the association between use of protective behavioral strategies (PBS) and alcohol outcomes, and b) the moderating effect of PBS use on the link between alcohol expectancies and alcohol outcomes.

Findings. Study 1 found that most chronically homeless individuals with alcohol problems endorsed negative perceptions of TMGs, which were in turn associated with less treatment attendance. Study 2 found that chronically homeless individuals with alcohol dependence were interested in drinking safer and were able to commit to using safer-drinking strategies. Study 3 showed that exposure to a harm-reduction drop-in center that allows alcohol consumption onsite was followed by significant decrease in alcohol use and related problems among socially marginalized AOD users in Switzerland, with greater attendance being related to additional improvement in mental health-related quality of life (QoL) and decrease in drug-related problem severity. Finally, studies 4 and 5 showed that use of PBS was related to future decreases in alcohol use and related consequences among US and Swedish high school seniors. Findings also showed significant interactions between drinking intentions and PBS use (study 4), and between alcohol expectancies and PBS use (study 5).

Conclusion. Taken together, findings confirmed that socially marginalized individuals and high school seniors show low interest in traditional approaches aiming abstinence or use reduction. Findings documented, however, that these distinct populations embrace alcohol harm-reduction approaches and that these approaches appear to be related to decreases in alcohol-related harm. Taken together, these findings suggest that alcohol harm-reduction approaches are promising ways to decrease alcohol-related harm across different populations and different cultures (i.e., US, Sweden, Switzerland).

Résumé

Contexte. Malgré leurs besoins importants en matière de traitement alcoologique, les personnes socialement marginalisées sont souvent sous-traitées par les traitements visant l'abstinence ou la consommation modérée. Similairement, les approches préventives promouvant l'abstinence ne suscitent généralement que peu d'intérêts et d'effets positifs au sein des jeunes (gymnasiens par exemple), qui sont pourtant connus pour leur usage d'alcool à risque. En réponse, les interventions ciblant ces populations intègrent de plus en plus des principes de réduction des risques et des méfaits. L'objectif général de ce travail de thèse était de contribuer à la recherche dans ce domaine en réalisant 5 études distinctes. Les deux premières études ont été conduites au sein de personnes sans-abris chroniques présentant un problème d'alcool aux États-Unis: L'étude 1 a examiné leurs perceptions des groupes d'entraide mutuelle en douze étapes (GEMs), et l'association entre ces perceptions et la fréquentation des traitements, la motivation et l'usage d'alcool. L'étude 2 a examiné l'usage des stratégies de consommation plus sûre au sein de cette population. L'étude 3 a évalué l'évolution de l'usage de substances et des problèmes associés après l'exposition à un espace d'accueil de jour tolérant la consommation d'alcool au sein de personnes socialement marginalisées en Suisse. Enfin, les études 4 et 5 ont été conduites parmi des gymnasiens aux États-Unis et en Suède et ont testé prospectivement a) l'effet modérateur des intentions de consommer sur le lien entre l'utilisation de stratégies de protection comportementales (SPCs) et l'usage d'alcool, et b) l'effet modérateur de l'usage de SPCs sur le lien entre les attentes liées à l'usage d'alcool et la consommation d'alcool.

Résultats. L'étude 1 a montré que la plupart des participants avaient des perceptions négatives des GEMs et que ces perceptions étaient associées négativement à la fréquentation des traitements. L'étude 2 a montré que les participants étaient intéressés à réduire les risques liés à leur usage d'alcool et qu'ils pouvaient s'engager à utiliser des stratégies de consommation plus sûre. L'étude 3 a montré que les participants ont diminué leur usage d'alcool et les problèmes associés au cours de l'évaluation et que chaque mois supplémentaire passé au sein de l'espace d'accueil était associé à une diminution supplémentaire de la sévérité des problèmes liés aux drogues et à une amélioration de la qualité de vie liée à la santé mentale. Les études 4 et 5 ont indiqué que l'usage de SPCs était prospectivement associé à une diminution de la consommation d'alcool et des conséquences associées. Les résultats ont également montré des interactions significatives entre l'usage des SPCs et a) les intentions de consommer (étude 4), et b) les attentes liées à l'alcool (étude 5).

Conclusion. Globalement, les études comprises dans ce travail de thèse confirment que les approches visant l'abstinence et la consommation modérée ne suscitent que peu d'intérêt au sein des personnes socialement marginalisées et des gymnasiens. Notre travail indique toutefois que ces populations acceptent les approches visant la réduction des risques et des méfaits et que celles-ci semblent être associées à une diminution des méfaits liés à l'usage d'alcool. De manière générale, ces résultats suggèrent que ces approches sont prometteuses au sein de différentes populations issues de cultures diverses (États-Unis, Suède, Suisse).

Introduction

Alcohol Use as a Major Public Health Problem

Alcohol use is widespread and represents a major public health problem. Worldwide, up to 48% of individuals aged 15 or older report being current drinkers, with the highest prevalence in European and North American countries (i.e., 66.4% and 61.5% respectively; World Health Organization, 2014). Importantly, epidemiological studies consistently show that hazardous drinking behaviors are common among drinkers. Hazardous drinking refers to the general level of alcohol consumption (i.e., 20g and 40g/ day or more of pure alcohol for women and men respectively) or pattern of drinking (i.e., HED: consuming 60g or more of pure alcohol consumed quickly on a single, discrete occasion) that are likely to result in harm if these behaviors persist (Babor, Campbell, Room, & Saunders, 1994). For instance, up to 22.9% of current drinkers in both North American and European countries report at least one HED per month (World Health Organization, 2014). Moreover, a sizable proportion of drinkers experience alcohol-use disorders (AUDs; alcohol abuse or alcohol dependence). In fact, in 2010, up to 7.5% and 6% of individuals aged 15 and more had AUDs in European and North American countries respectively (World Health Organization, 2014).

Alcohol use is associated with negative consequences, for both individuals and society at large. Alcohol plays a causal role in more than 200 health conditions (e.g. liver cirrhosis, pancreatitis, liver cancer, pneumonia, depressive disorders), accounting for 5.9% of all deaths worldwide (i.e., 3.3 million deaths every year; World Health Organization, 2014). Beyond health-related consequences, alcohol causes harm to society as a whole through, for example, increased strain on the health care and criminal justice

systems and increased associated costs. A recent epidemiologic survey conducted by the World Health Organization (2014) found that 5.1% of the global burden of disease was attributable to alcohol use. Finally, even nondrinkers experience secondary alcohol problems, such as property damage, injuries (e.g., traffic crashes), and verbal, physical and sexual violence (World Health Organization, 2014).

Access and Use of Alcohol Treatment

Given the extent of negative consequences that stem from alcohol use, it is important to provide affected individuals (i.e., hazardous drinkers; individuals with AUDs) access to interventions. Unfortunately, most affected individuals do not enter treatment. A US population-based survey conducted in 2013 indicated that 21.6 million individuals aged 12 or older needed treatment for substance-use disorders (i.e., classified as having substance abuse or dependence), yet only 4.1 million actually received it (Substance Abuse and Mental Health Services Administration, 2014).

Several perceived barriers to treatment have been identified in the literature, including the lack of confidence in treatment and its effectiveness or the fear of stigmatization (Grant, 1997; Saunders, Zygowicz, & D'Angelo, 2006; Tucker, Vuchinich, & Rippens, 2004). A recent US population-based study further evaluating barriers to treatment among individuals with substance-use disorders (e.g., alcohol or illicit drug) shed light on other barriers to treatment, such as financial and practical concerns, lack of information about treatment opportunities, or not being ready to stop using substances (Substance Abuse and Mental Health Services Administration, 2014). In fact, findings indicated the latter reason to be one of the most endorsed, with more than 40% of

respondents stating they did not seek treatment because they were not ready to stop using (Substance Abuse and Mental Health Services Administration, 2014).

In contrast, alcohol treatment has focused primarily on the achievement of complete and permanent abstinence. This approach stems from the disease model, which regards alcohol dependence as being a progressive, chronic and potentially fatal illness that is characterized by an inability to control drinking (Jellinek, 1960). This model holds that abstinence is the only viable pathway to recovery. As noted above, however, a sizable proportion of individuals with substance use disorders do not enter treatment because they are not interested, ready or willing to stop using (Substance Abuse and Mental Health Services Administration, 2013). Thus, an insistence on abstinence as the most desirable outcome may prevent affected individuals from successful treatment engagement and completion.

Alternatives to Abstinence-based Treatment

Brief interventions and brief motivational interventions. Given many drinkers disinterest in abstinence-based approaches, researchers began developing and evaluating interventions that offered drinking moderation or controlled drinking goals as alternatives to abstinence-based treatment (Davies, 1962; Sobell & Sobell, 1973, 1976). The resulting research showed that individuals previously diagnosed with alcohol dependence were able to return to moderate drinking (Davies, 1962; Sobell & Sobell, 1973, 1976), which was defined as "limited, non-problem-drinking" (Sobell & Sobell, 1976, p. 210). These findings contradicted the predominant disease model that considered alcohol dependence as a progressive disease characterized by the inability to control drinking (Jellinek, 1960).

Despite their promising findings, controlled and moderate drinking interventions were surrounded by controversy (Marlatt, 1983; Roizen, 1987) and were not widely adopted within alcohol treatment settings (Morse & Flavin, 1992; Willenbring, 2010).

In the 1980s, researchers focused on the development and evaluation of brief interventions (BIs) for drinkers in primary care settings (e.g., Chick, Lloyd, & Crombie, 1985; Heather, 2006; Kristenson, Ohlin, Hulten-Nosslin, Trell, & Hood, 1983). BIs for drinking have typically focused on helping less severely affected drinkers consider abstinence or drinking moderation (Bien, Miller, & Tonigan, 1993; Miller & Wilbourne, 2002). Although they can vary widely in target populations, goals, contacts, structure and content, BIs typically comprise feedback on alcohol use and related problems, identification of alcohol-related high-risk situations and coping strategies, and a personal plan to reduce drinking (Kaner et al., 2009). In general, literature has found BIs to be as effective as more intensive treatment and has shown their efficacy in reducing drinking among individuals with AUDs (Bien et al., 1993; Miller & Wilbourne, 2002).

Eventually, the brief and flexible BI structure was combined with motivational interviewing (i.e., collaborative, person-centered form of guiding aiming to elicit and strengthen motivation to change; Miller & Wilbourne, 2002) to create brief motivational interventions (BMIs) (Miller & Wilbourne, 2002; Rollnick, Heather, & Bell, 1992). BMIs typically consist of 20-60 minute sessions and focus on enhancing motivation to make positive alcohol-related behavior changes (Miller & Wilbourne, 2002). As with motivational interviewing, BMIs use a client-centered style paired with unconditional positive regard and a collaborative stance. BMIs have received strong support in the literature across a range of treatment providers and populations in various settings,

including medical (i.e., among hazardous drinkers who were not seeking alcohol treatment; Kaner et al., 2009), military (i.e., among young men; Daeppen et al., 2011), educational (i.e., among college students; Larimer & Cronce, 2007), and other settings (e.g., workplace, targeting hazardous drinking employees; Osilla, Zellmer, Larimer, Neighbors, & Marlatt, 2008).

Documenting the need for further alternative interventions for special populations: Socially marginalized individuals and youths. Research on controlled drinking, BIs and BMIs introduced the concept of alternative treatment (or intervention) goals to abstinence. The vast majority of these interventions, however, continued to focus on reduced use or abstinence as primary goals (Heather, 2006). Despite the success of these approaches, research has indicated that certain populations are uninterested in achieving abstinence or reducing drinking to "moderate" (i.e., up to one drink or 14g of pure alcohol and two drinks or 28g of pure alcohol for men and women, respectively; National Institute on Alcohol Abuse and Alcoholism, 2011) or "low-risk" (i.e., less than 20g and 40 g/day of pure alcohol for women and men, respectively;Gmel, Kuendig, Notari, & Gmel, 2015) levels.

Socially marginalized individuals (e.g., homeless individuals) and youths represent such populations. Indeed, although really distinct in their alcohol-related problem levels and needs (i.e., treatment for socially marginalized individuals vs. preventive interventions for youths), these two populations share the particularity of evinicing little interest in traditional approaches.

Literature indicates that very few socially marginalized individuals (e.g., homeless individuals, drug users) with substance-use disorders enter traditional treatment (Reissner et al., 2012; Wenzel et al., 2001) and even fewer complete it (Orwin, Garrison-Mogren, Jacobs, & Sonnefeld, 1999). Furthermore, traditional treatment has been related to modest improvements in substance outcomes among the few socially marginalized individuals who complete it (Hwang, Tolomiczenko, Kouyoumdjian, & Garner, 2005; Zerger, 2002). In fact, a NIAAA review of US alcohol and drug treatment documented that treatement engagement in these populations decreases as treatment demand (i.e., abstinence from substances; Orwin et al., 1999). Relatedly, it has been argued that socially marginalized individuals have such a low baseline level of quality of life (QoL) that they may see little advantage to changing their drinking behaviors (Heather, 2006). Echoing this view, a recent qualitative study documented that alcohol played central roles in these individuals' lives: It staved off acute and potentially life-threatening alcohol withdrawal, allowed for self-medication of psychiatric symptoms, and contributed to a sense of community (Collins, Clifasefi, et al., 2012). Thus, considering these findings as well as the modest effectiveness of traditional approaches in these populations, it is not surprising that these individuals mostly perceive traditional approaches and abstinence-based goals as undesirable (Collins, Clifasefi, et al., 2012; Collins et al., 2015; Padgett, Henwood, Abrams, & Davis, 2008).

Standind at the opposite side of the spectrum, youth (i.e., high school seniors aged 17-19; college students; non college-attending 18-22 young adults) comprises another population that is typically not interested in use-reduction or abstinence-based approaches (e.g., preventive interventions promoting abstinence in youths). Research has consistently

documented that excessive drinking (i.e., heavy episodic drinking: having 5 or more drinks in a row for a men and 4 or more for women; Wechsler, Dowdall, Davenport, & Castillo, 1995) is common (Gmel et al., 2015; Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2014), normative, widely accepted and even encouraged by peers in these populations (Bahr, Hoffmann, & Yang, 2005; Borsari & Carey, 2001; Jamison & Myers, 2008; Kelly, 2011; Larimer et al., 2011; Scull, Kupersmidt, Parker, Elmore, & Benson, 2010). These populations are therefore typically more interested in reducing alcohol-related harm than in reducing drinking itself or maintaining abstinence (Araas & Adams, 2008; Delva et al., 2004; Martens et al., 2004; Skewes & Gonzalez, 2013), and traditional "zero tolerance" (i.e., aiming abstinence) interventions (e.g., Drug Abuse Resistance Education, DARE) have been consistently found to be non-efficacious in reducing alcohol use and related harm in these populations (Lynam et al., 1999).

Harm-reduction approaches. In response, alcohol harm-reduction approaches have been increasingly applied with these two populations (Collins, Saxon, et al., 2014; Kelly, 2011; Larimer et al., 2009; Podymow, Turnbull, Coyle, Yetisir, & Wells, 2006; Tsemberis, Gulcur, & Nakae, 2004). Alcohol harm-reduction approaches provide an alternative to use-reduction and abstinence-based interventions that may better fit these populations' goals, expectations and needs. Harm-reduction approaches are focused on reducing harm and improving QoL without necessarily requiring reduction in alcohol use (Heather, 2006). The overall aim of this thesis was to examine outcomes related to the recent expansion of these efforts within these two distinct populations.

Harm reduction comprises a set of compassionate and pragmatic approaches that tries to meet substance users where they are at and aims to a) increase QoL and b)

decrease substance-related harm for both affected individuals and their communities (Collins, Clifasefi, et al., 2011; Marlatt, 1996). Harm reduction encompasses a broad array of individual, community, and policy interventions that can be applied across various high-risk behaviors (Ball, 2007; Collins, Clifasefi, et al., 2011; Degenhardt et al., 2010; Des Jarlais & Friedman, 1987; Des Jarlais et al., 1996; Grund, Kaplan, & Adriaans, 1991; Heather, 2006; Marlatt & Witkiewitz, 2010). In the present thesis, we explore harm-reduction approaches that focus on improving individuals' QoL and reducing alcohol-related harm among socially marginalized individuals and in youth (i.e., high school seniors).

After reviewing prior alcohol harm-reduction research findings in these populations, we present the thesis aims and how they built upon existing findings to contribute to this research field. For the sake of clarity and given the specificities of these two distinct populations, past research and overall dissertation aims are presented separately for 1) socially marginalized individuals, and 2) youths.

Alcohol Harm-Reduction Approaches Among Socially Marginalized Individuals

Social marginalization refers to the "position of individuals, groups or populations outside of mainstream society, living at the margins of those in the center of power, of cultural dominance and economical social welfare" (Schiffer & Schatz, 2008, p.6). Social marginalization is an umbrella term that has been used to describe various populations, including precariously housed and homeless individuals, social assistance recipients, and substance users (Pedersen, Gronbaek, & Curtis, 2012; Room, 2005).

Homeless individuals. An example of socially marginalized individuals is the homeless population. In the US, 578,424 individuals were estimated to be homeless on a given night in 2014 (National Alliance to End Homlessness, 2015). Homeless individuals are often multiply affected by medical, psychiatric and substance-use disorders (Fazel, Khosla, Doll, & Geddes, 2008; Martens, 2001; Taylor & Sharpe, 2008). A meta-analysis documented that up to 59% of homeless individuals worldwide have alcohol dependence (Fazel et al., 2008). Among chronically homeless individuals (i.e., unaccompanied individuals who have a disability and have been homeless for at least 1 year or on 4 or more separate occasions in the past 3 years; Homelessness Emergency Assistance and Rapid Transition to Housing Act, 2009), the prevalence of alcohol dependence is even higher (Collins, Malone, et al., 2012). Importantly, research has indicated that chronically homeless and homeless individuals experience severe alcohol-related consequences (Collins, Clifasefi, et al., 2012), such as acute (e.g., falls and injuries) and chronic medical problems (e.g., liver disease, cancer) (Fichter, Quadflieg, Greifenhagen, Koniarczyk, & Wolz, 1997). As a result, mortality rates due to alcohol-related problems among homeless individuals are many times that of the general population (Hwang, Wilkins, Tjepkema, O'Campo, & Dunn, 2009).

Socially marginalized individuals in Europe. Although the prevalence of homelessness in Europe has been on the rise, unsheltered homelessness is not a problem on the larger scale the way it is in the US (Homeless Worldcup, 2015). Other groups of socially marginalized individuals (e.g., social assistance recipients, substance abusers, precariously housed individuals) are, however, well known to be vulnerable. Similar to the US homeless population, these groups are multiply affected by medical, psychiatric

problems and substance-use disorders (Aday, 1994; Bieler et al., 2012; Byrne et al., 2003; Fazel et al., 2008; Groome et al., 2011; Naper, 2009; Palepu et al., 2013; Prinzleve et al., 2004; Trevena, Nutbeam, & Simpson, 2001). A Swiss study examining alcohol use among socially marginalized individuals found more than half of the sample engaged in "harmful drinking" (i.e., drinking 60 grams or more of pure alcohol per day; Labhart, Notari, & Gmel, 2010; World Health Organization, 2006). Of these individuals, 40% reported polysubstance use (e.g., heroin, cocaine), which is related to higher substance-related risks (e.g., falls, injuries, overdose ; Labhart et al., 2010), lower health-related QoL (Costenbader, Zule, & Coomes, 2007), and higher mortality than in the general population (Naper, 2009).

As mentioned earlier, despite their need for services, most socially marginalized individuals in the US and in Switzerland do not attend traditional, abstinence-based treatments (Reissner et al., 2012; Wenzel et al., 2001). For instance, the Treatment systems Research on European Addiction Treatment project (TREAT) found that only 7% of those with substance use disorders in Zurich reported having attended abstinence-based treatment over the past 6 months (Reissner et al., 2012). As a response, low-barrier alcohol harm-reduction approaches have been increasingly applied to these populations (Collins, Saxon, et al., 2014; Larimer et al., 2009; Podymow et al., 2006; Tsemberis et al., 2004).

Recent research efforts have yielded promising findings regarding alcohol harm-reduction approaches among socially marginalized individuals (e.g., homeless individuals with alcohol problems). For instance, a small Canadian study (N = 17) found that homeless individuals evinced decreases in alcohol use and publicly-funded service

utilization following exposure to a shelter-based managed alcohol program (i.e., shelter residents received alcohol on an hourly basis) (Podymow et al., 2006).

Other research has examined outcomes associated with Housing First programs. Housing First entails the provision of immediate, permanent, low-barrier supportive housing to chronically homeless individuals, without requiring abstinence achievement or treatment attendance (Larimer et al., 2009; Tsemberis et al., 2004). Recent studies have shown this approach to be associated with decreased alcohol use and related problems as well as reduced use of publicly funded services and associated costs (Collins, Malone, et al., 2012; Larimer et al., 2009; Stergiopoulos et al., 2015).

Finally, a recent pilot study was conducted to examine alcohol outcomes among chronically homeless individuals with alcohol dependence following harm-reduction counseling coupled with an anticraving medication (Collins, Duncan, et al., 2014). The harm-reduction counseling entailed a) personalized feedback to the participants about their drinking and related problems, b) elicitation participants' own harm-reduction goals and progress made towards them, and c) discussion of safer drinking using the Safer Drinking Steps worksheet[1]. The harm-reduction goals were entirely parricipant-driven and did not require focusing on alcohol (or other drugs). Findings showed that this intervention was feasible and acceptable and associated with significant decreases in alcohol craving, use and problems (Collins, Duncan, et al., 2014).

Dissertation aims for studies involving socially marginalized individuals. This dissertation includes three studies conducted with socially marginalized individuals in the US and in Switzerland. The collective aims of these studies were to document

[1] The Safer-Drinking Steps worksheet is presented in the second study of this dissertation (see Figure 1)

participants' perceptions of and responses to currently available abstinence-based approaches and alternative alcohol harm-reduction approaches. To this end, the first study of this dissertation documented perceptions of an existing, widely known and abstinence-based approach—twelve-step mutual-help groups (e.g., Alcoholics Anonymous)—and their association with alcohol use and related problems, treatment attendance and motivation among chronically homeless individuals with severe alcohol problems in the US. The second study of this dissertation documented use of safer-drinking strategies (e.g., eating protein-and carbohydrate-rich food before/while drinking, drinking in safer places, engaging in non-drinking activities; Collins, Duncan, et al., 2014) among chronically homeless individuals with alcohol dependence in the US. The third study's aim was to initially evaluate substance-use and QoL outcomes among socially marginalized alcohol and other drug (AOD) users following exposure to a harm-reduction drop-in center that allows alcohol consumption onsite in Switzerland.

Alcohol Harm-Reduction Approaches in Youth

Research has documented that alcohol use is common among late adolescents (i.e., high school seniors aged 17-19) and young adults (i.e., college students, non college-attending 18-22 emergent adults; Johnston et al., 2014; Substance Abuse and Mental Health Services Administration, 2013). More important, a common pattern of drinking in in these populations is heavy episodic drinking (i.e., having 5 or more standard drinks in a row for a men and 4 or more for women; Wechsler et al., 1995), with 22% of high school seniors reporting at least one heavy drinking episode (HED) in the last 2 weeks

and up to 42% of 20-24 aged young adults in Switzerland reporting at least one HED in the past 30 days (Gmel et al., 2015).

Furthermore, research conducted with these populations has consistently documented an association between alcohol use (e.g., HED) and negative consequences (American College Health Association, 2012; Arata, Stafford, & Tims, 2003; Cleveland, Mallett, White, Turrisi, & Favero, 2013; Miller, Naimi, Brewer, & Jones, 2007; Perkins, 2002), ranging in severity from short-term health-related consequences (e.g., vomiting, hangovers, blackouts; American College Health Association, 2012; Perkins, 2002), to increased engagement in risky behaviors (e.g., unintended and/or unprotected sexual activity ; American College Health Association, 2012; Perkins, 2002), to interpersonal violence and injuries, (Abbey, 2002; Hingson, 2012; Palmer, McMahon, Rounsaville, & Ball, 2010) and even to death (Hingson, 2012). In Switzerland, alcohol-related harm leads to 28 hospitalizations per week on average among young people aged 15-24 (Confédération Suisse, 2013).

As mentioned earlier, considering that excessive drinking is widespread, largely accepted and even encouraged in these populations, abstinence-based approaches are neither desirable nor effective in reducing alcohol-related harm (Kelly, 2011; Larimer, Dillworth, Neighbors, Lewis, & Witkiewitz, 2012). As a response, tremendous research efforts have been dedicated to develop brief alcohol harm-reduction approaches tailored to these populations' interests and needs. That said, most studies in this area have involved college students, and few studies have evaluated harm-reduction programs targeting adolescents and late adolescents (e.g., Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Collins, Carey, & Sliwinski, 2002; Doumas, Workman, Smith, &

Navarro, 2011; Kelly, 2011; Larimer et al., 2007; Neighbors, Larimer, & Lewis, 2004; Neighbors, Lee, Lewis, Fossos, & Walter, 2009; Poulin & Nicholson, 2005).

Brief harm-reduction interventions tailored to college students (i.e., delivered in group sessions, by mail or by emails) typically incorporate cognitive-behavioral skill training (e.g., coping skills training) and personalized normative feedback. Personalized normative feedback consists of providing young people with information a) about their own drinking and related consequences, b) about their perceptions of peers' drinking and c) about peers' actual drinking (Lewis & Neighbors, 2006). This strategy is based on previous findings having established that young people typically overestimate peers' drinking and that perceived norms are associated with drinking (Lewis & Neighbors, 2004; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). It therefere aims to correct misperceptions regarding peer-drinking behavior by disseminating accurate information about the prevalence of drinking (Lewis & Neighbors, 2006). These interventions have been associated with decreases in alcohol use and related consequences among college students (Carey et al., 2007; Collins et al., 2002; Doumas et al., 2011; Larimer et al., 2007).

Since a few years, some of these interventions have started to include a component promoting the use harm-reduction strategies (i.e., typically aiming to provide students with information regarding the use of these strategies), which are referred to as protective behavioral strategies (PBS) in the literature (e.g., Larimer et al., 2007). PBS are strategies that individuals can use while drinking to reduce alcohol-related harm. PBS target three domains including, a) the manner of drinking (e.g., avoid drinking games, avoid mixing different types of alcohol), b) limiting/stopping drinking (e.g., stop drinking at a

predetermined time, put extra ice in your drink) and c) serious harm reduction (e.g., use a designated driver, make sure you go home with a friend; Martens et al., 2005; Martens, Pederson, Labrie, Ferrier, & Cimini, 2007).

A substantial body of cross-sectional research among young adults (i.e., US college students) has documented that use of PBS is concurrently related to decreased alcohol use and alcohol-related consequences among college students (Araas & Adams, 2008; Benton et al., 2004; Delva et al., 2004; Martens et al., 2005; Martens, Neighbors, Dams-O'Connor, Lee, & Larimer, 2007; Martens, Pederson, et al., 2007; Pearson, Kite, & Henson, 2012). Although less commonly encountered in the literature, longitudinal research has shown similar findings, such that greater use of PBS is generally associated with fewer alcohol outcomes over time (Luebbe, Varvel, & Dude, 2009; Martens, Martin, Littlefield, Murphy, & Cimini, 2011; Napper, Kenney, Lac, Lewis, & LaBrie, 2014).

Previous research has also focused on the association between PBS use and other drinking-related correlates (i.e., factors that are associated with alcohol use) among college students. Examples of drinking-related correlates in youth (i.e., college students; adolescents) include drinking motives (i.e., reasons to drink), personality traits (e.g., sensation seeking), drinking intentions or alcohol expectancies (i.e., beliefs about the effects of alcohol) (Collins, Witkiewitz, & Larimer, 2011; Ham & Hope, 2003; Kilmer & Grazioli, 2015; Kuntsche, Knibbe, Gmel, & Engels, 2006). Multiple cross-sectional studies have documented the mediating role of PBS in relationships between drinking-related correlates and alcohol outcomes (e.g., drinking motives; Labrie, Lac, Kenney, & Mirza, 2011; anxiety and depressive symptoms; Linden, Lau-Barraco, & Milletich, 2013; Martens, Ferrier, & Cimini, 2007; Martens et al., 2008; age of drinking onset; Palmer,

Corbin, & Cronce, 2010). For example, Linden and colleagues showed that the positive association between anxiety and alcohol-related consequences was partially explained by use of PBS, such that having higher anxiety symptoms was associated with a greater failure to use PBS, which in turn was related to more alcohol-related consequences (Linden et al., 2013). These findings suggest that students with higher anxiety experience more alcohol-related consequences because they are less likely to use PBS when drinking than those with less anxiety.

Recent studies have also examined the moderating role of drinking-related correlates in relationships between PBS and alcohol outcomes (e.g., Ehret, Ghaidarov, & LaBrie, 2013; Kenney & LaBrie, 2013; LaBrie, Kenney, & Lac, 2010; Linden et al., 2013; Patrick, Lee, & Larimer, 2011). Such examinations provide insight regarding specific conditions under which use of PBS is more or less likely to be associated with alcohol outcomes. For instance, in a cross-sectional study among heavy drinking college students, Labrie and colleagues (2010) found moderating effects of social, mental and physical health in the relationships between use of PBS and alcohol outcomes, such that use of PBS was most strongly associated with reduced drinking among participants with stronger social health (i.e., with greater social skills), whereas use of PBS was most strongly related to reduced alcohol-related consequences among participants with poorer physical and mental health.

Other studies have examined whether use of PBS provides a protective function by weakening relationships between drinking-related correlates and alcohol outcomes (Benton et al., 2004; Borden et al., 2011; D'Lima, Pearson, & Kelley, 2012; Weaver, Martens, & Smith, 2012). Borden and colleagues (2011) showed that use of PBS

moderates the positive relationship between heavy drinking and alcohol-related consequences among college students, such that the relationship was weaker among students reporting more PBS use. Similar findings have been documented in the relationships between poor self-regulation (D'Lima et al., 2012) and negative urgency (i.e., among intercollegiate athletes; Weaver et al., 2012) with alcohol-related consequences. Thus, among at-risk college students, those who use more PBS were found to be at less risk than those using fewer PBS.

Disseration aims for studies involving youth. Overall, these findings indicate that PBS are a promising way to decrease alcohol-related harm among young adults (i.e., US college students). However, most PBS research has been conducted with US college drinkers, which limits generalizability of findings. Research is therefore needed to test use of PBS as a correlate of decreased alcohol-related harm in other age groups and cultures. Further, very little research has examined the longitudinal associations between use of PBS and alcohol outcomes. Longitudinal studies are needed to better understand the temporal associations between these variables. Finally, the moderating effect of drinking intentions on the association between use of PBS and future alcohol outcomes has not been examined in the literature. Similarly, no previous study has tested whether use of PBS plays a moderating role in the association between alcohol expectancies and future alcohol outcomes. Conducting such analyses may further help to a) shed light on specific conditions under which use of PBS is more or less likely to be effective and b) identify which drinking correlates' influence may be more or less dampened by PBS use.

This thesis addressed these gaps in the PBS literature through two studies conducted with US and Swedish high school seniors (i.e., aged 17-19). Study 4 examined

the moderating role of drinking intentions in the prospective association of PBS use and alcohol outcomes among US and Swedish high school seniors. Study 5 evaluated the moderating effect of PBS use in the longitudinal association between alcohol expectancies and alcohol outcomes among high school seniors in the US.

Specific Aims of the Thesis

Study 1: Perceptions of Twelve-Step Mutual-Help Groups and Their Associations With Motivation, Treatment Attendance and Alcohol Outcomes Among Chronically Homeless Individuals With Alcohol Problems

This study comprised a secondary analysis of data collected from chronically homeless individuals with alcohol problems who received a single-site Housing First intervention (Larimer et al., 2009). The study's aims were to:

- Qualitatively explore the content and valence of the perceptions of twelve-step mutual-help groups in this population.
- Test the association between the valence of the perception (i.e., positive; less positive valence) and substance-use related treatment attendance, motivation to change and alcohol outcomes.

Study 2: Safer-Drinking Strategies Used by Chronically Homeless Individuals With Alcohol Dependence

This study was a secondary analysis of data from a pilot study assessing feasibility, acceptability and alcohol outcomes following exposure to harm-reduction treatment entailing counseling coupled with an anticraving medication among chronically homeless individuals with alcohol dependence (Collins, Ducan, et al., 2014). In the context of the parent study, participants were provided with a harm-reduction counseling that entailed review and discussion of safer drinking using the Safer Drinking Steps worksheet (see study 2 Figure 1). The aims of this secondary study were to:

- Classify and evaluate the frequency of various participant-endorsed safer-drinking strategies.

- Evaluate whether the number of endorsed and implemented safer-drinking strategies changed over the course of the study.

Study 3: Six-Month Substance Use Outcomes Among Socially Marginalized Individuals Attending a Drop-in Center Allowing Alcohol Consumption

This program evaluation was conducted with socially marginalized AOD users who attended a Swiss harm-reduction drop-in center that allows alcohol consumption onsite. The aims were to:

- Evaluate longitudinal changes in substance-use outcomes following exposure to the harm-reduction drop-in center.
- Evaluate longitudinal changes in health-related QoL following exposure to the harm-reduction drop-in center.

Study 4: Protective Behavioral Strategies and Future Drinking: Effect of Drinking Intentions

This study drew on data from the baseline, 6-month and 12-month follow-up assessments within a larger parent study evaluating substance-use trajectories in the US and in Sweden. Participants comprised Swedish and US high school seniors. This study's aims were to:

- Evaluate the longitudinal relationships between use of PBS and alcohol outcomes.
- Evaluate the moderating role of drinking intentions in the association between PBS use and alcohol outcomes.

Study 5: Alcohol Expectancies and Alcohol Outcomes: Effects of the Use of Protective Behavioral Strategies

This last study used data from the baseline and 12-month follow-up assessments of a larger parent study on substance-use trajectories among high school seniors in the US. The aims of this study were to:

- Examine the moderating effect of PBS use on the relationship between positive and negative alcohol expectancies and later alcohol use and related consequences.

Detailed methods for these five studies are presented in the method section within each of the five articles / manuscripts.

Summary of the Findings

Study 1 – Perceptions of Twelve-Step Mutual-Help Groups and Their Associations With Motivation, Treatment Attendance and Alcohol Outcomes Among Chronically Homeless Individuals With Alcohol Problems

Findings documented that chronically homeless individuals with alcohol problems (N = 62) endorsed primarily negative perceptions of twelve-step mutual-help groups **(**TMGs) (61.38%), followed by positive (29.55%) and neutral (9.09%) perceptions. Further, results showed that positive perceptions of TMGs were associated with higher intrinsic motivation to change alcohol use and greater alcohol treatment attendance. There were, however, no significant associations between the valence of participants' perceptions of TMGs and alcohol outcomes.

Study 2 – Safer-Drinking Strategies Used by Chronically Homeless Individuals With Alcohol Dependence

Findings indicated that all participants (N = 31) endorsed some kind of safer-drinking strategies, and that nearly all strategies (up to 90%) were implemented during the course of harm-reduction treatment. Qualitative findings documented that strategies aiming to buffer the effects of alcohol on the body were the most highly endorsed, followed by changing the manner in which one drinks. Reducing alcohol consumption—including achieving abstinence—was the least endorsed group of safer-drinking strategies. Finally, findings indicated that neither the number of safer-drinking strategies endorsed nor the proportion of safer-drinking strategies achieved changed significantly across the 8 weeks.

Study 3 – Six-Month Substance Use Outcomes Among Socially Marginalized Individuals Attending a Drop-in Center Allowing Alcohol Consumption

Exposure to a harm-reduction drop-in center that allows alcohol consumption onsite was followed by positive outcomes among socially marginalized AOD users in Switzerland ($N = 85$). Each passing month in the evaluation was related to 5% and 4% decreases in alcohol consumed on both typical and peak drinking days, respectively, and to a 7% decrease in alcohol-related problems. Additionally, findings documented that greater drop-in center attendance was associated with improved mental health-related QoL and decreases in drug-related problem severity.

Study 4 – Protective Behavioral Strategies and Future Drinking: Effect of Drinking Intentions

Results indicated that use of PBS was related to fewer alcohol-related consequences at the 12-month follow-up ($N = 1189$); however, use of PBS was unrelated to alcohol use. The study also showed that drinking intentions were related to increases in future alcohol use and related consequences, such that endorsing high drinking intentions in high school was related to greater alcohol outcomes one year later. Next, findings showed that Swedish high school seniors reported drinking more and using PBS less frequently than US participants at baseline. However, there were no significant differences between the samples on the experience of alcohol-related consequences. One year later, despite still reporting using more PBS than Swedish participants, US students reported more alcohol use and related consequences than Swedish students. Finally, drinking intentions were found to significantly moderate the negative association between PBS use and future

alcohol use, such that the association was stronger among high school seniors endorsing high drinking intentions. These findings indicated that use of PBS was associated with reduced alcohol use among high school seniors who intended to drink more versus less.

Study 5 – Alcohol Expectancies And Alcohol Outcomes: Effects of the Use of Protective Behavioral Strategies

This study found that use of PBS was related to decreased alcohol use over time, whereas it was unrelated to alcohol-related consequences ($N = 282$). Findings indicated a positive link between positive alcohol expectancies (AEs) endorsement and being a drinker 12 months later, such that endorsing higher AEs in high school was related to more alcohol use one year later. Results found no significant association between negative AEs and alcohol outcomes. Regarding interactions, results found PBS use to significantly moderate the relationships between a) positive AEs and future alcohol-related consequences, and b) negative AEs and future alcohol use, such that among high school seniors endorsing high positive and negative AEs, those using more PBS reported fewer alcohol-related consequences and alcohol use, respectively. Thus, among participants with high AEs, those who used more PBS were found to be at less risk than those using fewer PBS.

Finally, certain PBS (serious harm-reduction PBS) were found to significantly moderate the associations between a) positive AEs and alcohol use, and b) negative AEs and alcohol-related consequences, such that participants with higher positive or negative AEs and higher use of PBS (aiming serious harm reduction) were at greatest risks towards future alcohol use and related consequences. These findings revealed that,

whereas use of PBS (aiming serious harm reduction) was protective against future alcohol use and related consequences among participants who endorsed low positive and negative AEs in high school, its use was associated with increased alcohol outcomes among those endorsing high AEs.

General Discussion and Perspectives

The literature has documented that most individuals who engage in hazardous drinking are not ready, willing and/or able to stop using or to reduce consumption to moderate drinking levels. This is especially the case for two distinct populations—socially marginalized individuals and youth (e.g., high school seniors)—who are known to have social norms and living contexts that widely support heavy drinking. The overarching purpose of the studies included in this dissertation was to shed light on these populations' perceptions of and responses to existing abstinence-based approaches and newer harm-reduction approaches. Overall, findings indicated that participants preferred harm reduction to abstinence-based approaches, and that these approaches appeared to be related to decreases in alcohol-related harm in these populations.

Gauging Interest in Abstinence-based or Use-reduction Approaches

Studies 1, 2 and 4 showed that only a small minority of socially marginalized individuals and high school seniors endorsed abstinence-based or use-reduction approaches. Consistent with two qualitative studies conducted with chronically homeless individuals and homeless individuals with alcohol problems (Collins, Clifasefi, et al., 2012; Rayburn, 2009), study 1 documented that chronically homeless individuals with alcohol problems mostly endorsed negative perceptions of TMGs. Further, studies 2 and 4 indicated that chronically homeless individuals with alcohol dependence and high school seniors were more interested in safer drinking (e.g., buffering the effects of alcohol; changing manners of drinking) than in reducing overall consumption or achieving abstinence. This finding is consistent with other research conducted among

socially marginalized individuals and college drinkers (Araas & Adams, 2008; Delva et al., 2004; Grazioli, Collins, Paroz, Graap, & Daeppen, 2015; Howard, Griffin, Boekeloo, Lake, & Bellows, 2007; Martens et al., 2004). Taken together, these findings shed light on the need for alcohol harm-reduction approaches to reach the large majority of socially marginalized individuals and late adolescents (i.e., high school seniors) who are not interested in abstinence or use reduction.

Gauging Interest in Alcohol Harm-reduction Approaches

Overall, findings from studies 2, 3, 4 and 5 indicated that socially marginalized individuals and high school seniors were interested in alcohol harm-reduction approaches. More specifically, studies 2, 4 and 5 documented that both US and Swedish high school seniors and chronically homeless individuals in the US were interested in using safer-drinking strategies (or PBS) while drinking to reduce alcohol-related harm. For instance, study 2 showed that chronically homeless individuals with alcohol dependence endorsed a mean of three safer-drinking strategies, with all participants endorsing at least one strategy. Further, participants reported implementing up to 90% of their endorsed safer-strategies. Taken together, these findings are in line with previous PBS studies among US college drinkers (Delva et al., 2004; Martens, Pederson, et al., 2007; Martens et al., 2004) and with recent findings among Swiss marginalized individuals with AUDs, which found that 97% of participants endorsed at least one safer-drinking strategy (Grazioli, Collins, et al., 2015). These findings suggest that interventions promoting safer-drinking strategies and PBS may be well received in these

populations. Such interventions may encourage and reinforce the use of user-driven, safer-drinking strategies and PBS, which may in turn decrease alcohol-related harm.

Additionally, findings for study 3 indicated that a harm-reduction drop-in center that allows onsite alcohol consumption represents a promising approach that aligns with the expectations of socially marginalized AOD users in Switzerland. Descriptive findings indicated strong, voluntary drop-in center attendance, with participants attending a median of 30 days through the 6-month follow-up.

Overall, our findings that socially marginalized individuals and high school seniors embraced alcohol harm-reduction approaches corroborate recent research conducted in North America among homeless individuals with alcohol problems and in youth (Collins, Duncan, et al., 2014; Collins, Malone, et al., 2012; Kelly, 2011; Larimer et al., 2011; Larimer et al., 2009; Padgett, Stanhope, Henwood, & Stefancic, 2011; Stergiopoulos et al., 2015). Collectively, these studies suggest that alcohol harm-reduction approaches may be a good fit for different populations of socially marginalized individuals (i.e., chronically homeless individuals with alcohol problems, socially marginalized AOD users) and youth (i.e., college students; high school seniors) across different cultures (i.e., US, Canada, Sweden, Switzerland).

Associations Between Alcohol Harm-reduction Approaches and Substance-use Outcomes

Studies 3, 4 and 5 yielded preliminary findings indicating that alcohol harm-reduction approaches are promising ways to decrease alcohol-related harm and improve health-related QoL among both socially marginalized individuals and high school

seniors. In particular, study 3 showed that exposure to a harm-reduction drop-in center that allows alcohol consumption onsite was followed by decreases in alcohol use and related problems among socially marginalized AOD users in Switzerland. Additionally, findings indicated that greater drop-in center attendance was related to improved mental health-related QoL and decreased drug-related problem severity. These findings correspond to those of recent pilot studies conducted in North America that have likewise shown that other harm-reduction approaches (i.e., Housing First; Management Alcohol Program; harm-reduction counseling) are associated with decreases in alcohol use and related problems among homeless individuals with alcohol problems (Collins, Duncan, et al., 2014; Collins, Malone, et al., 2012; Larimer et al., 2009; Padgett et al., 2011; Stergiopoulos et al., 2015).

Further, studies 4 and 5 showed that, overall, use of PBS was related to less alcohol use and/or fewer alcohol-related consequences over time among Swedish and US high school seniors. Moderation analyses, however, indicated that use of PBS might not be equally protective among all high school seniors. Specifically, we found that the association between PBS use and future alcohol use was moderated by drinking intentions (study 4), such that PBS use was more protective among high school seniors endorsing high drinking intentions than among those with low drinking intentions. Interaction findings also showed a moderating effect of PBS use on the association between AEs and alcohol use and related consequences, which indicated that PBS use might act as a buffer against alcohol-related risks associated with high AEs endorsement (study 5).

Overall, these findings are in line with past research conducted with college students that generally showed similarly inverse, longitudinal associations between PBS use and alcohol use and related problems (Luebbe et al., 2009; Martens et al., 2011; Napper et al., 2014). These findings thus provide initial support for the generalizability of PBS findings for college drinkers to a younger population (i.e., high school seniors) and to another country (i.e., Sweden).

General Limitations

The studies comprised in this dissertation are not without limitations. Specific limitations for each study are discussed within each article/manuscript. We discuss below general limitations. First, all studies relied on response to self-report questionnaires, which may be subject to inaccuracies resulting from cognitive impairment, memory biases or social desirability (Belli, 1998; Ekholm, 2004; Gelberg & Siecke, 1997; Langenbucher & Merrill, 2001; Yoshino & Kato, 1995). That said, participants were assured confidentiality, and past research has suggested that self-report measures are generally reliable and valid (Clifasefi et al., 2011; Del Boca & Darkes, 2003). Finally, these specific study measures had all been used in prior studies with socially marginalized individuals and youth (Collins & Carey, 2007; Collins, Duncan, et al., 2014; Daeppen et al., 1996; Fromme & D'Amico, 2000; Larimer et al., 2009; Larson, 2002).

Second, given the longitudinal nature of many of the studies, attrition may have affected our results. Attrition and the resulting missing data can introduce biases into statistical analyses. To address this limitation, we followed guidelines in the literature to

test differences between completers and noncompleters on key variables in the dataset and to control for these variables to increase our confidence that data could be considered missing at random (i.e., after controlling for key variables, the probability of missing data on the outcomes is unrelated to their value; Allison, 2001).

Finally, the generalizability of all of the studies featured in this dissertation may be limited to the cultures in which the studies were conducted. Epidemiological studies have shown differences in alcohol use patterns across countries and cultures (Gmel et al., 2015; Hibell et al., 2012; Substance Abuse and Mental Health Services Administration, 2014; World Health Organization, 2014). Future research should therefore further evaluate alcohol harm-reduction approches across other countries and populations in order to further explore the generalizability of the current findings.

Perspectives

Despite these limitations, and as discussed above, we believe that the studies comprised in this dissertation provide interesting contributions to the alcohol harm-reduction literature among socially marginalized individuals and high school seniors across different cultures. Findings also pointed to the needs for research further examining alcohol harm-reduction approaches in these populations. We present some suggestions below.

Research is needed to further evaluate effectiveness of alcohol harm-reduction approaches. Findings provide preliminary support for safer-drinking strategies endorsement among chronically homeless individuals with alcohol dependence. The next

step for future research is to examine whether safer-drinking strategies use is related to decrease in alcohol-related harm among socially marginalized individuals.

Further, findings among US and Swedish high school seniors call into question whether all types of PBS are equally beneficial over time. Overall, PBS aiming to change the manner of drinking (e.g., avoid drinking games; avoid mixing different types of alcohol) have been the most consistently associated with decreases in alcohol use and related consequences, whereas PBS aiming to limit overall consumption or stop drinking (e.g., determine not to exceed a set number of drinks; make sure that you go home with a friend) have yielded inconsistent results (Grazioli, Lewis, et al., 2015; Martens et al., 2011; Napper et al., 2014). Future research should therefore further evaluate effectiveness of different types of PBS in decreasing alcohol outcomes over time.

Additionaly, descriptive findings (study 4) documented that, despite experiencing more alcohol-related consequences, US high school seniors consistently reported using more PBS than Swedish high school seniors. One could speculate that Swedish participants used alternative strategies to reduce harm while drinking that were not captured within the PBS used in the current work (Martens, Pederson, et al., 2007). In fact, drug education programs in Sweden schools (i.e., I-Q Initiative) mostly focus on alcohol-related harm reduction (Jarlbro, 2015). The Swedish I-Q initiative's overall mission is to give Swedish residents a "smarter approach to alcohol, which in turn should lead to reduction of alcohol' harmful effects" (Jarlbro, 2015, p. 2), with youth being one of the primary target populations. It is therefore likely that Swedish participants have received information on how drinking safer through this program. The PBS was developed in the US, and as discussed earlier, literature has yielded inconsistent findings

regarding effectiveness of certain PBS included in the PBS (Luebbe et al., 2009; Martens et al., 2011; Napper et al., 2014). Future research should therefore explore use of PBS and its effectiveness in decreasing alcohol-related harm among Swedish high school seniors and more broadly among European high school seniors. Doing so may provide valuable information to further develop the PBS scale as well as harm-reduction interventions including PBS recommendations.

Relatedly, it is possible that differences in alcohol-related consequences between Swedish and US high school seniors pertain to other confounding factors that were not included in the study 4, such as mental health and use of other substances than alcohol (see complementary descriptive analyses appendix 2). Future research should therefore further compare US and Swedish high school seniors on these variables over time and consider whether research evaluating PBS use and alcohol-related consequences among these populations should adjust the analyses with mental health and substance use variables.

Research is needed to develop and test tailored stand-alone interventions aiming to promote use of safer-drinking strategies and PBS. An important direction for future research is the development and test of tailored stand-alone interventions aiming to promote use of safer-drinking strategies and PBS among socially marginalized individuals and late adolescents. No research to date has tested effectiveness of such interventions when delivered independently among socially marginalized individuals. Although the PBS construct has been included among others in recent harm-reduction programs tailored to college students in the form of personalized feedback (Martens, Kilmer, Beck, & Zamboanga, 2010) and through encouragement to use PBS (Larimer et

al., 2007), it has been rarely tested as a stand-alone intervention (Martens, Smith, & Murphy, 2013). Research is therefore needed to further examine effectiveness of stand-alone targeted-PBS-based interventions and establish optimal content, duration and setting of these interventions. Collectively, past research and the studies comprised in this dissertation suggest that such interventions may represent a promising way to decrease alcohol-related harm among late adolescents, particularly among those endorsing high drinking intentions and/or high AEs in high school.

Conclusions

We believe that the studies comprised in this dissertation make several important contributions to the alcohol harm-reduction literature. First, findings confirmed that socially marginalized individuals and late adolescents evince greater interest in alcohol harm-reduction approaches than in traditional approaches aiming abstinence achievement and maintenance or use reduction. Second, although larger randomized controlled trials are needed to confirm the preliminary findings reported in this dissertation, the present findings indicated that alcohol harm-reduction approaches are promising ways to decrease alcohol-related harm across different populations (i.e., socially marginalized AOD users, high school seniors) and different cultures (i.e., US, Sweden, Switzerland).

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Articles / Manuscripts

STUDY 1

Perceptions of Twelve-step Mutual-help Groups and Their Associations with Motivation, Treatment Attendance and Alcohol Outcomes Among Chronically Homeless Individuals with Alcohol Problems

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This article was published in ***International Journal of Drug Policy*** *26*(5), p. 468-474, 2015.

PhD candidate contribution:

VG conducted the background literature review, participated in the qualitative analysis, conducted the statistical analysis and drafted the manuscript.

International Journal of Drug Policy 26 (2015) 468–474

Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Research paper

Perceptions of twelve-step mutual-help groups and their associations with motivation, treatment attendance and alcohol outcomes among chronically homeless individuals with alcohol problems

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ARTICLE INFO

Article history:
Received 20 August 2014
Received in revised form 22 October 2014
Accepted 29 October 2014

Keywords:
Homelessness
Alcohol use
Twelve-step mutual-help groups
Qualitative analysis
Motivation
Treatment attendance

ABSTRACT

Background: Twelve-step mutual-help groups (TMGs) are among the most available forms of support for homeless individuals with alcohol problems. Qualitative research, however, has suggested that this population often has negative perceptions of these groups, which has been shown to be associated with low TMG attendance. It is important to understand this population's perceptions of TMGs and their association with alcohol outcomes to provide more appropriate and better tailored programming for this multiply affected population. The aims of this cross-sectional study were to (a) qualitatively examine perception of TMGs in this population and (b) quantitatively evaluate its association with motivation, treatment attendance and alcohol outcomes.
Methods: Participants ($N = 62$) were chronically homeless individuals with alcohol problems who received single-site Housing First within a larger evaluation study. Perceptions of TMGs were captured using an open-ended item. Quantitative outcome variables were created from assessments of motivation, treatment attendance and alcohol outcomes.
Results: Findings indicated that perceptions of TMGs were primarily negative followed by positive and neutral perceptions, respectively. There were significant, positive associations between perceptions of TMGs and motivation and treatment attendance, whereas no association was found for alcohol outcomes.
Conclusions: Although some individuals view TMGs positively, alternative forms of help are needed to engage the majority of chronically homeless individuals with alcohol problems.

Interventions for individuals with alcohol-use disorders have most commonly been abstinence based and include professionally administered treatment programs as well as other types of abstinence-based support in the community. Perhaps the most well-known examples of community-based services for alcohol-use disorders are twelve-step, mutual-help organizations, such as Alcoholics Anonymous (AA). AA, which was established in the US in 1935, uses a twelve-step recovery model to help individuals achieve and maintain abstinence from alcohol (Mäkelä, 1993). Although the twelve-step recovery model developed within AA has been incorporated into professionally led treatments (e.g., twelve-step facilitation; Nowinski, Baker, & Carroll, 1999), twelve-step mutual-help groups (TMGs) are typically peer-led. To date, there are more than 114,000 AA groups operating in over 170 countries worldwide (Alcoholics Anonymous General Service Office, 2013).

Extensive research among individuals with substance-use disorders has documented an association between post-treatment TMG (e.g., AA or Narcotics Anonymous) attendance and decreased substance use or increased abstinence (Christo & Franey, 1995; Emrick, 1987; Fiorentine, 1999; Humphreys, Kaskutas, & Weisner, 1998; Kelly, Stout, Zywiak, & Schneider, 2006; Magura et al., 2005; Ouimette, Moos, & Finney, 1998; Pagano, White, Kelly, Stout, & Tonigan, 2013; Timko, Moos, Finney, & Lesar, 2000), with frequency of TMG attendance being predictive of such outcomes (Fiorentine

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http://dx.doi.org/10.1016/j.drugpo.2014.10.009
0955-3959/

& Hillhouse, 2000; Gossop, Stewart, & Marsden, 2008; Harris et al., 2003; Humphreys, Moos, & Cohen, 1997; Moos & Moos, 2004). Yet, research also indicates that few individuals consistently attend TMGs over time (Gossop et al., 2008; Harris et al., 2003; Kelly & Moos, 2003; Pagano et al., 2013). Even lower levels of attendance are found among more severely affected groups, such as dually diagnosed patients (Noordsy, Schwab, Fox, & Drake, 1996; Timko, 2008).

Chronically homeless people with alcohol problems represent one of these severely affected groups and are in need of a targeted attention. It has been reported that up to 58.5% of homeless individuals have alcohol dependence (Fazel, Khosla, Doll, & Geddes, 2008). Homeless individuals are particularly vulnerable (Booth, Sullivan, Koegel, & Burnam, 2002), because they are often multiply affected by medical, psychiatric and substance-use disorders (Fazel et al., 2008; Martens, 2001; Prigerson, Desai, Liu-Mares, & Rosenheck, 2003; Taylor & Sharpe, 2008). As a result of these various risk factors, the age-adjusted mortality rate in this population is approximately four times that of the general population (Barrow, Herman, Cordova, & Struening, 1999).

Unfortunately, despite their vulnerability and high need for services, most homeless individuals with alcohol problems remain underserved (Wenzel et al., 2001). Among those who receive support, TMGs represent the most available form of help (Zerger, 2002). These groups, however, were not designed to meet the needs of this population, and special populations may encounter difficulties fitting into such groups (Timko, 2008).

In fact, attitudes toward TMGs are mixed across various populations. Some studies show more positive than negative perceptions of twelve-step facilitation (e.g., among drug using and treatment seeking populations; Best et al., 2001; Vederhus, Timko, Kristensen, & Clausen, 2011), whereas others show evenly split positive and negative perceptions (e.g., among people in alcohol inpatient treatment; Harris et al., 2003). To the best of our knowledge, very few studies have explored perceptions of TMGs among chronically homeless individuals with alcohol problems. We are aware of two recent qualitative studies that have begun to address this topic. The first study showed that homeless men with alcohol dependence face unique barriers to recovery within the context of TMGs among people in alcohol inpatient treatment (e.g., identification with the community; Rayburn & Wright, 2009). The second study indicated that chronically homeless individuals with alcohol problems often have negative perceptions and experiences of TMGs (Collins, Clifasefi, et al., 2012).

These findings are of concern because perceptions of abstinence-based programming, such as TMGs and abstinence-based treatment, are associated with various important outcomes. For example, perceptions of TMGs are associated with TMG attendance among individuals with substance problems (Kingree, Simpson, Thompson, McCrady, & Tonigan, 2007), such that individuals with negative attitudes evince lower TMG attendance than those with more positive attitudes (Brown, O'Grady, Farrell, Flechner, & Nurco, 2001). Further, a positive perception of abstinence-based treatment is associated with greater treatment motivation among individuals with substance-use disorders (Drieschner, Lammers, & van der Staak, 2004). In turn, greater treatment motivation has been shown to facilitate engagement in substance-use treatment and is associated with greater treatment attendance and better outcomes among homeless individuals with substance-use disorders (Erickson, Stevens, McKnight, & Figueredo, 1995). Perceptions of TMGs are therefore important to ensure that chronically homeless people with alcohol dependence are maximally benefitting from community supports.

The current study aims were to (a) explore the content and valence of the perception of TMGs among chronically homeless people with alcohol problems, and (b) test the relationships between perceptions of TMGs and treatment attendance, motivation to change, and alcohol outcomes in this population. To the best of authors' knowledge, no studies to date have tested these relationships in this population. Based on the literature discussed above, it was hypothesized that a positive perception of TMGs would be associated with greater abstinence-based treatment attendance, greater motivation to change, less alcohol use and fewer alcohol-related problems than negative or neutral perceptions of TMGs.

Table 1
Descriptive statistics of the sample ($N = 62$). Sociodemographic variables.

Variables	*M* (*SD*) (%)
Sociodemographic variables	
Age	48.26 (9.65)
Race/ethnicity	
American Indian/Alaska Native	24.2
Asian	1.6
Black/African American	9.7
Hispanic/Latino	9.7
Native Hawaiian/Pacific Islander	4.8
White/European American	37.1
"More than one race"	9.7
Self-reported "Other"	3.2
Level of education	
Some high school	37
High school/GED	30.8
Vocational school	11.3
Some college	14.5
College graduate	3.2
Some graduate school/Advanced degree	3.2
Relationship status	
Divorced	35.5
Married	1.6
Never married	50.0
Separated	9.7
Widowed	3.2
Alcohol-use variables	
At least one day of abstinence (the past 30 days)	33.3
Typical alcohol quantity (standard drinks/day)	22.35 (27.84)
Alcohol-related problems (SIP-2R)	18.00 (14.57)

Notes: SIP-2R, Short Inventory of Problems summary score.

Methods

Participants

Participants ($N = 62$; 4.8% women) were chronically homeless individuals with alcohol problems who received a single-site Housing First (HF) intervention (i.e., the provision of immediate, permanent, low-barrier, nonabstinence-based, supportive housing units within a single housing project) who had (a) participated in a larger parent study evaluating the effects of HF in improving publicly funded service utilization and alcohol outcomes (Collins, Clifasefi, et al., 2012; Larimer et al., 2009) and (b) indicated they had attended TMGs, such as AA, in the past. Please see Table 1 for sample demographics.

Measures

Demographic variables

Descriptive information (i.e., age, gender, ethnicity, partnership status, education) was measured with single items in the baseline interview.

Perceptions of twelve-step programs

Valence and content of perceptions of TMGs were coded from an open-ended item: "*If you have gone to AA, or any twelve-step group, what was it like for you?*" Because this measure was added after the

study start date, not all participants were exposed to this question at the baseline assessment. We therefore used participants' initial exposure to this question, which may have occurred at the baseline, 3-, 6-, or 9-month assessment sessions. Qualitative content of these items was explored in content analyses, and the valence of perceptions of TMGs (i.e., positive, negative and neutral) was used as the predictor in quantitative analyses.

Treatment attendance

Substance abuse treatment attendance was recorded using three items from the Addiction Severity Index (ASI; McLellan et al., 1992). Items were collapsed to represent any substance abuse treatment attendance (drug or alcohol; inpatient or outpatient) and were dummy coded, where 1 = attended and 0 = did not attend. Variables were collapsed to ensure inclusion of all abstinence-based treatment episodes that addressed participants' potentially overlapping polysubstance use and to thereby capture any and all exposure to abstinence-based treatments. Substance abuse treatment attendance at each available time point (i.e., baseline through the 24-month follow-up) was used as an outcome variable in quantitative analyses.

Motivation to change

Motivation to change was assessed using the 6-item Taking Steps scale of the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller & Tonigan, 1996), which appears to best reflect motivation to change in this population (Collins, Malone, & Larimer, 2012). This measure was assessed at each available time point (i.e., baseline through the 24-month follow-up) and was used as an outcome variable in quantitative analyses. The Taking Steps scale includes items such as "I have already started making some changes in my drinking" and "I am actively doing things now to cut down or stop drinking."

Drinking outcomes

The primary drinking outcome variables in the study were derived from the following measures, which were measured and used in analyses at each available timepoint (i.e., baseline through the 24-month follow-up). The Alcohol Use Quantity Form (AQUA) is an alcohol quantity measure that captures quantity of alcohol consumption, even when it does not conform to traditional standard drink measures (e.g., sharing bottles, consuming beverages from large-volume containers, and use of nontraditional alcohol forms) (Larimer et al., 2009). This measure yielded alcohol quantity on typical drinking occasions in the past 30 days (referred to as typical quantity). Frequency of alcohol use in the past 30 days was ascertained with one item from the Addiction Severity Index (i.e., "How many days have you used alcohol in the past 30 days?") (McLellan et al., 1992). This item was dummy-coded in the final analysis to yield 30-day report of at least one day of abstinence (referred to from here as "abstinence"). The 15-item Short Inventory of Problems (SIP-2R; Blanchard, Morgenstern, Morgan, Labouvie, & Bux, 2003), which was adapted from the Inventory of Drug Use Consequences-2R (Miller & Tonigan, 1996), was used to assess participants' frequency of alcohol-related problems in the past 3 months using a 4-point Likert scale (i.e., 0 = never to 3 = daily or almost daily). Examples of items include "Because of my drinking, I have not eaten properly", or "I have taken foolish risks when I have been drinking". The SIP-2R summary scores range from 0 to 45 and have been found to be reliable and valid in substance-using populations (Kenna et al., 2005).

Procedures

The data in this secondary study were collected during the larger parent evaluation, which was a two-year nonrandomized controlled trial of single-site Housing First and was conducted from 2005 to 2009 in a midsized city in the US Pacific Northwest (Collins, Clifasefi, et al., 2012; Larimer et al., 2009). Please see Larimer et al. (2009) for more information on the parent study design and procedures.

After providing written, informed consent, participants were administered the above measures in the context of a larger assessment battery at baseline and at 3-, 6-, 9-, 12-, 18- and 24-month follow-ups. Participants were paid $20 for each interview attended. All procedures were reviewed and approved by the institutional review board of the University of Washington and the King County Mental Health Chemical Abuse and Dependency Services.

Data preparation and analysis plan

Qualitative analysis

Responses to the question "If you have gone to AA, or any twelve-step group, what was it like for you?" were subject to conventional content analysis (i.e., a systematic process of coding and classification) (Hsieh & Shannon, 2005) using the Atlas.ti 6 qualitative data analysis program. Participants' responses were reviewed by 2 raters (VG and SC) to explore participants' perceptions of TMGs and thereby identify (a) recurring codes and categories and, (b) the valence of participants' responses (i.e., positive, negative, neutral).

The two raters conducted initial coding independently and then met to discuss memos and to synthesize or eliminate highly idiosyncratic or redundant codes to create focused codes. A codebook of focused codes was created, and the 2 raters repeated the independent coding process using the codebook. Interrater reliability was established using percent agreement (88.64%) and reached acceptable levels according to standards in the literature (Shek & Tang, 2005). Remaining discrepancies were resolved in consensus meetings. Focused codes were sorted into categories, which corresponded to positive, negative or neutral perception valences. An overall response valence – negative, neutral, or mixed (i.e., positive and negative) – was then coded for each participant. The overall response valence served as the predictor in the quantitative analyses.

Quantitative analysis

Quantitative analyses were conducted in STATA 11.2. Generalized linear modeling (GzLM; Hilbe, 2011) was used to examine the concurrent associations between the predictor (i.e., valence of perception of twelve-step programs) and the outcome variables (i.e., treatment attendance, motivation to change, typical quantity, abstinence and alcohol-related problems). Because it was added after the data collection had begun, the predictor was not always assessed at baseline. It is therefore important to note that the analyses are to be interpreted as cross-sectional versus longitudinal. Following from the content analysis categories, the valence predictor was dummy coded, where 1 = positive perception, 0 = less positive perceptions (i.e., neutral, negative and mixed perceptions).

In exploratory data analyses, outcomes were examined for outliers and deviation from expected distributions. Motivation to change was found to have a normal distribution, and therefore, Gaussian GzLM was used. The typical quantity and alcohol-related problems variables were overdispersed count variables that fit the negative binomial distribution. Finally, abstinence and treatment attendance were dichotomous variables and were coded for logistic regression analyses (i.e., for abstinence, 1 = at least 1 day of abstinence in the past 30 days and 0 = no days of abstinence in the past 30 days; for treatment attendance, 1 = attended in the past 30 days and 0 = did not attend).

Because we used all of participants' outcome data over the two-year study, these data violated the assumption of independence (i.e., data were correlated for the same individual over

Table 2
Perceptions of TMGs organized according to their valence and ranked in order of frequency.

Rank	Category	Examples	Frequency	%
Negative Perceptions of TMGs				
1	Disliking TMGs in general	"I hated it" "I just don't like that"	14	25.9
2	Disliking the twelve-step discourse	"Very boring at times, same story, forward and backward"	12	22.3
3	Negatively evaluating TMG members	"Just a bunch of people who are crying around"	10	18.5
4	Having a negative affective response to TMGs	"I felt sick when I left because of too much history"	10	18.5
5	Finding TMGs unhelpful	"I found it detrimental to go"	8	14.8
	Total Negative Perceptions		54	100
Positive Perceptions of TMGs				
1	Finding TMGs helpful	"Beneficial, stayed sober for a while ago"	14	53.8
2	Generally liking TMGs	"love it" "Pretty good"	9	34.6
3	Finding fellowship	"Very supportive. I like to going to meetings and communicating with other alcoholics"	3	11.6
	Total Positive Perceptions		26	100
Neutral Perceptions of TMGs				
1	Finding TMGs ok	"It was ok" "It was all right"	6	75
2	Feeling TMGs are just not for me	"It is not for me"	2	25
	Total Neutral Perceptions		8	100

Note: Percentages of perceptions are presented within the valence categories. Overall, 61.36% ($n = 54$) of the perceptions were negative, whereas 29.55% ($n = 26$) were positive and 9.09% ($n = 8$) were neutral.

time). We therefore used a modified sandwich estimate of variance to create robust standard errors and thereby account for data nonindependence. The significance level was set at $p = .05$, and confidence intervals were set at 95%.

Results

Qualitative results

Although most responses were brief, some included more than one semantic 'chunk.' For this study, semantic chunks were defined as complete ideas. Each chunk ($n = 88$) was coded independently for the content analysis. Ten coding categories were identified and organized according to their valence (i.e., positive, negative and neutral; see Table 2).

Quantitative results

An overall response valence was obtained for every participant: 54.8% ($n = 34$) of participants provided an overall negative perception, 32.3% ($n = 20$) a positive perception, 11.3% ($n = 7$) a neutral perception, and 1.6% ($n = 1$) a mixed (i.e., positive and negative) perception.

The motivation model was statistically significant, Wald χ^2 ($df = 1$, $N = 359$) = 16.04, $p < .001$. There was a significant main effect for valence of perception ($B = .78$, $p < .001$), such that participants with a positive perception had greater motivation to change than participants with negative, neutral or mixed perceptions.

The logistic model for treatment attendance in the past 30 days was significant, Wald χ^2 ($df = 1$, $N = 344$) = 4.81, $p = .03$, and showed a significant main effect for valence ($OR = 2.46$, $p = .03$). These results indicated that participants with a positive perception of TMGs had nearly 2.5 times greater odds of treatment attendance than participants with neutral, negative or mixed perceptions.

The models for number of drinks on a typical drinking day, alcohol-related problems and at least one abstinent day in the past 30 days were not significant (all $ps > .09$).

Discussion

Despite their high need for services, homeless individuals with alcohol problems are underserved (Wenzel et al., 2001). Although TMGs, such as AA, are among the most widely available options to them (Zerger, 2002), not much is known about how they perceive and experience TMGs. Gaining a better understanding of this population's perceptions of TMGs is important considering that positive perceptions of TMGs are associated with greater program attendance among individuals with substances-use disorders (Kingree et al., 2007), and that TMG attendance is associated with positive alcohol outcomes among severely affected individuals with substance-use disorders (Timko & Sempel, 2004; Timko, Cronkite, McKellar, Zemore, & Moos, 2013). The current study was designed to explore the content and the valence of perceptions of TMGs among chronically homeless individuals with alcohol problems and test the hypothesis that a positive perception would be associated with greater treatment attendance, motivation to change and alcohol outcomes.

Participants' perceptions of TMGs were relatively polarized

Overall, the majority of participants' responses reflected negative perceptions of TMGs followed by positive and neutral perceptions. The neutral category was the least represented and developed, which suggested most participants had clearly defined opinions about TMGs – either positive or negative. This finding is not consistent with previous research, which found approximately equal groups expressing positive, negative and neutral attitudes among alcohol-dependent individuals in inpatient treatment (Harris et al., 2003). It may be that chronically homeless individuals with alcohol problems have more polarized perceptions of TMGs because of their extensive histories with abstinence-based treatment and mutual-help program attendance. In fact, the parent study involving this sample showed that these individuals report up to 16 lifetime treatment episodes (Larimer et al., 2009).

Negative perceptions of TMGs predominated

In comparison with the neutral and positive perceptions, negative perceptions comprised the most common and differentiated of the valence categories. The preponderance of negatively valenced perceptions is consistent with a previous qualitative study with this population, which suggested that TMGs may not always fit with this population's goals and expectations (Collins, Clifasefi, et al., 2012). Although similar findings have been documented among people in inpatient alcohol (i.e., 42% endorsing negative perceptions; Best et al., 2001) most studies (i.e., alcohol and/or drug; dually diagnosed patients) have shown an opposite pattern, with participants endorsing an overall positive attitude toward TMGs (Laudet, 2003; Pristach & Smith, 1999; Vederhus et al., 2011). In fact, the predominance of negative perceptions endorsed by the participants of the current study suggests that chronically homeless individuals with alcohol problems might face more barriers to engagement in TMGs than other populations.

Our finding that participants had negative perceptions of other TMG members might represent such a barrier. These results are consistent with previous studies on special populations (e.g., youth, women, more severely affected individuals), which have documented special populations' difficulties identifying with other AA members (Kaskutas, 1994; Kelly, Myers, & Brown, 2002; Kelly, Myers, & Rodolico, 2008; Timko, 2008). Our results also corroborate findings of another qualitative study conducted with homeless men with alcohol problems who participated in TMGs (Rayburn & Wright, 2009). This study showed participants' low sense of identification with the AA fellowship, which the authors attributed to the condition of homelessness itself (i.e., social isolation and stigma). In fact, some participants in the current study went as far as to express highly negative evaluations of other group members, which suggests that this issue might be even more important to consider in this population.

Some participants reported negative affective responses to TMG attendance. Most commonly, they reported feeling uncomfortable sharing in front of others. To the best of our knowledge, negative affective responses to TMGs have not been reported previously in qualitative studies exploring perceptions of TMGs. These findings do, however, correspond to those of a prior qualitative study conducted with homeless adults with co-occurring mental illness and substance use disorders, which found that past trauma and concern for privacy led this population to prefer one-on-one versus group formats (Padgett, Henwood, Abrams, & Davis, 2008). In fact, issues related to psychiatric comorbidity have been cited as potential barriers to participation in TMGs (Bogenschutz & Akin, 2000; Kaskutas, 1994; Noordsy et al., 1996; Timko, 2008). Although psychiatric comorbidity was not measured in the current study, this point deserves further attention in future studies with chronically homeless people with alcohol problems. Taken together with the aforementioned studies, our findings suggest that, for at least a subset of chronically homeless individuals with alcohol problems, one-on-one intervention formats may be more suitable than group work.

Positive perceptions of TMGs represented a sizable minority of responses

Nearly one-third of participants expressed a positive perception of TMGs. Among those individuals, TMGs were credited with providing insights into alcohol use and related problems and were also viewed as helpful in maintaining sobriety. These last findings are consistent with previous research in which participants viewed TMGs as "an insurance policy against relapse" (Humphreys et al., p.191), and as a means to help with sobriety (Laudet, 2003).

Sense of fellowship was another positively perceived aspect of TMGs. Participants appreciated receiving support from people who shared their substance-use background. This theme has been documented in previous research evaluating attitudes toward TMGs among other populations with substance-use disorders (Kaskutas, 1994; Kelly et al., 2008; Laudet, 2003). In fact, literature on TMGs has identified social support as a key mechanism underlying the effectiveness of the programming in promoting sobriety (Groh, Jason, & Keys, 2008).

Perception of TMGs is associated with motivation and treatment attendance but not alcohol-use outcomes

The quantitative results showed that a positive perception of TMGs was associated with greater motivation to change. This finding is in line with hypotheses and with the extant literature on alcohol treatment, which has shown a correlation between positive perception of treatment and motivation among individuals with substance-use disorders (Drieschner et al., 2004).

A positive perception of TMGs was also associated with greater treatment attendance. Because participants have such polarized perceptions of TMGs, these results suggest that it is important to take into account individuals' perceptions of TMGs and other abstinence-based approaches prior to treatment referral. These perceptions appear to either facilitate treatment attendance, or on the flipside, serve as a barrier to treatment entry and completion.

In fact, the majority of participants in this study evinced negative perceptions of TMGs, and our study found that less positive perceptions of TMGs (i.e., neutral, negative and mixed) were associated with less treatment attendance. This association may be explained by the similarities in goals (i.e., abstinence) and content (i.e., twelve-step recovery model) of TMGs and professionally led, abstinence-based treatment, given that elements of the twelve-step recovery model have been incorporated into most professional-led treatments. This finding may also help explain why this population appears to be underserved (Wenzel et al., 2001): Individuals are likely not accessing or benefiting from much-needed services because they are not tailored to their own needs and goals. Future intervention development should prioritize client- versus provider-driven goals to better engage and more successfully treat this population. In this way, participants who prefer TMGs can maintain the positive benefits they enjoy, while participants with less positive perceptions of TMGs can benefit from other types of services.

Although a positive perception of TMGs was associated with greater motivation to change and greater treatment attendance, it was not associated with alcohol outcomes. This finding is somewhat at odds with the findings of Tonigan, Miller, and Connors (2000), who found that perceptions of AA represented one aspect of a larger construct, "AA experience," which was positively associated with alcohol outcomes (Tonigan et al., 2000). That said, no studies to date have examined perceptions of TMGs and their correlations with alcohol outcomes among chronically homeless individuals with alcohol dependence. As previously stated, this population's experience of TMGs may be different from that of the larger substance-using population (Rayburn & Wright, 2009). Despite positive perceptions and attendance reported by some participants, it may be that this population does not experience the same benefit from TMG attendance as less severely affected populations. Future studies are needed that directly test the effects of TMG attendance for this population. Further, our previous research with this population has indicated abstinence-based goals are not always viewed as attainable or desirable (Collins, Clifasefi, et al., 2012); thus, these findings highlight the need for research on what kinds of interventions and resources these individuals are

motivated for and whether such alternative interventions are associated with alcohol outcomes.

Further, our findings that positive perception of TMGs was associated with greater motivation to change and greater treatment attendance but not with alcohol outcomes expand upon those of a previous study conducted with this sample, which showed that intrinsic motivation to change but not treatment attendance predicted alcohol outcomes over time (Collins, Clifasefi, et al., 2012). Taken together, these studies suggest that interventions should more effectively capitalize on people's own motivation for change, which may or may not involve traditional twelve-step or abstinence-based treatment. However, larger, longitudinal studies are needed to more thoroughly evaluate these initial effects prior to clinical application.

Limitations

The current study has limitations that deserve mention. Because it was added after data collection had begun, the question addressing perceptions of TMGs was not consistently assessed at baseline but throughout the first year of assessment. Thus, treatment attendance and alcohol-related problems are potentially confounded with concurrently assessed perception of TMGs because individuals who do not achieve significant alcohol use reductions or abstinence may be less likely to view TMGs as worthwhile over time and vice versa. For this reason, analyses should be interpreted as cross-sectional versus longitudinal, which precludes temporal or causal interpretations of the observed associations. Future longitudinal studies evaluating associations between perceptions of TMGs and treatment attendance, motivation to change and alcohol outcomes over time are needed to establish sequences of events and thereby clarify temporal relationships.

Second, this study was a secondary analysis of data that were not originally designed to evaluate perceptions of TMGs. We used a single questionnaire item to conduct our qualitative analysis and the resulting data were therefore limited (e.g., lack of specific information on the type of TMGs attended, whether attendance was mandated, and no corresponding questions assessing participants' views on harm reduction and/or abstinence-based treatments).

Conclusions

Despite its limitations, the current study adds to the literature by providing a qualitative exploration of perceptions of TMGs among chronically homeless individuals with alcohol problems and by evaluating the association between valence of these perceptions (i.e., negative, neutral, positive and mixed) and treatment attendance, motivation to change and alcohol outcomes. Overall, our findings indicated that the majority of participants had negative perceptions of TMGs, which included negative perceptions of other TMG members and a negative affective response to group attendance. That said, a sizable minority had a positive perception of TMGs. As hypothesized, positive perceptions were associated with greater treatment attendance and motivation to change but not with less alcohol use and related problems. Despite the limitations of this study, these findings may help explain why this population remains underserved. Specifically, existing TMGs may not be compatible with the needs and goals of most chronically homeless individuals with alcohol problems. Future efforts should ascertain the needs of TMG subpopulations to optimally tailor TMG content or to offer other types of formats (e.g., individual consultations with sponsors instead of group meetings). Finally, some individuals may not be interested in attending TMGs. Thus, future studies should prioritize clients' own treatment goals and provide support to individuals' recovery wherever they are along the spectrum of behavior change.

Acknowledgements

This research was supported by a grant from the Swiss Alcohol Research Foundation to VG (FSRA 229), a grant from the Robert Wood Johnson Foundation Substance Abuse Policy Research Program (grant 53672) to ML, and a Career Transition Award from the National Institute on Alcohol Abuse and Alcoholism to SC (K22AA018384). The grant agencies had no further role in study design, in the data collection, analysis and interpretation, in the writing of the report or in the decision to submit manuscript to publication.

Conflicts of interest: The authors have no conflicts of interest.

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STUDY 2

Safer-drinking Strategies Used by Chronically Homeless Individuals with Alcohol Dependence

Safer-drinking Strategies Used by Chronically Homeless Individuals with Alcohol Dependence

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This article was published in ***Journal of Substance Abuse Treatment*** *54*, p. 63-68, 2015.

PhD candidate contribution:

VG conducted the background literature review, participated in the qualitative analysis, conducted the statistical analysis and drafted the manuscript.

Journal of Substance Abuse Treatment 54 (2015) 63–68

Contents lists available at ScienceDirect

Journal of Substance Abuse Treatment

Safer-Drinking Strategies Used by Chronically Homeless Individuals with Alcohol Dependence☆

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ARTICLE INFO

Article history:
Received 17 October 2014
Received in revised form 16 December 2014
Accepted 26 January 2015

Keywords:
Safer-drinking strategies
Alcohol dependence
Homelessness
Harm reduction

ABSTRACT

Chronically homeless individuals with alcohol dependence experience severe alcohol-related consequences. It is therefore important to identify factors that might be associated with reduced alcohol-related harm, such as the use of safer-drinking strategies. Whereas effectiveness of safer-drinking strategies has been well-documented among young adults, no studies have explored this topic among more severely affected populations, such as chronically homeless individuals with alcohol dependence. The aims of this study were thus to qualitatively and quantitatively document safer-drinking strategies used in this population. Participants ($N = 31$) were currently or formerly chronically homeless individuals with alcohol dependence participating in a pilot study of extended-release naltrexone and harm-reduction counseling. At weeks 0 and 8, research staff provided a list of safer-drinking strategies for participants to endorse. Implementation of endorsed safer-drinking strategies was recorded at the next appointment. At both time points, strategies to buffer the effects of alcohol on the body (e.g., eating prior to and during drinking) were most highly endorsed, followed by changing the manner in which one drinks (e.g., spacing drinks), and reducing alcohol consumption. Quantitative analyses indicated that all participants endorsed safer-drinking strategies, and nearly all strategies were implemented (80–90% at weeks 0 and 8, respectively). These preliminary findings indicate that chronically homeless people with alcohol dependence use strategies to reduce harm associated with their drinking. Larger randomized controlled trials are needed to test whether interventions that teach safer-drinking strategies may reduce overall alcohol-related harm in this population.

1. Introduction

In the US, 610,042 individuals were estimated to be homeless on a given night in 2013 (National Alliance to End Homelessness, 2014). Homeless individuals are a particularly vulnerable population (Booth, Sullivan, Koegel, & Burnam, 2002), affected by medical, psychiatric and substance-use disorders (Fazel, Khosla, Doll, & Geddes, 2008; Martens, 2001; Taylor & Sharpe, 2008). In fact, according to a meta-analysis, up to 58% of homeless individuals worldwide have alcohol dependence (Fazel et al., 2008).

Among chronically homeless individuals (i.e., unaccompanied individuals who have a disability and have been homeless for at least 1 year or on 4 or more separate occasions in the past 3 years; Homelessness Emergency Assistance and Rapid Transition to Housing Act, 2009), the prevalence of alcohol dependence is even higher (Kuhn & Culhane, 1998). Studies have indicated that chronically homeless individuals with alcohol dependence experience severe alcohol-related consequences (Collins et al., 2012). Previous research has also documented that homeless individuals with alcohol dependence have interpersonal problems and difficulties maintaining housing (Drake & Brunette, 1998; Fichter, Quadflieg, Greifenhagen, Koniarczyk, & Wolz, 1997). Further, alcohol-use disorders among homeless people are associated with high comorbidity of psychiatric disorders (Fazel et al., 2008) and high rates of suicidal ideation (Prigerson, Desai, Liu-Mares, & Rosenheck, 2003). Alcohol-use disorders also precipitate both acute medical problems (e.g., delirium tremens, Collins, Malone, et al., 2012; Fichter et al., 1997; falls and injuries; Hibbs et al., 1994; Roy, Boivin, Haley, & Lemire, 1998) and chronic medical problems (e.g., liver disease and cancer; Fichter et al., 1997; Hwang, Wilkins, Tjepkema, O'Campo, & Dunn, 2009). As a result, the risk of mortality due to alcohol-related problems among homeless individuals is many times that of the general population (Hwang et al., 2009).

Considering these findings, it is important to explore ways to help chronically homeless individuals with alcohol dependence reduce their alcohol-related harm. Recent qualitative studies, however, have documented that chronically homeless individuals with alcohol problems do not find abstinence-based goals to be acceptable or desirable and endorse mostly negative perceptions of abstinence-based approaches (Collins et al., 2012; Grazioli, Collins, Daeppen, & Larimer, 2014). Thus, interventions that do not require abstinence and

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http://dx.doi.org/10.1016/j.jsat.2015.01.010
0740-5472/

instead promote the use of safer-drinking strategies may be more acceptable treatment alternatives for this population. Safer-drinking strategies are ways in which patterns of alcohol use may be changed to reduce alcohol-related harm, including buffering the effects of alcohol on the body (e.g., eating protein- and carbohydrate-rich foods before/while drinking), changing the manner of consumption (e.g., drinking in safer places), and/or reducing alcohol consumption (e.g., engaging in non-drinking activities, Collins, Duncan, et al., 2014).

To the best of the authors' knowledge, use of safer-drinking strategies among chronically homeless individuals with alcohol dependence has not been explored. However, a close construct, namely "protective behavioral strategies" (PBS), has received considerable attention among high school (e.g., Glassman, Werch, & Jobli, 2007) and college students (e.g., Araas & Adams, 2008; Benton et al., 2004; Martens, Pederson, Labrie, Ferrier, & Cimini, 2007; Pearson, D'Lima, & Kelley, 2013). PBS are defined as cognitive and behavioral strategies that students can use while drinking to limit alcohol consumption and alcohol-related consequences (Martens, Pederson, Labrie, Ferrier, & Cimini, 2007). Examples of PBS include avoiding drinking games or using a designated driver. Research has documented use of PBS as a promising way to reduce alcohol-related harm among young adults (e.g., Araas & Adams, 2008; Benton et al., 2004; Delva et al., 2004; Glassman et al., 2007; Martens, Martin, Littlefield, Murphy, & Cimini, 2011; Martens, Neighbors, Dams-O'Connor, Lee, & Larimer, 2007; Napper, Kenney, Lac, Lewis, & LaBrie, 2014; Pearson, 2013). Although the PBS and safer-drinking strategy constructs both represent means of alcohol harm reduction, they were independently developed for two distinct populations: college students and chronically homeless individuals, respectively. Given the unique needs and characteristics of these populations, these constructs are parallel yet distinct (Collins, Clifasefi, et al., 2012; Collins, Kirouac, et al., 2014).

Although use of PBS has been widely studied among young adults, no studies to date have explored this topic among more severely affected populations, such as chronically homeless individuals with alcohol dependence. Further, research examining safer-drinking strategies among populations other than college students are needed (Pearson, 2013). The current study was designed to fill this gap in the literature. Specifically, the aims of this study were to qualitatively and quantitatively document the safer-drinking strategies endorsed by chronically homeless individuals with alcohol dependence within the context of a pilot study of a pharmacobehavioral intervention featuring extended-release naltrexone and harm-reduction counseling (for more information on the parent study, see Collins, Duncan, et al., 2014; Collins, Kirouac, et al., 2014). In the present, secondary study, we used content analysis to classify and evaluate the frequency of participant-endorsed safer-drinking strategies. Second, we used inferential statistics to evaluate whether participant's number of endorsed and implemented safer-drinking strategies changed over the course of the study.

2. Materials and methods

2.1. Participants

Participants ($N = 31$; 12.9% women) were currently or formerly (i.e., now living in permanent supportive housing) chronically homeless individuals with alcohol dependence (see Table 1 for baseline demographic data), who participated in a pilot study assessing initial feasibility, acceptability, and alcohol outcomes after receiving treatment with extended-release naltrexone and harm-reduction counseling (for a complete list of inclusion and exclusion criteria in the parent study, see Collins, Duncan, et al., 2014; Collins, Kirouac, et al., 2014).

2.2. Measures

2.2.1. Demographic variables

The personal information form comprises single items assessing age, gender, race, ethnicity, education level and employment status.

Table 1
Baseline descriptive statistics for the study sample (N = 31).

Variable	*M* (*SD*)/%
Age	50.16 (6.35)
Housing status 1 week prior to baseline assessment	54.8% Housing First[a] residents
	45.2% Currently homeless
	29% Sleep-off shelter
	6.5% Emergency shelter
	3.2% Outside
	3.2% Friend's house
	3.2% Other
Ethnicity	3.3% Hispanic/Latino/a
Race	
American Indian/Alaska Native/First Nations	35.5%
Asian	0%
Black/African American	9.7%
Native Hawaiian/Pacific Islander	3.2%
White/European American	38.7%
"More than one race"	12.9%
Highest education level	
No high school degree	29.0%
HS graduate/GED	29.0%
Vocational school	16.1%
Some college	16.1%
College graduate	3.2%
Some graduate school/advanced degree	6.4%
Employment status	
Full time	0%
Part time	3.2%
Unemployed (no assistance)	9.7%
Unemployed (Cash Assistance Program)[b]	38.7%
Disability (SSI/SSDI)	45.2%
Other	3.2%
Self-reported alcohol outcomes	
Typical quantity	24.02 (22.40)
Peak quantity	33.21 (19.00)
Frequency	26.45 (6.15)
Craving	21.00 (7.39)
Alcohol problems	23.29 (11.24)

Notes. Percentages may not total 100% due to rounding.
[a] Housing First is an innovative model of housing that entails the provision of immediate, permanent, low-barrier, nonabstinence-based supportive housing to chronically homeless people who often have co-occurring psychiatric, medical and substance-use disorders.
[b] The Aged, Blind, Disabled Cash Assistance Program is a state program that provides cash grants to people who a) are 65 or older, blind or have a long-term medical condition that is likely to meet federal disability criteria; b) meet income and resource requirements; c) meet citizenship/alien status requirements; and d) reside in-state. This program is applied until individuals qualify for federal disability income.

The housing timeline followback is a set of monthly calendars used to record where participants resided/spent the night each day over the past 30 days (Sobell & Sobell, 1992; Tsemberis, McHugo, Williams, Hanrahan, & Stefancic, 2007). These measures yielded variables that were used to describe the sample at baseline.

2.2.2. Drinking variables

The Alcohol and Substance-use Frequency Assessment questions were adapted from the Addiction Severity Index (ASI) and were used to assess frequency of alcohol use in the past 30 days (McLellan et al., 1992). The Alcohol Quantity of Use Assessment (AQUA) assessed participants' peak and typical alcohol quantity in the past 30 days (Collins, Duncan, et al., 2014). Alcohol craving in the past week was measured using the 5-item, Likert-type *Penn Alcohol Craving Scale* (PACS; Flannery, Volpicelli, & Pettinati, 1999). Internal consistency was adequate ($\alpha = .91$). Finally, alcohol-related problems were assessed using the Short Inventory of Problems (SIP-2R). The SIP-2R is a 15-item, Likert-scale questionnaire that measures social, occupational and psychological alcohol problems (Miller, Tonigan, & Longabaugh, 1995). Internal consistency was adequate ($\alpha = .91$). All of the drinking measures yielded variables that were used to describe the sample at baseline.

2.2.3. Safer-drinking strategies

Participants' willingness to commit to and subsequent implementation of specific safer-drinking strategies was documented at weeks 0 and 8 using an open-ended questionnaire called the Safer-drinking and Harm Reduction Efforts (SHaRE) form (Collins, Duncan, et al., 2014). The safer-drinking portion of this form comprises a grid on which study physicians recorded safer-drinking strategies participants reported wanting to commit to after study physicians introduced a 12-item list of safer-drinking strategies during the intervention (see Fig. 1 for the safer-drinking strategies). Participants' open-ended responses to these prompts were recorded, and participants were informed that the study physicians would check in with them during the next meeting to see how their use of safer-drinking strategies went (i.e., whether the safer-drinking strategies were successfully implemented). Participants received the safer-drinking strategies handout to take with them. At subsequent sessions, study interventionists asked participants whether they had implemented each of the endorsed safer-drinking strategies, and these responses were recorded in the grid next to their previously endorsed strategies.

2.3. Procedures

Study procedures were approved by the institutional review board at the home institution and followed the ethical guidelines outlined in the Declaration of Helsinki (for more details on procedures, see Collins, Duncan, et al., 2014; Collins, Kirouac, et al., 2014). All participants provided written, informed consent. Participants were administered the demographic and alcohol measures at baseline. The next week (week 0), participants were provided with harm-reduction counseling, during which study physicians provided personalized alcohol feedback, elicited participants' own goals (i.e., goals were determined by the participant and did not need to be related to alcohol use), introduced a list of safer-drinking strategies, and administered the study medication (i.e., 380 mg of extended-release naltrexone) and medication management. Participant endorsement and implementation of safer-drinking strategies were assessed at similar counseling appointments at weeks 1, 4, 8 and 12.

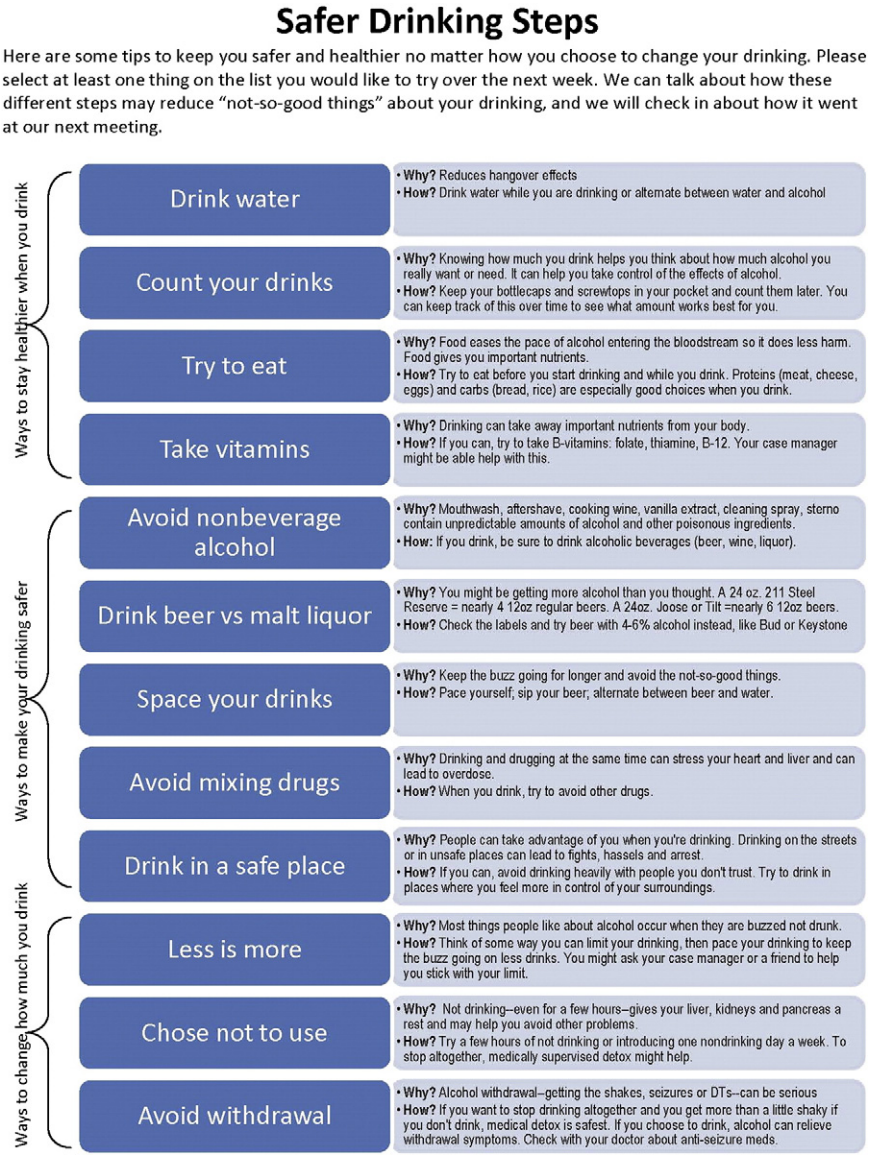

Fig. 1. Safer-drinking strategies list.

2.4. Data preparation and analysis plan

2.4.1. Qualitative data analysis

Responses describing the safer-dinking strategies were transcribed from the SHaRE into a spreadsheet program. Content analysis, which is a methodology that facilitates description of a qualitative data through a systematic process of coding and classification, was conducted (Hsieh & Shannon, 2005). Participants' responses were reviewed by a team of raters, including bachelor-, post-baccalaureate and master's-level psychology students and a clinical psychologist, to identify recurring categories of safer-drinking strategies (Hsieh & Shannon, 2005; Shek & Tang, 2005). Initial coding was conducted independently, and a codebook was created in consensus meetings, pooling codes and eliminating highly idiosyncratic or redundant codes. After the codebook was established, the raters independently rated the responses again. Ratings were discussed, and discrepancies were resolved in meetings until interrater consistency reached acceptable standards in literature (i.e., 80%; Shek & Tang, 2005). Next, frequency analysis was conducted in SPSS 19 to describe the percentage of safer-drinking strategies categories endorsed by the participants at weeks 0 and 8.

2.4.2. Quantitative data analysis

Further quantitative analyses were conducted using SPSS 19. Preliminary descriptive analyses were conducted to describe the sample, document data distributions and identify potential outliers. Because number of safer-drinking strategies endorsed was normally distributed, we used a paired-sample *t*-test to detect significant changes on this variable over time. Proportion of safer-drinking strategies implemented was negatively skewed, and thus, nonparametric tests (i.e., Wilcoxon signed rank signed test) were used to examine significant changes over time. Alpha was set to $p = .05$, and confidence intervals (CI) were set to 95%.

3. Results

3.1. Qualitative results

Interrater reliability for the content analysis categories reached 95.8% for week 0 and 94.6% for week 8. Content analysis yielded three main categories: a) buffering the effects of alcohol on the body, b) changing the manner of drinking, and c) reducing alcohol consumption. At both time points (i.e., weeks 0 and 8), buffering the effects of alcohol on the body was the most encountered category and represented almost half of responses, followed by changing the manner of drinking and reducing alcohol consumption. Table 2 shows rank-ordered lists of safer-drinking strategies and their frequencies across time points.

3.1.1. Buffering the effects of alcohol on the body

Changing eating habits was the most frequently stated safer-drinking strategy. Some participants mentioned wanting to eat more or more often (e.g., "eat 3 times a day"). A few participants also cited generally wanting to eat healthier (e.g., "eat better food") or cooking their own food instead of relying on junk food or fast food. The second most common strategy in this category was to take vitamins (e.g., "take vitamins daily"). Increasing overall intake of nonalcoholic beverages to promote hydration was the third most common strategy to buffer the effects of alcohol. Examples of responses included "drinking more fluids throughout the day," or "drink more water." Relatedly, the fourth most highly endorsed strategy was alternating alcoholic beverages with nonalcoholic beverages. For example, one participant reported "drinking water while drinking alcohol," whereas another mentioned "drinking water between drinks." The fifth most frequently encountered strategy was eating while or before drinking (e.g., "try to eat before drinking," "don't drink on empty stomach") to slow the absorption of alcohol and/or reduce digestive symptoms (e.g., pain in the stomach or pancreas).

Table 2
Safer-drinking strategies at weeks 0 and 8.

Rank	Category	Week 0		Week 8	
		n	%	*n*	%
1	Buffering the effects of alcohol	47	49.9	47	55.9
	Eating	16	17.0	18	21.4
	Taking vitamins	14	14.9	13	15.5
	Drinking non-alcoholic beverages	13	13.8	16	19.0
	Drinking non-alcoholic beverages while drinking	2	2.1	0	0
	Eating while drinking	2	2.1	0	0
2	Changing the manner of drinking	39	41.5	31	36.9
	Spacing drinks	10	10.6	8	9.5
	Drinking in a safer place	8	8.5	7	8.3
	Drinking lower-proof beverage	8	8.5	6	7.2
	Counting drinks	5	5.3	2	2.4
	Avoiding withdrawal symptoms	4	4.3	4	4.7
	Avoiding mixture of drugs and alcohol	2	2.1	3	3.6
	Avoiding non-beverage alcohol	1	1.1	1	1.2
	Diluting alcoholic beverages	1	1.1	0	0
3	Reducing alcohol consumption	8	8.6	6	7.2
	Choosing not to drink	4	4.3	1	1.2
	Drinking less	3	3.2	2	2.4
	Avoiding withdrawal symptoms while reducing	1	1.1	0	0
	Buying beer less often	0	0	1	1.2
	Engaging in non-drinking activities	0	0	2	2.4
	Total safer-drinking strategies	94	100	84	100

Notes. The order of the safer-drinking strategies is based on their ranks at week 0.

3.1.2. Changing the manner of drinking

The second most endorsed category was changing one's manner of drinking, which represented more than one-third of participants' responses. Within this category, spacing drinks was the most commonly cited strategy, followed by drinking in a safer place (e.g., "drink in safe place," "drink in familiar place"). Drinking lower-proof beverages was the next most encountered strategy: some participants mentioned choosing lower-proof beverages in general (e.g., "drinking beer"), whereas others wished to replace higher-proof beverages with lower-proof beverages (e.g., "drink beer versus malt liquor," "drink beer instead of whiskey"). Other less-represented strategies included counting drinks, drinking in a manner to avoid withdrawal symptoms, not mixing drugs and alcohol, avoiding nonbeverage alcohol (e.g., "mouthwash," "cooking wine"), and diluting alcoholic beverages (e.g., "add ice to drinks").

3.1.3. Reducing alcohol consumption

Within this final category, the most frequently cited strategy was incorporating short-term periods of abstinence (e.g., "choose not to drink"), whereas the second was reducing drinking while avoiding withdrawal (e.g., "avoid withdrawal while slowing down"). Finally, two less frequently cited strategies included engaging in non-drinking activities (e.g., "schedule day with activities other than drinking ") and buying alcohol less often (e.g., "buy beer less often").

3.2. Quantitative results

The number of endorsed safer-drinking strategies ranged from 2 to 6 at both week 0 ($M = 3.1$, $SD = 1.37$) and week 8 ($M = 3.3$, $SD = 1.01$). A paired-samples *t*-test indicated no significant change in the overall number of safer-drinking strategies endorsed from week 0 to week 8, $t(24) = -1.75$, $p = .09$. Similarly, a Wilcoxon signed-rank test showed no significant change in the proportion of safer-drinking strategies implemented from week 0 ($Mdn = 0.8$, $IQR = 0.5$) to week 8 ($Mdn = 0.9$, $IQR = 0.33$), $z = -.49$, $p = .62$.

4. Discussion

This secondary study had two aims. The first was to qualitatively and quantitatively document the safer-drinking strategies endorsed by chronically homeless individuals with alcohol dependence within a

pilot intervention study. The second was to test whether the number of safer-drinking strategies endorsed and used by participants changed over an 8-week time frame.

Findings indicated that all study participants endorsed some kind of safer-drinking strategy. Buffering the effects of alcohol on one's body (e.g., eating before or while drinking, taking vitamins and drinking non-alcoholic beverages) was the most frequently documented category, representing over one-half of the endorsed strategies at weeks 0 and 8. These findings correspond to previous qualitative (Howard, Griffin, Boekeloo, Lake, & Bellows, 2007) and quantitative studies (Araas & Adams, 2008; Delva et al., 2004; Haines, Barker, & Rice, 2006; Martens et al., 2004) conducted with college students, which have also documented the relative popularity of this set of safer-drinking strategies. As discussed by Martens et al. (2004), the popularity of this set of strategies may be due to the fact that it is not very constraining and is relatively easy to implement.

The second most commonly endorsed category was changing the manner in which one drinks, which garnered well over one-third of responses at both weeks 0 and 8. Consistent with these findings, college students also endorse a range of strategies to "ensure safety while drinking" (Howard et al., 2007, p. 249). That said, the drinking milieus are different. Whereas participants in the present study most often endorsed spacing drinks, drinking in a safer place, and drinking lower-proof alcohol, college students most commonly reported using a designated driver, knowing where their drink has been at all time, or avoiding drinking games (Araas & Adams, 2008; Delva et al., 2004; Martens et al., 2004, 2005). Strategies used by chronically homeless individuals with alcohol dependence thus differ from those for college students. This finding is not surprising given these populations' different experiences with alcohol (Collins, Duncan, et al., 2014; Collins, Kirouac, et al., 2014). These differences may help explain why some strategies that are priorities for chronically homeless individuals with alcohol dependence do not apply to college students and vice-versa. Importantly, our findings that relevant strategies depend upon the population with which they are used suggest a strength in using open-ended data collection strategies to assess safer-drinking plans across diverse populations.

The final category, strategies to reduce alcohol consumption, was represented in less than 10% of responses. Most participants who endorsed this category were interested in tapering or reducing their use. Only a very small minority of participants was interested in incorporating periods of abstinence into their safer-drinking plan, and among these individuals, abstinence was primarily viewed as a temporary reprieve from ongoing alcohol use instead of a long-term lifestyle change. Although college drinkers are less affected by alcohol dependence than this population, the current findings are parallel to findings for the use of PBS in college samples (Delva et al., 2004; Martens et al., 2004). One study indicated that only a minority of college drinkers were interested in setting drinking limits (Martens et al., 2004), and another study found that choosing not to drink was the least endorsed strategy among college students (Delva et al., 2004). The relatively low interest in abstinence-oriented strategies across these populations highlights the need for harm-reduction oriented interventions that may reach individuals who are not ready, willing and/or able to stop drinking to begin to reduce their alcohol-related harm and improve their quality of life.

Regarding the quantitative findings, participants endorsed a mean of three safer-drinking strategies over the course of the study. Further, participants reported implementing 80% to 90% of their endorsed safer-drinking strategies at weeks 0 and 8, respectively. Findings also indicated that neither the number of safer-drinking strategies endorsed nor the proportion of safer-drinking strategies implemented changed significantly across the 8 weeks. Given the very high proportions of strategies that were implemented, however, it is likely that the later finding is attributable to a ceiling effect. Taken together, our preliminary findings indicate that harm-reduction interventions promoting safer-drinking strategies are likely to be well-received among chronically homeless individuals with alcohol dependence. Such interventions may help these individuals increase the number of safer-drinking strategies participants incorporate and successfully implement in their day-to-day lives, which may in turn decrease their level of alcohol-related harm.

4.1. Limitations

Interpretation of these findings should be considered in light of the study's limitations. Previous literature has suggested that self-report data can be subject to inaccuracies resulting from cognitive impairment and memory biases (Ekholm, 2004; Gelberg & Siecke, 1997). That said, our research team has shown that self-report measures among chronically homeless individuals with alcohol problems can be reliable (Clifasefi et al., 2011). Next, questions were piloted and developed with the specific study population in mind and therefore focused on the discrete, recent, and manageable time fames recommended by researchers working with homeless populations and alcohol use outcomes (Clifasefi et al., 2011; Gelberg & Siecke, 1997; Maisto, Sobell, & Sobell, 1982).

Another limitation is that this sample was small and included a specific subcategory of individuals with alcohol dependence. Generalizability and statistical power to detect significant changes are therefore limited. The small sample size also precluded an evaluation of the associations between use of safer-drinking strategies and alcohol outcomes.

Despite these limitations, this study fills a literature gap: Although a validated PBS measure exists for college students (Martens, Pederson, Labrie, Ferrier, & Cimini, 2007), there are no equivalent measures tailored to the drinking patterns and drinking milieu of chronically homeless individuals with alcohol dependence. This study is thereby introducing a new, open-ended measure for assessing the use of safer-drinking strategies while providing a foundation for future larger-scales studies examining the use of safer-drinking strategies and its effectiveness in this population.

5. Conclusion and future directions

This study indicated that chronically homeless individuals with alcohol dependence are interested in drinking safer when they do choose to drink and can commit to using safer-drinking strategies. These findings indicate that interventions aiming to increase use of safer-drinking strategies may be well-received in this population. Future research is needed to more thoroughly examine the effectiveness of interventions involving safer-drinking strategies in this population.

Acknowledgements

This research was supported by a Swiss National Science Foundation (SNSF) grant # PP1LAP3–148418 awarded to V.S. Grazioli and grants awarded to S.E. Collins from the Alcohol and Drug Abuse Institute (ADAI), the Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP) and the National Institutes of Health (K22AA018384). The grant agencies had no further role in study design, in the data collection, analysis and interpretation, in the writing of the report or in the decision to submit manuscript to publication.

We would like to thank Megan Kirouac for her assistance in setting up and managing the study organization; Emily Taylor and Katy Thysell for their assistance with data management; Samantha Chalker, Laura Haelsig, Gail Hoffman, Jennifer Holttum, Ami Kanagawa, Maya Nehru, Anthony Olds, and Morgan Quick for their help with data entry and management; and Drs. Mark Duncan and Brian Smart for their assessment and management of the data collection. Most of all, we would like to thank the study participants for their role in this research and for helping us understand the meaning of harm reduction.

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STUDY 3

Six-Month Substance Use Outcomes Among Socially Marginalized Individuals Attending a Drop-in Center Allowing Alcohol Consumption

Six-Month Substance Use Outcomes Among Socially Marginalized Individuals Attending a Drop-in Center Allowing Alcohol Consumption

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This manuscript is currently under review.

PhD candidate contribution:

VG helped conceive the study and its design, conducted the background literature review, provided scientific project management, assembled measures, managed and prepared the data, conducted the statistical analyses, and drafted the manuscript.

Objectives. Despite their experience of substance-related harm, few socially marginalized alcohol and other drug (AOD) users access substance use treatment. Thus, identifying alternative approaches for this population is important. This program evaluation documented substance use and quality-of-life (QoL) outcomes following exposure to such an alternative approach: a harm-reduction drop-in center allowing alcohol consumption onsite. **Methods.** Participants (N = 85) were socially marginalized AOD users (e.g., alcohol, heroin) attending a harm-reduction drop-in center in the French-speaking part of Switzerland. Time and drop-in center attendance were predictors of substance-use and QoL outcomes, which were measured at baseline, 1- and 6-month follow-ups. **Results.** Findings indicated that, for each month of the evaluation, participants' alcohol use and related problems decreased by 5% and 7%, respectively. Drop-in center attendance predicted additional decreases in drug-related problem severity and improvements in mental health-related QoL. **Conclusions.** Participants' alcohol use and related problems decreased over time. Additionally, participants evinced improved mental health-related QoL and decreased drug-related problem severity with greater drop-in center attendance. Harm-reduction drop-in centers allowing alcohol consumption onsite are promising interventions for socially marginalized AOD users.

Keywords: Socially marginalized individuals, alcohol, drugs, harm reduction, drop-in center, quality of life

Six-Month Outcomes for Socially Marginalized Alcohol and Drug Users Attending a Drop-in Center Allowing Alcohol Consumption

Socially marginalized individuals are characterized by the European Network of Social Inclusion and Health as "individuals, groups or populations outside of mainstream society, living at the margins of those in center of power, of cultural dominance and economical social welfare" (p. 6).[1] Social marginalization has been used in Europe as an umbrella term to refer to individuals who regularly use publicly funded clinical and social services (i.e., shelters, drop-in centers, case management, and medical and psychiatric centers), marginally housed or homeless individuals, social assistance recipients, and substance users.[2]

Worldwide, socially marginalized individuals are more severely affected by alcohol and drug-use disorders than the general population.[3-5] A Swiss study of substance use among socially marginalized individuals showed that more than half of the people surveyed engaged in "harmful drinking" (i.e., drinking 60 grams or more of pure alcohol per day).[6] Additionally, 40% reported polysubstance use (e.g., heroin, cocaine), which is associated with increased substance-related harm (e.g., falls, injuries, overdose), reduced health-related quality of life (QoL), and higher mortality rates than those seen in the general population.[3,6,7] Despite their clearly demonstrated needs, most socially marginalized individuals do not present for widely available abstinence-based treatments. In fact, the Treatment systems Research on European Addiction Treatment project (TREAT) documented that only 7% of those with substance use disorders in Zurich, Switzerland reported having attended abstinence-based treatment over the past 6 months.[8]

To more adequately address this situation, the Swiss government has called for innovative approaches that could better engage and address the needs of socially marginalized AOD users.[9] Harm-reduction interventions are well-positioned to respond to this call. Harm reduction comprises a set of pragmatic, compassionate and user-driven approaches that aim to improve health-related QoL and reduce substance-related harm (e.g., alcohol) without requiring abstinence or use reduction.[10]

Alcohol-related harm-reduction interventions have been surrounded by some controversy because of concerns that nonabstinence-based interventions could "enable" or augment harmful alcohol use.[10] Contrary to this enabling hypothesis, however, recent pilot studies of harm-reduction interventions conducted in North America have shown promising findings for socially marginalized AOD users. For example, a pilot study (N = 17) in Canada showed decreased use of alcohol and publicly funded services (i.e., emergency medical and criminal justice systems) following exposure to a shelter-based managed alcohol program in which homeless individuals with alcohol dependence received alcohol on a controlled hourly schedule.[11] More recent research has shown that Housing First, which entails the provision of immediate, permanent, low-barrier, nonabstinence-based supportive housing, is associated with decreased alcohol use and problems as well as publicly funded service utilization and associated costs.[12-14] Finally, a recent pilot study of harm-reduction counseling (i.e., interactive alcohol feedback; client-driven, harm-reduction goal elicitation; and discussion of safer drinking strategies) coupled with anticraving medication showed harm-reduction alcohol treatment is feasible and acceptable and is associated with significant decreases in alcohol craving, use and problems among homeless individuals with alcohol use disorders in the US.[15]

Given most European countries' comprehensive social safety net, unsheltered homelessness is not the large-scale problem it is in North America.[16] In Switzerland, however, there are concerns about lack of daytime shelter and public intoxication among socially marginalized AOD users, who often gather and drink in public spaces.[6] There have thus been calls to address this situation by developing low-threshold drop-in centers that provide a safe space for these individuals to engage with social services, help reduce substance-related harm, and limit public disorder.[9]

In response, a new harm-reduction drop-in center serving socially marginalized AOD users was recently opened in a city within the French-speaking part of Switzerland. Although there are no substance-use treatment attendance requirements, onsite staff are available to engage interested attendees in harm-reduction substance-use counseling and temporary vocational activities. Although the center does not provide alcohol, clients are allowed to bring and consume their own alcoholic beverages onsite. A pre-existing, harm-reduction drop-in center that does not allow alcohol consumption onsite is located across a narrow passage from this center and provides complementary harm-reduction services and nursing care.

The present program evaluation documented AOD outcomes (i.e., quantity, frequency and related problems) and health-related QoL among socially marginalized AOD users following exposure to this new harm-reduction drop-in center. Contrary to the enabling hypothesis and in line with recent, promising findings for harm-reduction approaches, we predicted drop-in center clients would evince decreases in AOD use and related problems as well as improvements in health-related QoL. We also hypothesized

that greater attendance at the drop-in center would be associated with additional improvements in AOD outcomes and health-related QoL.

METHODS

Setting

The setting for this program evaluation was a harm-reduction drop-in center that serves socially marginalized AOD users and allows alcohol consumption onsite. The drop-in center is located in the French-speaking part of Switzerland and opened in February 2014. It is open every day from 12pm to 7pm and can serve 25 individuals at a time. Clients may bring and consume their own alcoholic beverages onsite. Nonalcoholic beverages and snacks (i.e., sandwiches and pastries) are provided free of charge, and a lunchtime meal is available at a reduced price. A pre-existing, harm-reduction drop-in center that does not allow alcohol consumption onsite is located nearby, and provides complementary harm-reduction services (e.g., safer drug use kits, shower and laundry facilities, secondhand clothes distribution) and nursing care.

Given the center's low-barrier, harm-reduction approach, clients are not required to attend treatment; however, onsite staff (i.e., 1-2 social workers, 1-2 nurses and a psychologist) are available to provide interested clients with harm-reduction substance-use counseling and vocational opportunities. The harm-reduction substance-use counseling was adapted from a brief intervention developed by the second author and focuses on eliciting and supporting participants' own goals and engaging participants around safer-drinking strategies (e.g., tips for tapering and maintenance drinking to avoid alcohol withdrawal; buffering the effects of alcohol on the body by taking B-complex

vitamins and eating before and during use).[15] Harm-reduction goals are entirely participant-driven and do not require a focus on substance-use abstinence or reduction.[15]

Participants

Participants were socially marginalized AOD users who attended a harm-reduction drop-in center in the French-speaking part of Switzerland. Inclusion criteria were being at least 18 years of age, having adequate French language skills to complete study questionnaires, being able to provide informed consent, having visited the drop-in center at least once, and having provided written or oral informed consent to participate in the evaluation. The initial sample included 101 participants. One participant was excluded from analyses because he had not visited the drop-in center at least once. Next, participants reporting no alcohol consumption (n = 9) and/or no drug use (i.e., illicit and nonprescription drugs; n = 6) in the past month were not included in the analyses, resulting in a in a finale sample of 85 participants (see Figure 1).

Measure of ability to provide informed consent. Ability to consent was assessed using the *UCSD Brief Assessment of Capacity to Consent.* This measure ensures that participants understand the study protocol, potential risks/benefits and their rights as participants prior to study enrollment.[17] Three items were translated and administered (i.e., *What is the purpose of the program evaluation that was just described to you? Do you believe this is primarily research or primarily treatment? Do you have to be in this program evaluation if you do not want to participate?*).

Measures for baseline sample description. Single items were used to assess baseline sociodemographic information, including age, gender, nationality, highest

education level, income sources and housing status. Responses were used to describe the sample.

Measures of AOD use and related problems. The *Alcohol Quantity of Use Assessment (AQUA)* was used to assess alcohol quantity (i.e., number of standard drinks) consumed on typical and peak drinking days in the past month (hereafter referred to as typical and peak alcohol quantity).[12,15]

Frequency of alcohol and other nonprescription drug use in the past month was assessed with items from the *Addiction Severity Index (ASI-5).*[18] AOD frequency items were dummy coded to yield a 30-day report of at least 1 AOD abstinence day (1 = ≥ 1 abstinent day and 0 = no abstinent days). The ASI-5 was also used to compute a drug composite score, which is a reliable and valid index of drug-related problem severity.[19] Scores range from 0 to 1, with higher scores indicating greater drug-related problem severity.[19]

Individuals' experience of alcohol-related problems over the past month was assessed using the *Short Inventory of Problems (SIP-2R),* which is a 15-item questionnaire that evaluates social, occupational and psychological problems that people experience while drinking.[20] Internal consistency was adequate ($\alpha = 0.91$, 0.87 and 0.92 at baseline, 1 and 6-month assessments, respectively).

Measures of health-related QoL. The French version of the *12-Item Short Form Survey Instrument (SF-12v2)* was used to measure health-related QoL over the past month. The *SF-12v2* yields physical and mental health summary scores. Following the scoring guidelines, a linear *T*-score transformation (i.e., based on the US general population) was conducted to obtain norm-based scores (mean = 50; *sd* = 10).[21] Scores

range from 0 to 100 with higher scores indicating better health-related QoL. This measure has been psychometrically validated with socially marginalized individuals.[22]

Drop-in center attendance. Drop-in center staff recorded participants' attendance. Drop-in center attendance in months represented exposure to the intervention and served as one of the primary predictors in the main analyses.

Procedures

All procedures were approved by the institutional review board at the home institution and followed the ethical guidelines outlined in the Declaration of Helsinki. Participants were recruited from February to December 2014, and the follow-up period ended in May 2015. The drop-in center and research staff notified drop-in center attendees (as well as attendees at the sister site in the same complex) of the opportunity to participate in the program evaluation, and informational flyers were posted at the drop-in center. Research staff (i.e., a psychologist) conducted information sessions with interested clients, during which she explained the purpose, content and structure of the program evaluation; participants' rights; potential study-related risks; and informed consent materials. After providing written (n = 75) or oral (n = 10) informed consent, participants were administered the above measures at the baseline, 1- and 6-month follow-ups. Research staff also administered the harm-reduction counseling at the baseline and 1-month follow-up. To honor their time spent in assessment sessions, participants were compensated CHF 30 at the baseline and 1-month follow-up and CHF 50 at the 6-month follow-up. Research staff attended in-person training sessions and ongoing supervision regarding the questionnaire administration with a licensed clinical psychologist (i.e., the second author).

Data Preparation and Analysis Plan

Data were double-entered by research assistants, and discrepancies were resolved by the first author to ensure data integrity. Data were then screened for missingness, outliers and distribution shape. Descriptive and inferential analyses were conducted using SPSS 19 and STATA 13.1, respectively. Mann-Whitney *U* tests (for continuous variables) and Pearson χ^2 tests (for categorical variables) were conducted to compare completers and noncompleters on demographic and outcome variables at the baseline, 1- and 6-month follow-ups.

Population-averaged generalized estimating equation (GEE) modeling was used to test time and drop-in center attendance as predictors of AOD and health-related QoL outcomes over the 6-month follow-up period. GEE models are marginal models that can be applied to data conforming to different types of distributions and can take into account nonindependence resulting from data clustering (e.g., longitudinal data).

GEEs were used to test the following nested models. The first model included centered, linear *time* to represent the passage of time since participants entered into the evaluation and centered *drop-in center attendance*. The second model examined the additive effect of the two-way *time* x *drop-in center attendance* interaction, which represented the effects of drop-in center attendance over time. The relative fit of the models was determined using the quasilikelihood under the independence model information criterion (QICu), where a lower score indicates a more parsimonious model.

Dependent variables included experience of at least one AOD abstinence day, typical and peak alcohol quantities, alcohol-related problems, other drug-related problems, and physical and mental health-related QoL. As the distributions of typical and

peak alcohol quantities and alcohol-related problems were positively skewed and overdispersed count/integer responses, negative binomial distributions with log links were specified for these variables. Drug-related problem severity and physical and mental health-related QoL scores were normally distributed; thus, we specified the Gaussian distribution with identity links for these variables. Finally, because experience of at least one AOD abstinent day was a dichotomous variable, we specified a Bernoulli distribution with the logit link. Repeated measures for each individual served as the sole clustering variable. Because the dependent variables were clustered, unbalanced and evinced gaps for some participants, we used an exchangeable correlation structure to ensure model convergence. To enhance model interpretability, exponentiated coefficients (e.g., odds ratios, incident rate ratios) were used where appropriate. Alpha was set to $p = .05$.

RESULTS

Study Sample Description

The mean age was 37.44 ($SD = 9.59$) years. The sample ($N = 85$) was predominantly male (17.6% female), and 64.7% reported being homeless (sheltered or unsheltered).[23] See Table 1 for additional baseline sociodemographic data. Participants' drop-in center attendance ranged from 0.07 to 9.9 months ($Mdn = 1.37$, $IQR = 2.53$). Table 2 presents descriptive statistics for dependent variables across time points.

Attrition Analyses

Attrition analyses indicated that a greater proportion of noncompleters versus completers at 1 month, $\chi^2 (1, N = 85) = 5.12$ $p = .02$, and at 6 months, $\chi^2 (1, N = 85) = 4.42$, $p = .04$, were homeless at baseline. Noncompleters at 6 months were also younger $t(85) = -2.84$, $p = .006$ and reported more alcohol-related problems, $U (N = 85) = 495.5$, p

= .03, at baseline than completers (all other *ps* > .15). Age and housing status at baseline were therefore added as covariates in all GEE models. Alcohol-related problem score at baseline was added as a covariate to GEE models that did not involve alcohol use so as to avoid problems with collinearity.

Primary Analyses

AOD quantity and frequency. The main effects models for typical and peak alcohol quantities were both significant (see Table 3 for omnibus model statistics and parameter estimates). Time, but not drop-in center attendance, was a significant predictor of typical and peak alcohol quantity. Specifically, participants experienced monthly decreases of 5% and 4% for typical and peak alcohol quantities, respectively. The full models, which included the time x drop-in center attendance interaction, were also significant. However, the full models' higher QICu statistics and nonsignificant omnibus tests indicated that the inclusion of the interaction did not significantly contribute above and beyond the main effects (see Table 3). The model for experience of at least one AOD abstinence day was significant; however, no individual predictors reached significance (see Table 3).

AOD-related problems. As shown in Table 3, the model for alcohol-related problems was significant. Time, but not drop-in center attendance, was a significant predictor, which indicated that participants reported 7% fewer alcohol-related problems for each month in the evaluation. The full model was also significant and slightly more parsimonious; the time x drop-in center attendance interaction was significant, indicating differences in drop-in center attendance effects over time (see Figure 2).

The model for drug-related problem severity was significant (see Table 3). Although time was not a significant predictor, overall higher drop-in center attendance was significantly associated with lower drug-related problem severity. The full model was also significant but less parsimonious than the first model. The time x drop-in center attendance interaction was significant, indicating differences in drop-in center attendance effects over time (see Figure 3).

Health-related QoL. Although the model for physical health-related QoL was significant, neither the main effects nor the interaction effects were significant (see Table 3). The model for mental health-related QoL was significant. Drop-in center attendance, but not time, was a significant predictor, which indicated that greater drop-in center attendance was associated with better mental health-related QoL. Although the full model was also significant, it was less parsimonious and the interaction was not significant (see Table 3).

DISCUSSION

In this program evaluation, we tested longitudinal changes in AOD outcomes and health-related QoL among socially marginalized AOD users following exposure to a Swiss harm-reduction drop-in center that allows alcohol consumption onsite. This innovative harm-reduction intervention had met with some controversy prior to its opening.[24] This controversy stemmed from the commonly held belief that more severely affected substance users require abstinence-based treatment to achieve positive outcomes.[25] The corollary is that harm-reduction approaches that do not require abstinence will result in increases in substance use and related problems.[10]

Contrary to this so-called enabling hypothesis, this evaluation yielded promising findings. Participants reported significant decreases in alcohol use and related problems over the course of the evaluation. Specifically, each passing month in the evaluation was associated with 5% and 4% decreases in alcohol consumed on both typical and peak drinking days, respectively, and with a 7% decrease in alcohol-related problems. Findings also indicated that greater drop-in center attendance was associated with improved mental health-related QoL and decreased drug-related problem severity.

Two significant interactions between time and drop-in center modified these main effects and indicated that participants with medium drop-in center attendance evinced the clearest decreases in alcohol- and drug-related problems over time compared to those with the lowest attendance (< 25th percentile). In contrast, those with the highest attendance (> 75th percentile) evinced fluctuations in their experience of alcohol-related problems and drug-related problems severity over time. One explanation for the latter findings may be that participants who attended the center the most—more than every other day on average—were the most socially marginalized, vulnerable and severely affected individuals. Fluctuations in AOD-related harm are expected in this more severely affected population and may reflect their generally poorer trajectories. Fortunately, the overall trend indicated that greater attendance was associated with decreases in these outcomes.

Overall, these findings are in line with those of prior studies conducted in the US and Canada, which have shown that harm-reduction approaches are associated with decreases in alcohol use and alcohol-related problems as well as improved health-related QoL.[11-15,26] Although larger, randomized controlled trials of harm-reduction approaches

for alcohol use are needed, this growing body of literature suggests that alcohol harm-reduction approaches may be a good fit for socially marginalized individuals across different cultures (i.e., US, Canada and Europe).

Limitations

This program evaluation has limitations that deserve mention. For example, this evaluation used self-report data exclusively. Self-report data can be subject to inaccuracies resulting from cognitive impairment, memory biases, and social desirability.[27-31] Fortunately, prior studies conducted with socially marginalized AOD users have shown adequate concordance between self-report and administrative records.[32] Further, the measures were developed with the specific study population in mind and therefore focused on the discrete, recent, and manageable time frames recommended by researchers working with socially marginalized individuals.[28,33] Finally, these specific study measures had all been used in prior studies with socially marginalized individuals and/or Swiss populations.[12,15,18,22]

An additional limitation that affects many longitudinal program evaluations is attrition. Attrition and the resulting missing data can introduce biases into statistical analyses. To address this limitation, we followed guidelines in the literature to test differences between completers and noncompleters on key variables in the dataset and to control for these variables to increase our confidence that data could be considered missing at random (i.e., after controlling for key variables, the probability of missing data on the outcomes is unrelated to their value).[34] Further, completion rates were on par with standards often seen in longitudinal program evaluations (i.e., > 70% across all timepoints).

Finally, a single-arm evaluation precludes conclusions regarding the causality of the observed findings. On the one hand, it is possible that other factors may have accounted for the observed improvements in AOD outcomes and health-related QoL. On the other hand, findings clearly contradicted the enabling hypothesis, which would have otherwise suggested that alcohol consumption being allowed onsite would augment harmful alcohol use among attendees. Further, findings indicated that—even after accounting for the passage of time—increased exposure to the drop-in center was correlated with statistically significant improvements in mental health-related QoL and drug-related problem severity. These points increase our confidence that the harm-reduction drop-in center is a promising approach for socially marginalized AOD users. Future randomized controlled trials could further bolster these preliminary findings and allow researchers to determine whether the observed effects are due to the intervention or other confounding factors.

Conclusions and Public Health Implications

The present program evaluation has yielded several important preliminary findings. The Swiss harm-reduction drop-in center did not require AOD abstinence or abstinence-based treatment engagement, and it allowed alcohol consumption onsite. Nonetheless, participants evinced significant decreases in alcohol use and related problems over time. Further, findings showed that the amount of time spent at the drop-in center was associated with additional decreases in drug-related problem severity and improvements in mental health-related QoL. Although future research is necessary to confirm these preliminary findings, they suggest that harm-reduction drop-in centers

allowing alcohol consumption onsite are a promising approach for socially marginalized AOD users.

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Table 1.

Baseline Descriptive Statistics for the Study Sample (N = 85)

Variables	*M* (*SD*) or %
Age	37.44 (9.59)
Relationship status	
Married	2.4%
Single	75.2%
Separated, divorced	22.4%
Highest educational level	
No high school degree	51.2%
High school graduate	6.0%
Vocational school	33.3%
College graduate	9.5%
Housing status	
Housed	35.3%
Homeless[1]	64.7%
Income sources	
Employed full or part time	0.0%
Unemployed (no assistance)	9.5%
Social security/disability[2]	35.7%
Social assistance	46.4%
Other (family assistance, scholarship)	8.4%

Note. [1]Includes both sheltered (e.g., sleeping in hostels or other temporary accommodations) and unsheltered (e.g., sleeping rough or in emergency accommodation homeless individuals. [2]State programs that provide income to people who a) are 65 or older, or b) have a long-term disability.

Table 2.

Descriptive Statistics for Primary Outcome Variables (N = 85)

	M(*SD*) or % *Mdn*		
Variables	Baseline	1-mo follow-up	6-mo follow-up
Alcohol use and related problems			
Typical alcohol quantity	8.52(7.94)	8.75(9.02)	7.35(7.59)
	5.48	6.28	5.24
Peak alcohol quantity	17.46(14.96)	16.60(15.84)	12.97(13.52)
	14.06	15.79	9.27
Alcohol-related problems	9.95(8.73)	7.97(7.49)	6.82(8.00)
	8.00	6.50	3.50
Drug use and related problems			
At least 1 day of AOD abstinence	19.00	22.50	26.70
Drug-related problem severity[a]	0.27(0.13)	0.26(0.13)	0.25(0.14)
	0.28	0.27	0.24
Quality of life			
Physical health-related QoL[b]	48.37(8.48)	48.92(8.90)	48.17(8.34)
	48.74	51.17	49.54
Mental health-related QoL[b]	35.32(9.46)	39.05(10.97)	39.38(11.52)
	34.23	40.43	37.07

Notes. [a]Scores range from 0 to 1, with greater scores indicating greater problem severity.

[b]Scores range from 0 to 100, with higher scores indicating a better health-related QoL

Table 3.

Omnibus Model Effects and Parameters Showing the Association of Time and Drop-in Center Attendance with Alcohol and Other Nonprescription Drug-use Outcomes and Health-Related QoL (N = 85)

Variables	Typical alcohol quantity[ab]			Peak alcohol quantity[ab]			Alcohol-related problems[a]		
	Wald χ^2	*QICu*	*IRR(SE)*	Wald χ^2	*QICu*	*IRR(SE)*	Wald χ^2	*QICu*	*IRR(SE)*
Model 1	13.69**	183.02		25.23***	204.24		15.75**	304.86	
Time			0.95(0.02)**			0.96(0.02)**			0.93(0.02)**
Drop-in center attendance			1.06(0.05)			1.05(0.05)			1.02(0.05)
Housing			0.97(0.16)			1.12(0.18)			0.91(0.16)
Age			0.98(0.01)*			0.97(0.01)**			0.98(0.01)*
Model 2	13.45*	184.69		25.23***	205.87		20.12**	303.86	
Time			0.95(0.02)**			0.96(0.02)**			0.92(0.02)***
Drop-in center attendance			1.06(0.05)			1.06(0.05)			1.02(0.05)
Time x drop-in center attendance			1.01(0.01)			1.00(0.01)			1.02(0.01)*

Variable	Typical alcohol quantity[ab]			Peak alcohol quantity[ab]			Alcohol-related problems[a]		
	Wald χ^2	*QICu*	*IRR(SE)*	Wald χ^2	*QICu*	IRR(SE)	Wald χ^2	*QICu*	*IRR(SE)*
Housing			0.98(0.17)			1.12(0.18)			0.93(0.16)
Age			0.98(0.01)*			0.97(0.01)**			0.98(0.01)*

Variable	AOD abstinence[ac]			Drug-related problem severity[ad]		
	Wald χ^2	*QICu*	*OR(SE)*	Wald χ^2	*QICu*	*B(SE)*
Model 1	13.96*	215.12		16.41**	15.61	
Time			1.05(0.05)			-0.002(0.002)
Drop-in center attendance			1.19(0.12)			-0.01(0.01)*
Housing			1.32(0.59)			0.01(0.03)
Age			0.99(0.02)			0.001(0.001)
Alcohol-related problems[ab]			0.92(0.03)**			0.004(0.001)**
Model 2	14.61*	216.66		35.56***	17.58	
Time			1.06(0.05)			-0.003(0.002)
Drop-in center attendance			1.18(0.12)			-0.01(0.01)*
Time x drop-in center attendance			0.98(0.02)			0.002(0.001)*
Housing			1.32(0.59)			0.01(0.03)

Variable	AOD abstinence[ac]			Drug-related problem severity[ad]		
	Wald χ^2	*QICu*	*OR(SE)*	Wald χ^2	*QICu*	*B(SE)*
Age			0.99(0.02)			0.001(0.001)
Alcohol-related problems[ab]			0.91(0.03)**			0.004(0.001)**

Variable	Physical health-related QoL[ae]			Mental health-related QoL[ae]		
	Wald χ^2	*QICu*	*B(SE)*	Wald χ^2	*QICu*	*B(SE)*
Model 1	11.75*	16588.58		18.37**	24660.00	
Time			-0.02(0.19)			0.33(0.20)
Drop-in center attendance			0.02(0.34)			0.95(0.39)*
Housing			-0.76(1.77)			-2.98(1.97)
Age			-0.26(0.09)**			0.16(0.12)
Alcohol-related problems[ab]			-0.13(0.09)			-0.19(0.13)
Model 2	12.64*	16588.93		28.59***	24313.65	
Time			-0.04(0.19)			0.42(0.19)*
Drop-in center attendance			-0.01(0.35)			0.90(0.39)*
Time x drop-in center attendance			0.06(0.09)			-0.21(0.18)
Housing			-0.75(1.77)			-3.00(1.97)

Variable	Physical health-related QoL[ae]			Mental health-related QoL[ae]		
	Wald x2	*QICu*	*B(SE)*	Wald x2	*QICu*	*B(SE)*
Age			-0.25(0.09)**			0.16(0.12)
Alcohol-related problems[ab]			-0.14(0.09)			-0.18(0.12)

Note. [a]All outcomes were measured over the past 30 days. [b]This variable entails the number of standard drinks on either a typical or peak drinking day. [c]Alcohol and other drug abstinence, with 1 = at least one abstinent day and 0 = no abstinent day. [d]Scores range from 0 to 1, with higher scores indicating greater problem severity. [e]scores range from 0 to 100, with higher scores indicating a better health-related QoL. Time (coded in months) represents the passage of time since participants entered into the evaluation. Drop-in center attendance represents the intensity of attendance or the number of months of attendance from the drop-in center opening through participants' 6-month follow-up. Housing status has been dichotomized, with 0 = nor being homeless and 1 = being homeless

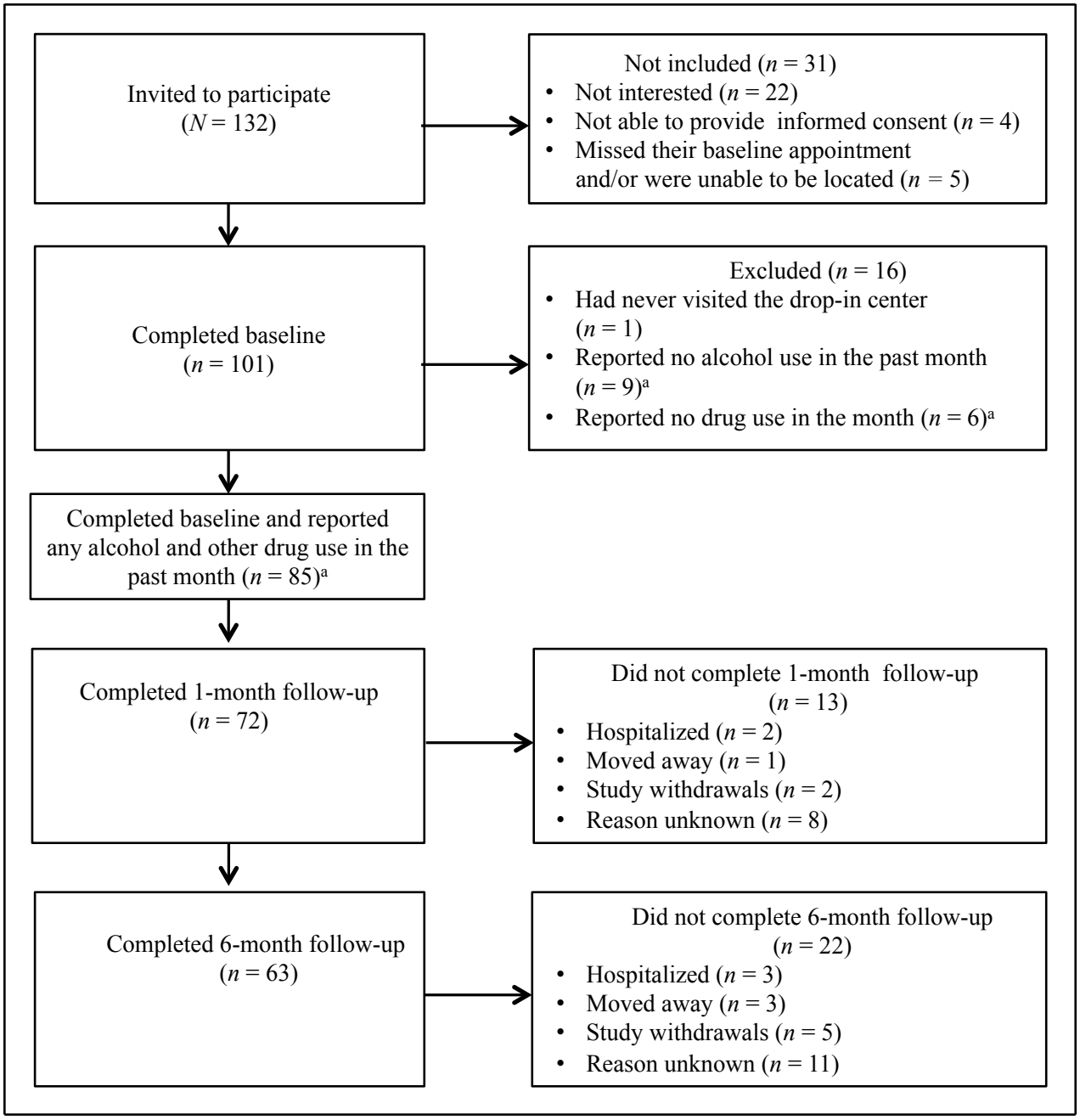

Figure 1. Flow diagram documenting participants' progression through the program evaluation

Note. [a]Described in the method section

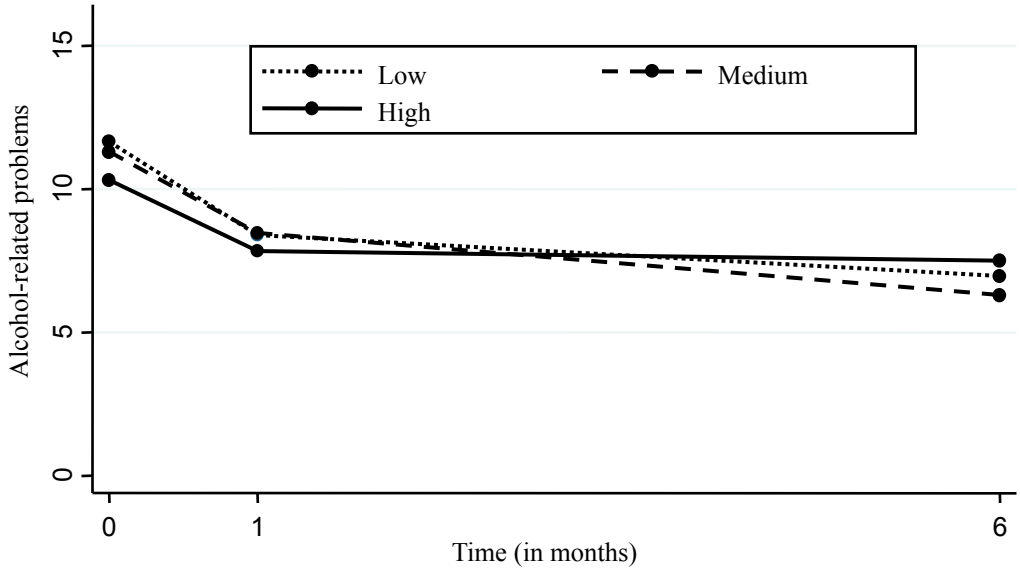

Figure 2. Graph of the interaction between time and harm-reduction drop-in center attendance and its effect on alcohol-related problems. For illustrative purposes, harm-reduction drop-in center attendance was split using the interquartile range, where low attendance is less than the 25th percentile, medium attendance is between the 25th and 75th percentiles, and high attendance is greater than the 75th percentile.

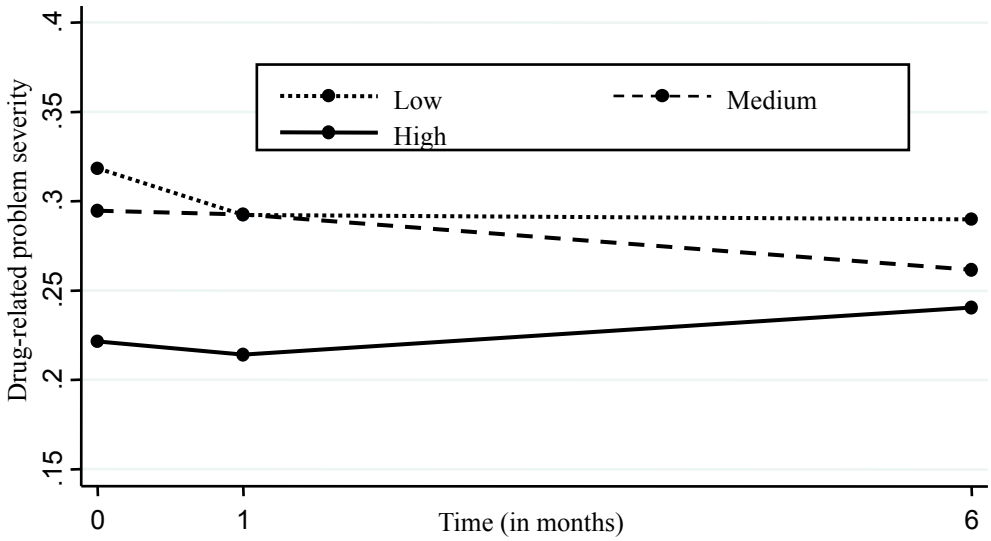

Figure 3. Graph of the interaction between time and harm-reduction drop-in center attendance and its effect on drug-related problem severity. For illustrative purposes, harm-reduction drop-in center attendance was split using the interquartile range, where low attendance is less than the 25th percentile, medium attendance is between the 25th and 75th percentiles, and high attendance is greater than the 75th percentile.

STUDY 4

Protective Behavioral Strategies and Future Drinking Behaviors: Effect of Drinking Intentions

Protective Behavioral Strategies and Future Drinking Behaviors: Effect of Drinking Intentions

Véronique S. Grazioli, Tiara Dillworth, Katie Witkiewitz, Claes Andersson, Jason R. Kilmer, Timothy Pace, Nicole Fossos-Wong, Haley Carroll, Mats Berglund, Jean-Bernard Daeppen & Mary E. Larimer

This article was published in ***Psychology of Addictive Behaviors*** *29*(2), p. 355-364, 2015.

The supplemental material is presented in **Appendix 1**.

PhD candidate contribution:

VG conducted the background literature review, conceived the study and its design, participated in the statistical analyses and drafted the manuscript.

Psychology of Addictive Behaviors
2015, Vol. 29, No. 2, 355–364

0893-164X/15/$12.00 http://dx.doi.org/10.1037/adb0000041

Protective Behavioral Strategies and Future Drinking Behaviors: Effect of Drinking Intentions

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Alcohol use is common among United States and Swedish high school students and is related to negative consequences. Whereas drinking intentions are associated with future drinking behaviors, the use of protective behavioral strategies (PBS) is associated with decreased alcohol-related harm among young adults. The interactive effect of PBS and drinking intentions in predicting alcohol outcomes has not been examined. Further, because most PBS studies have been conducted among U.S. college students, PBS research among other populations is needed. The aims of this study were to evaluate longitudinally (a) the relationships between drinking intentions, PBS and alcohol outcomes, and (b) the moderating roles of drinking intentions and country in these relationships among United States and Swedish high school drinkers. Data were collected at baseline, 6- and 12-month follow-ups on 901 Swedish and 288 U.S. high school drinkers. Drinking intentions were associated with more alcohol use and consequences, and use of certain PBS was related to fewer alcohol-related consequences over time. Additionally, the negative prospective relationship between use of PBS and alcohol use, but not alcohol-related consequences, was moderated by intentions, such that the relationship was stronger among participants endorsing high drinking intentions. Country did not moderate these relationships. These results provide initial support for the generalizability of PBS college research to United States and Swedish high school students and suggest that interventions targeting the use of PBS may be most effective among high school drinkers endorsing high drinking intentions.

Keywords: United States and Swedish high school students, drinking intentions, protective behavioral strategies, moderation

Supplemental materials: http://dx.doi.org/10.1037/adb0000041.supp

Alcohol use among high school students is fairly common in the United States. National U.S. surveys indicate that among 12th-graders (i.e., aged 17–19), 70% report consuming alcohol at some point in their life (Johnston, O'Malley, Bachman, & Schulenberg, 2011). Further, heavy drinking (i.e., consuming four or more drinks on a single occasion for women or five or more drinks on a single occasion for men; Miller, Naimi, Brewer, & Jones, 2007) is a common pattern of alcohol consumption in this population,

This article was published Online First February 2, 2015.

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This research was supported by NIAAA #R01AA018276-03 awarded to Mary E. Larimer and Mats Berglund.

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with 22% reporting at least one episode in the past 2 weeks (Johnston et al., 2011).

Heavy alcohol consumption is also common among high school students in European countries. Compared to the United States, a slightly greater percentage of European high school students consume alcohol and endorse heavy drinking (Hibell et al., 2012). Data from 2011 in Sweden (Hibell et al., 2012) indicated that 84% of 11th-graders reported drinking alcohol over the past year, with 38% reporting at least one heavy drinking episode per month.

Of concern, research in this age group has consistently found an association between alcohol consumption and alcohol-related consequences. For example, Arata, Stafford, and Tims (2003) found a broad spectrum of alcohol-related negative consequences that were endorsed by high school students, such as getting into fights, acting bad or doing mean things (up to 36%), finding themselves in a place they could not remember getting to (up to 27%) or driving after four drinks (up to 14%). Moreover, heavy drinking among high school students has been associated with poor school performance and involvement in health risk behaviors including riding with a driver who had been drinking, engaging in risky sexual behavior or being a victim of dating violence (Miller et al., 2007).

A way to further understand problematic drinking is to identify factors that are associated with excessive alcohol use and related negative consequences, such as drinking intentions. The importance of intentions is central to the Theory of Planned Behavior (TPB), developed by Ajzen (1991), and is designed to capture the motivational factors that influence a behavior. According to this model, intention to perform a behavior is one of the primary determinants of future behavior. Extensive research has consistently documented a significant relationship between drinking intentions and drinking behaviors among young adults (i.e., high school and college students; e.g., Armitage, Norman, & Conner, 2002; Glassman, Dodd, Sheu, Rienzo, & Wagenaar, 2010; Elliott & Ainsworth, 2012; Litt et al., 2013; Norman, 2011; Norman, Armitage, & Quigley, 2007; Testa, Kearns-Bodkin, & Livingston, 2009). Consistent with the TPB identifying intentions as a proximal predictor of behaviors, some studies have shown drinking intentions to be related to drinking behaviors cross-sectionally or over relatively short time-spans (e.g., ranging from 1 to 4 weeks; Collins & Carey, 2007; Conner, Warren, Close, & Sparks, 1999; Cooke, Sniehotta, & Schüz, 2007; Elliott et al., 2012; Glassman et al., 2010; Litt et al., 2013). Additionally, other studies have evaluated the predictive role of drinking intentions over longer time-spans (i.e., ranging from 3 to 6 months; Collins, Logan, & Neighbors, 2010; Mcmillan & Conner, 2003; Testa et al., 2009). For instance, Mcmillan and colleagues (2003) found that drinking intentions were a significant predictor of frequency of alcohol use over a 6-month period in a U.K. college sample. Similarly, Testa and colleagues (2009) showed that precollege intentions (i.e., assessed among senior high school females) significantly predicted future drinking 6 months later. Thus, whereas drinking intentions are associated with current or short-term drinking behaviors, they also represent a predictor of future drinking behaviors among young adults.

On the other hand, researchers have attempted to identify factors that might reduce alcohol misuse and related consequences, such as the use of protective behavioral strategies (PBS). PBS are defined as cognitive and behavioral strategies that can be used while drinking to limit alcohol consumption and alcohol-related consequences (Martens, Ferrier, & Cimini, 2007). Examples of PBS include avoiding drinking games, alternating nonalcoholic beverages with alcoholic beverages or drinking water while drinking alcohol. Research has established that greater use of PBS is associated with less alcohol use and fewer alcohol-related consequences among U.S. young adults (i.e., high school students: Glassman, Werch, & Jobli, 2007; college students: e.g., Araas & Adams, 2008; Benton et al., 2004; Delva et al., 2004; Martens et al., 2005; Martens, Pederson, LaBrie, Ferrier, & Cimini, 2007). More recently, Martens, Martin, Littlefield, Murphy, and Cimini (2011) have shown similar findings over time, with increases in the use of some PBS across time being associated with less alcohol use and fewer alcohol-related consequences at follow-ups (i.e., 6 and 12 months after a baseline assessment).

A growing body of literature on PBS has focused on the role of PBS in the context of established risk factors for alcohol use and consequences. Whereas several studies have examined the mediating role of PBS in relationships between alcohol-related risk factors and alcohol outcomes (e.g., drinking motives; Martens et al., 2007; age of first alcohol use; Palmer, McMahon, Rounsaville, & Ball, 2010), other studies have evaluated the interactive effects of PBS use and established risk factors in predicting alcohol outcomes. Specifically, some studies have examined how use of PBS might be protective in weakening relationships between alcohol-risk factors and alcohol-related consequences. For instance, Borden and colleagues (2011) showed that use of PBS significantly moderated the relationship between heavy drinking and alcohol-related consequences among college students, such that the relationship was stronger among students reporting less PBS use. Similar findings have been revealed in the relationship between poor self-regulation and alcohol-related consequences (D'Lima, Pearson, & Kelley, 2012).

Other recent studies have examined the moderating role of alcohol-risk factors in relationships between use of PBS and alcohol outcomes (Ehret, Ghaidarov, & Labrie, 2013; Kenney & Labrie, 2013; LaBrie, Kenney, & Lac, 2010; Linden, Lau-Barraco, & Milletich, 2013; Patrick, Lee, & Larimer, 2011). Such examination provides valuable insight regarding specific conditions under which use of PBS is more or less likely to be associated with alcohol outcomes. For instance, recent studies documented that the negative relationships between PBS use and alcohol use and/or fewer negative consequences were strongest among college students with poorer physical and mental health, stronger social health, (LaBrie et al., 2010), higher coping and conformity motives (Patrick et al., 2011), higher anxiety (Linden et al., 2013), and who were lower in refusal self-efficacy (Ehret et al., 2013).

Very few studies have examined the use of safer strategies in the context of intentions. We are aware of one study about safer sexual behaviors, which found the relationship between intentions to engage in safer sexual behavior (i.e., intentions to use a condom) and the actual safer sexual behavior (i.e., using a condom) to be mediated by preparatory behaviors (i.e., buying condoms, discussion about condoms with the partner; Bryan, Fisher, & Fisher, 2002). To the best of our knowledge, however, no studies have evaluated the moderating role of drinking intentions in the relationship between use of PBS and alcohol outcomes among high school students. However, exploring whether high school students with different drinking intention levels are less or more likely to be

protected by use of PBS is important, as it may help identifying which students are likely to benefit the most from PBS use and fostering targeted PBS-based interventions. Given the well-established positive relationship between drinking intentions and drinking behaviors (e.g., Glassman, Dodd, Sheu, Rienzo, & Wagenaar, 2010; Elliott & Ainsworth, 2012; Litt et al., 2013), we expect that young adults endorsing high drinking intentions will prioritize engaging in drinking behaviors over protecting themselves from negative consequences.

Furthermore, no studies have compared these constructs using samples of high school students in the United States and Sweden. Considering that most research on PBS has been conducted among U.S. college students, conducting such a study is important to provide initial evidence regarding the generalizability of previous findings to younger populations (i.e., high school students) and to other countries and cultures (i.e., Sweden). Thus, the aims of the current study were to evaluate longitudinally (a) the relationship between drinking intentions and alcohol use and related consequences, (b) the relationship between use of PBS and alcohol use and related consequences, (c) the moderating role of drinking intentions in the relationship between use of PBS and alcohol use and related consequences and, and by exploring (d) the moderating role of country in the relationships between drinking intentions/PBS use and alcohol use and related consequences. Considering the literature described above, we hypothesized that high drinking intentions would be associated with more alcohol outcomes and high PBS use with fewer alcohol outcomes. We also expected that drinking intentions would moderate the relationship between use of PBS and alcohol outcomes, such that PBS use would be less protective among participants with high drinking intentions. Finally, whereas we expected that Swedish students would be more at risk regarding alcohol than U.S. students, we had no specific hypotheses regarding PBS use. Thus, testing country as a possible moderator in the relationship between PBS use and consequences was exploratory.

Method

Participants

Participants in the current study were United States and Swedish high school seniors who completed baseline, 6- and 12-month follow-up assessments as parts of a larger 4-year longitudinal study on alcohol use during the transition from high school to young adulthood. Participants were included in the current study if they were randomized to the assessment-only control group (the alcohol-related intervention included information on PBS and we were particularly interested in the association between PBS and alcohol outcomes in the absence of intervention) and reported consuming alcohol during the past 3 months. The final sample included 1,189 high school seniors (56.1% female) from 22 high schools across the state of Washington in the United States (n = 288, 62.2% female) and from 19 high schools in Sweden (n = 901, 54.2% female). There were significantly more females in the U.S. sample, $\chi^2(1, N = 1{,}189) = 5.66$, $p < .05$.

At baseline, the mean age reported was 17.51 years (SD = 0.51) among U.S. participants and 17.82 (SD = 0.51) among Swedish participants, with Swedish participants being significantly older, $t(1187) = -9.09$, $p < .01$. In the U.S. sample, 78.6% self-identified as White, 12.3% as Hispanic or Latino, 2.8% as Asian, 2.1% as Black, 1.4% as American Indian or Alaska Native, 0.4% as Native Hawaiian or other Asian Pacific Islander, 9.8% as "more than one race," and 4.9% as other. As it is not culturally appropriate to collect information on race and ethnicity in Sweden, only information on place of birth was collected in the Swedish sample. Among the Swedish participants, 96.5% reported being born in Sweden, 0.8% in another Nordic country, 1.8% in another European country, and 0.9% outside Europe.

Of the 1,189 participants that completed the baseline survey, 250 U.S. participants (i.e., 86.8% of the U.S. baseline sample) and 640 Swedish participants (i.e., 71.0% of the Swedish baseline sample) completed a 6-month follow-up assessment, and 221 U.S. participants (i.e., 76.7% of the U.S. baseline sample) and 416 Swedish (i.e., 46.2% of the baseline Swedish sample) participants completed a 12-month follow-up assessment. Given the differentially high rate of attrition in the Swedish sample we conducted additional tests to ascertain predictors of attrition in both the United States and Swedish samples. Results indicated that age, $t(1186) = -4.43$, $p < .001$, gender, $\chi^2(1) = 34.88$, $p < .001$, and baseline peak drinking quantity, $t(1120) = -7.13$, $p < .001$, were significantly associated with attrition at the 12-month follow-up, with older males who drank more on peak occasions at baseline being more likely to be noncompleters of the 12-month follow-up. Therefore, we incorporated each of these measures as covariates in all analyses.

Assessment Procedures

In the United States, high school seniors were recruited during classroom visits by research staff. Students who were 17 or 18, could read, write, understand English, and were interested in participating (and had parent consent if they were 17) were invited to complete a Web-based baseline survey. In Sweden, high school seniors who were between the ages of 17 and 19 and had fluency in Swedish were recruited to complete a paper baseline survey during a school visit by research staff. In both countries, all participants who completed the baseline assessment were invited to complete subsequent Web-based follow-up assessments. In the United States, participants were paid $20 for completion of each survey and were entered into a prize drawing for a laptop and iPods. In Sweden, financial payment is a complicated method because of accounting rules; thus, participants received one cinema ticket (valued at approximately $15 U.S. dollars) and were entered into a drawing to win one of two Smart Phones/Tablet Computers or a weekend trip to New York after completing each survey. All procedures were approved by the university Institutional Review Board (U.S. sample), and the Regional Ethics Committee (Swedish sample).

Measures

Measures in the current study were part of a larger assessment battery and are described below. All measures were translated into Swedish and back-translated to check for accuracy of translation. The internal consistency for each measure is presented for the total sample (United States and Sweden), followed by values for the United States and Sweden separately, respectively.

Drinking intentions questionnaire. Drinking intentions were measured at the baseline and 6-month follow-up assessments with

a 4-item self-report questionnaire designed to assess participant's expected quantity and frequency of alcohol use in the next 6 months (Ajzen, 2002) (i.e., *When you drink alcohol during the next 6 months, how many drinks do you expect to have on a typical occasion? How often do you expect to drink alcohol during the next 6 months? During the next 6 months, how often do you expect to consume more than 4 (women) or 5 (men) drinks in a row on a single occasion? During the next 6 months, how often do you expect to consume enough alcohol to feel drunk or intoxicated?).* Responses to quantity items were scored on a 0 to 5 scale, where 0 = *less than one drink*, 1 = *1–2 drinks*, 2 = *3–4 drinks*, 3 = *5–7 drinks*, 4 = *8–10 drinks,* and 5 = *more than 10 drinks*. Responses to frequency items were also scored on a 0 to 5 scale, where 0 = *never*, 1 = *1 time per month*, 2 = *2–3 times per month*, 3 = *1–2 times per month*, 4 = *3–4 times per month,* and 5 = *more than 10 times*. Similar items have been previously used in studies conducted among United States and European young adults (i.e., U.S. high school students and U.K. college students; Mcmillan et al., 2003; Testa et al., 2009). A sum score for drinking intentions based on the baseline report of intentions for the first 6-months of the study after baseline and 6-month report of intentions through 12-months was created for analyses to cover the entire time span of the alcohol-related consequences measure (i.e., RAPI over the past 12 months). The internal consistencies of the intentions sum score was $\alpha = .88$ (total sample), $\alpha = .95$ (U.S.), and $\alpha = .75$ (Sweden).

Drinking behaviors. Drinking behaviors were measured with items from the Quantity/Frequency/Peak Alcohol Use Index (QFP; Dimeff, Baer, Kivlahan, & Marlatt, 1999; Marlatt et al., 1998) and the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Specifically, we used the QFP (i.e., from baseline and 12-month follow-up assessments) to measure the number of drinks on a peak drinking day, and the DDQ (i.e., from baseline and 12-month follow-up assessments) to assess the total number of drinks per week. Both questionnaires have been previously used in studies conducted among U.S. young adults, including adolescents, high school and college students (e.g., D'Amico & Fromme, 2000; Doumas, Hausheer, Esp, & Cuffee, 2014; Martens et al., 2007) and among Swedish young adults (Gajecki, Berman, Sinadinovic, Rosendahl, & Andersson, 2014). In addition to serving as covariates in our analyses (i.e., peak drinking quantity at baseline), these drinking behavior measures were used to describe the drinking behaviors of the population. Next, the total number of drinks per week at 12-month follow-up served as one of the alcohol outcomes for the analyses.

Rutgers Alcohol Problem Index (RAPI). Alcohol-related consequences that had occurred in the past 12 months were assessed at baseline and 12-month follow up assessments, with the Rutgers Alcohol Problem Index (White & Labouvie, 1989). RAPI scores measured at 12-month follow-up served as the second alcohol outcome for the analyses. Participants indicated frequency of each of 26 consequences on a 5-point scale ranging from 0 = *Never* to 4 = *more than 10 times*. Example items include: "*Got into fights, acted bad or did mean things*" and "*Neglected your responsibilities*." In the present study, three items were added to assess negative consequences related to driving while intoxicated (i.e., "*Drove shortly after having more than 1, 2, and 4 drinks*"). Previous studies have used the RAPI in samples of young adults (i.e., adolescents, high school and college students) in the United States and in European Nordic countries very similar to Sweden, including Norway and Finland (Arata et al., 2003; Dick, Aliev, Viken, Kaprio, & Rose, 2011; Doumas et al., 2014; Martens et al., 2007; Pedersen & Skrondal, 1999). Reliability and validity of this measure have been supported in prior studies conducted in the aforementioned samples in the United States and in Finland (Dick et al., 2011; Martens, Neighbors, Dams-O'Connor, Lee, & Larimer, 2007; White & Labouvie, 1989). The internal consistencies were $\alpha = .93$ (total sample), $\alpha = .92$ (United States), and $\alpha = .93$ (Sweden).

Protective Behavioral Strategies Scale (PBSS). Use of cognitive–behavioral strategies aiming to limit alcohol consumption and alcohol-related consequences were assessed at baseline with the PBSS (Martens et al., 2005) and served as the predictor in the analyses (i.e., total scale and subscales). Participants were asked to indicate *how often they engaged in the following behaviors when using alcohol or "partying" in the past six months* using a 6-point scale, where 1 = *never* and 6 = *always*. In addition to a total score, ($\alpha = .88$, total sample; $\alpha = .89$, United States; and $\alpha = .88$, Sweden), this measure is comprised of three subscales: Stopping/Limiting (e.g., *Determine not to exceed a set number of drinks*, $\alpha = .83$, total sample; $\alpha = .85$, United States; and $\alpha = .81$, Sweden), Serious Harm Reduction (e.g., *Use a designated driver*, $\alpha = .62$, total sample; $\alpha = .63$, United States; and $\alpha = .61$, Sweden), and Manner of Drinking (e.g., *Avoid mixing different types of alcohol*; $\alpha = .77$ for all three groups). Reliability and convergent validity of this measure have been supported among U.S. college students (Martens et al., 2005, 2007). In the current study, we noticed a problem related to a single item comprised in the Manner of Drinking subscale (i.e., *Drink shots of liquor*[1]), which negatively impacted the reliability of the subscale. Thus, to ensure acceptable psychometric proprieties of the scale and given that, to the best of our knowledge, the PBSS has not been validated or used in previous studies among United States and Swedish high school students; we have removed this item from the analyses. Additionally, although the internal consistencies for the Serious Harm Reduction subscale (i.e., for the three samples) are slightly below the most cited-standard in the literature (i.e., .70), they are consistent with previous findings (e.g., Lewis et al., 2010; Martens et al., 2005, 2007; 2011). The low internal consistency may be attributed to the small number of items included in this subscale (Martens et al., 2005, 2007; Prince, Carey, & Maisto, 2013). However, given that, to the best of our knowledge, PBSS has not been previously used among United States and Swedish high school drinkers, we also calculated mean interitem correlation values for each subscales to ensure for acceptable consistency, which is more appropriate with scales including few items (Briggs & Cheek, 1986). Overall, these values ranged from .35 to .40 for the three subscales and for the combined, United States only and Swedish only samples, which correspond to the standard in the literature (Briggs & Cheek, 1986).

Data Analysis Plan

Multilevel generalized linear mixed models using a negative binomial distribution with log link function (Cohen, Cohen, West,

[1] It may be because it is the only item that has a reversed scored (i.e., higher score meaning less protective).

& Aiken, 2003; Hilbe, 2007) were used to examine associations between drinking intentions and alcohol outcomes over 12 months, controlling for clustering within schools. A multilevel model is appropriate for clustered data, in that it evaluates the effects of individuals while accounting for the nonindependence of the data within the groups (Diez Roux, 2002). Moderation analyses were used to test for possible interactions between use of PBS, country of origin, and drinking intentions in predicting alcohol outcomes (Aiken & West, 1991). Given demographic differences between United States and Sweden at baseline, as well as the need to covary factors associated with attrition, we controlled for age, gender, baseline peak drinking quantity. Next, we controlled for alcohol-related consequences and total drinks per week at baseline, respectively, in the models with (a) alcohol-related consequences and, (b) total drinks per week at 12-month follow-up as the outcomes. All continuous covariates and predictor variables (intentions, PBS) were mean-centered. Each scale of the PBS (total score, Serious Harm Reduction, Manner of Drinking, and Limiting/Stopping) was tested in a separate model. Country was dummy coded (United States = 0; Sweden = 1) with United States as the reference group. Significant interactions were followed with an examination of the simple slopes to determine direction and degree of the interaction.[2] Given the number of models estimated (one model for each of the four scales of the PBSS), significance was evaluated at $p < .01$ to account for multiple comparisons. We used SPSS 21 to run the analyses.

Results

Descriptive Statistics

Descriptive statistics for all key variables by country are presented in Table 1. Independent samples *t* tests indicated no difference in drinking intentions between Swedish and United States participants. However, Swedish participants were higher on number of drinks on a peak drinking day and on total drinks per week at baseline ($p < .001$). At 12-month follow-up however, whereas there was no longer any significant difference in number of drinks on a peak drinking day between countries, United States participants were higher on total drinks per week ($p < .05$). Next, United States participants were significantly higher in use of PBS (i.e., the total score; $p < .001$), in use of Serious Harm Reduction ($p < .001$), Limiting/Stopping ($p < .001$), and Manner of Drinking ($p < .001$) strategies at baseline. At 12-month follow-up, although United States participants were still significantly higher in use of Limiting/Stopping PBS ($p < .01$), no significant differences were found for the total score and the Manner of Drinking and Serious Harm Reduction subscales. Finally, United States students were higher in alcohol-related consequences at 12-month follow-up ($p < .001$), whereas no significant differences were found at baseline.

Next, the relationships between country, drinking intentions, and PBS on alcohol-related negative consequences and on total drinks per week at 12-month follow-up assessment were tested. Raw (log based) and exponentiated parameter estimates (e ^ B; interpretable as incident rate ratios) with significance tests and confidence intervals are presented in Tables 2 and 3.[3]

Total Drinks per Week at 12-Month Follow-Up

The exponentiated parameter estimates for drinking intentions ranged from 1.05 to 1.10, such that each additional unit increase in drinking intentions was associated with, on average, 5% to 10% more drinks. Regarding PBS, the associations between total score, Serious Harm Reduction, Limiting/Stopping, and Manner of Drinking subscales with total drinks per week were not significant. For country of origin, the exponentiated parameter estimates ranged from 1.35 to 1.36, which indicated that participants in the United States reported on average 35% to 36% more drinks per week than Swedish participants.

Next, the interactions between Serious Harm Reduction and Limiting/Stopping subscales and drinking intention were not significant. We found, however, significant interactions between PBS total score and PBS Manner of drinking and drinking intentions in predicting total drinks per week. As shown in Figure 1, the negative association between PBS use (i.e., total score and Manner of Drinking subscale) and drinks per week were stronger among participants with higher drinking intentions. Finally, the interactions between PBS use and country were not significant, nor were the interactions between drinking intentions and country.

Alcohol-Related Consequences at 12-Month Follow-Up

The exponentiated parameter estimates for drinking intentions ranged from 1.05 to 1.06, which indicated that each additional unit increase in drinking intentions was associated with, on average, 5% to 6% more negative consequences. Next, The relationships between PBS total score, the Manner of Drinking and Serious Harm Reduction subscales and negative consequences were not significant. For the Limiting/Stopping subscale as the predictor, the exponentiated parameter estimates was 0.79, indicating that each additional unit increase in Limiting/Stopping strategies was associated on average with 21% fewer negative consequences. For country of origin as a predictor of 12-month RAPI scores, the exponentiated parameter estimates ranged from 2.12 to 2.17, indicating that participants in the United States were over twice more likely to experience negative consequences compared with participants in Sweden.

Finally, the interactions between PBS use (total score and subscales) total score, Manner of Drinking, Serious Harm Reduction and Limiting/Stopping subscales and drinking intentions were not significant. Similarly, the interactions between country of origin and PBS use (total score and subscales) were not significant, nor were the interactions between country of origins and drinking intentions.

Discussion

This study sought to further elucidate the relationships between PBS, drinking intentions, and alcohol outcomes in a sample of

[2] Three-way interactions were tested in previous analyses and were not significant. Given that they were not included in our aims they are not presented here.

[3] See supplemental material including the tables presenting total drinks per week and alcohol-related consequences at 12-month follow-up as a function of drinking intentions, use of PBS subscales (i.e., Limiting/Stopping, Manner of Drinking, and Serious Harm Reduction) and country of origin.

Table 1
Means, SDs, and Significance at Baseline and 12-Month Follow-Up by Country of Origin

Variables	U.S. participants		Swedish participants		
	M	*SD*	*M*	*SD*	*t*
Number of drinks (peak) (baseline)	4.72	5.15	8.97	5.75	11.72***
Number of drinks (peak) (12 months)	6.18	5.17	6.24	4.77	0.22
Total drinks per week (baseline)	5.03	9.05	8.18	8.08	5.24***
Total drinks per week (12 months)	7.79	8.08	6.42	6.83	−2.13*
Alcohol-related consequences (baseline)	6.40	10.11	6.06	10.33	−0.48
Alcohol-related consequences (12 months)	9.32	14.30	5.79	11.31	−3.64***
Drinking intentions (baseline +6 months)	11.23	8.33	12.19	6.94	1.72
Protective behavioral strategies (baseline)					
Total score (baseline)	3.73	1.10	3.28	0.99	−6.40***
Total score (12 months)	3.22	1.21	3.05	1.04	−1.74
Serious Harm Reduction score (baseline)	4.60	1.30	4.15	1.33	−4.98***
Serious Harm Reduction score (12 months)	4.11	1.63	4.08	1.47	−0.27
Manner of Drinking score (baseline)	3.72	1.26	3.41	1.26	−3.55***
Manner of Drinking score (12 months)	3.17	1.29	3.08	1.32	−0.84
Limiting/Stopping score (baseline)	3.40	1.26	2.87	1.03	−6.45***
Limiting/Stopping score (12 months)	2.91	1.27	2.64	1.02	−2.66**

* $p < .05$. ** $p < .01$. *** $p < .001$.

United States and Swedish high school drinkers. As hypothesized, drinking intentions predicted future alcohol use and related consequences at a 1-year follow-up. These results are consistent with previous research conducted in United States high school (Testa et al., 2009) and college populations (Collins et al., 2010; Glassman et al., 2010; Mcmillan et al., 2003), and provide initial support for the generalizability of drinking intention literature conducted in U.S. high school and college populations to Swedish high school seniors.

Results found that certain PBS (i.e., Limiting/Stopping subscale) were associated with fewer alcohol-related consequences over time, although they were not associated with alcohol use. These results are partially in line with previous studies having examined the prospective relationships between PBS and alcohol outcomes (Luebbe, Varvel, & Dude, 2009; Martens et al., 2011; Napper, Kenney, Lac, Lewis, & Labrie, 2014). Specifically, consistent with our findings, Luebbe and colleagues (2009) found that use of PBS predicted fewer alcohol-related problems over time in a sample of college women. Our results are, however, not completely consistent with two other recent longitudinal studies that have used the PBSS among college drinkers. In the first study, Martens and colleagues (2011) documented that use of PBS Limiting/Stopping predicted fewer drinks but more alcohol-related problems over time, and PBS Serious Harm Reduction predicted fewer alcohol-related problems. The second study found no significant association between PBS Limiting/Stopping and alcohol outcomes, and negative prospective relationships between PBS Manner of Drinking and alcohol use and related consequences, and PBS Serious Harm Reduction and alcohol-related problems (Napper et al., 2014). Taken together with our results, these findings provide mixed evidence regarding the prospective relationship between PBS use and alcohol outcomes, which may be because of the instability of use of PBS over time (Pearson, 2013). It is important to note, however, that the aforementioned studies evaluating the prospective associations between PBS and alcohol outcomes were conducted among college students and examined most often these relationships in shorter periods than in the current study. Thus, given the mixed evidence, and the fact that, to our

Table 2
Total Drinks Per Week at 12-Month Follow-Up as a Function of Drinking Intentions, Use of Protective-Behavioral Strategies (Total Score), and Country

Variable	B	*SE* B	*t*	e ^ B	Low 95% e ^ B	Upper 95 e ^ B
Intercept	3.14	1.46	2.14†	22.99	1.30	407.26
Age	−0.10	0.08	−1.20	0.91	0.77	1.07
Gender	−0.20	0.09	2.26†	1.22	1.03	1.46
Baseline Peak Drinking Quantity	0.02	0.01	1.52	1.02	1.00	1.04
Baseline Total Drinks Per Week	0.02	0.01	1.66	1.02	1.00	1.03
Drinking Intentions	0.05	0.01	5.86**	1.05	1.03	1.07
PBS (total score)	−0.09	0.06	−1.59	0.91	0.81	1.02
Country	0.30	0.10	3.10*	1.35	1.12	1.64
Drinking Intentions × PBS (total score)	0.02	0.01	2.90*	1.02	1.01	1.03
Country × Drinking Intentions	0.00	0.01	0.04	1.00	0.98	1.02
Country × PBS (total score)	0.05	0.09	0.54	0.95	0.80	1.13

† $p < .05$. * $p < .01$. ** $p < .001$.

Table 3
Alcohol-Related Consequences at 12-Month Follow-Up as a Function of Drinking Intentions, Use of Protective-Behavioral Strategies (Total Score), and Country

Variable	B	*SE* B	*t*	e ^ B	Low 95% e ^ B	Upper 95 e ^ B
Intercept	−0.32	2.70	−0.12	0.73	0.00	145.66
Age	0.09	0.15	0.56	1.09	0.81	1.46
Gender	0.17	0.16	1.11	1.19	0.88	1.62
Baseline Peak Drinking Quantity	0.02	0.02	1.05	1.02	0.99	1.05
Baseline Alcohol-Related Consequences	0.02	0.01	1.92	1.02	1.00	1.04
Drinking Intentions	0.05	0.01	3.73**	1.05	1.03	1.08
PBS (total)	−0.25	0.10	−2.43†	0.78	0.64	0.95
Country	−0.76	0.19	4.08**	2.14	1.48	3.08
Drinking Intentions × PBS (total)	0.01	0.01	1.39	1.01	0.99	1.03
Country × Drinking Intentions	−0.01	0.02	−0.52	0.99	0.95	1.03
Country × PBS	0.14	0.17	0.87	1.54	0.84	1.59

† $p < .05$. ** $p < .001$.

knowledge, this is the first study examining longitudinally PBS among United States and Swedish participants, future longitudinal studies are needed to further evaluate these prospective relationships in these populations and assess generalizability.

Unexpectedly, although U.S. participants reported less alcohol use at baseline than Swedish participants, U.S. participants were at greater risk regarding alcohol use and consequences than Swedish Participants 12 months later. These findings are not consistent with previous studies having documented Swedish young adults as being at increased risk for experiencing alcohol-related negative consequences (Ståhlbrandt et al., 2008). To our knowledge, however, no study to date has compared longitudinally both countries regarding alcohol outcomes during the transition from high school to young adulthood. Differences in general alcohol policies in the United States and Sweden may help explain these results. In fact, even though the legal age in Sweden for purchasing alcohol at the Systembolaget (i.e., state-controlled outlets) is 20, individuals are allowed to purchase alcoholic drinks in restaurants at age 18 (Ståhlbrandt et al., 2008). In the United States, regardless of where alcohol is purchased, the minimum legal drinking age is 21 (Wagenaar & Toomey, 2002). Therefore, it is likely that Swedish participants started consuming alcohol earlier than U.S. students. Thus, it may be that, while U.S. participants have their first alcohol-related experiences and transition out, Swedish participants are already maturing out. Indeed, whereas our results indicated an increase in drinking among U.S. participants from baseline to the 12-month assessment, they showed an opposite pattern in the Swedish sample.

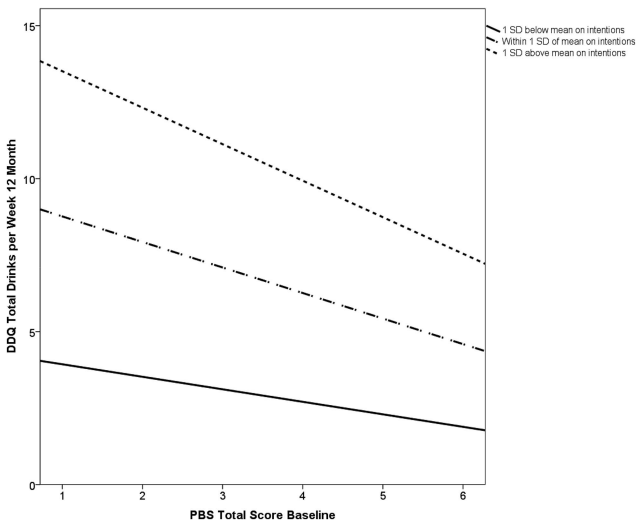

Figure 1. Relationship between PBS use (total score) at baseline and alcohol use at 12-month (i.e., total drinks per week) for participants with high and low drinking intentions. *Note.* The relationship between PBS (Manner of Drinking) and alcohol use for participants with high and low participants is similar.

Another explanation of these results might be related to the drug education program in place in Swedish schools, which focuses on specific issues including alcohol intoxication and reducing harm related to drinking (The IQ-Initiative, 2013). It is possible that Swedish participants have received information on strategies aimed at reducing alcohol-related harm through this program, whereas U.S. programs (i.e., Drug Abuse Resistance Education) tend to emphasize abstinence from alcohol and other drugs. Therefore, it may be that Swedish participants used alternative strategies to minimize the risk while drinking that were not captured within the PBS questionnaire used in our study (i.e., PBSS; Martens et al., 2005). More research further exploring which strategies are used in these populations is, therefore, needed.

Another explanation of these results may pertain to the higher attrition rate of heavy drinkers in the Swedish sample. Finally, college entrance may also help to explain these results. In fact, U.S. young adults are likely to transition to college sooner than Swedish young do. This is important as college literature has established college entrance as a critical transition, with students significantly increasing their drinking during the first year (e.g., Bishop, Weisgram, Holleque, Lund, & Wheeler-Anderson, 2005; Grekin & Sher, 2006; White et al., 2006). Overall, future research comparing longitudinally drinking practices among Swedish and U.S. young adults is needed to further understand the impact of country of origin on drinking and related consequences over the transition out of high school.

Regarding interactions, contrary to our hypothesis, the negative relationship between PBS use (total score and Manner of Drinking subscale) and total drinks per week was stronger among partici-

pants with high drinking intentions. These results suggest, therefore, that high drinking intentions endorsement does not impede use of PBS. It is possible that, because young adults with high drinking intentions know in advance that they will drink, they may have had time to think of ways to limit their consumption. In fact, our findings indicate that use of PBS is likely to have a protective function against alcohol use among young adults endorsing high drinking intentions in high school. These preliminary findings extend previous literature evaluating the moderating role of alcohol-risk factors in relationships between use of PBS and alcohol outcomes (e.g., Ehret et al., 2013; Kenney & Labrie, 2013; LaBrie, Kenney, & Lac, 2010; Linden et al., 2013; Patrick et al., 2011) and may have clinical implications. Specifically, if future research replicates these findings, it may indicate that high school seniors endorsing high drinking intentions represent good candidates for PBS-based preventive interventions.

The major strengths of the current study are its longitudinal design and the international comparison. However, our study has several limitations that deserve to be mentioned. First, internal consistency for the drinking intentions questionnaire was higher in the U.S. sample ($\alpha = .95$) than in the Swedish sample ($\alpha = .75$). Even though both values correspond to most cited-standard in the literature (i.e., $\alpha > .70$), it is possible that the internal consistency variability between both samples may impact the results, which need, therefore, to be interpreted with caution. Second, whereas the longitudinal nature of our study is a contribution to the literature, the retention rate in the Swedish sample after 1 year was low. It is possible that methodological differences in assessment methods (i.e., paper survey in Sweden vs. Web survey in the United States at baseline) and in compensation values (i.e., cinema tickets in Sweden vs. $20 in the United States) have contributed to the higher attrition rate in the Swedish sample. Of note, however, predictors of attrition were incorporated as covariates in all analyses. Next, no previous study has used the PBSS in younger and Swedish samples. Thus, special attention was given to the psychometric properties of the scale that showed good reliability, although only after removing one of the items regarding drinking liquor. However, future research is needed to further evaluate and validate the PBSS among United States and Swedish high school seniors. Moreover, only the intention construct of the Theory of Planned Behavior (Ajzen, 1991) was used as a primary predictor of drinking outcomes, although the TPB posits perceived control over the behavior and intentions to both be primary determinants of behavior. It would be interesting to evaluate the whole model to further compare Swedish and U.S. high school seniors longitudinally. Further, the entire study relied on responses to self-report questionnaires and their validity may be a concern although participants were assured confidentiality. A final limitation of the current study pertains to the exclusion of abstainers from the sample. Because of this exclusion criterion, the findings of the current study may be limited to high school drinkers (from United States and Sweden) uniquely. However, this exclusion criterion was motivated by the fact that PBSs are most often used while drinking (Martens et al., 2005).

Although future research is needed to further confirm the current findings and despite the aforementioned limitations, we believe that this study adds to the literature by providing initial support for the generalizability of previous PBS research conducted among U.S. college students to a younger (high school seniors) sample and to other European countries (i.e., Sweden). Further, the current study provides initial results documenting that the negative prospective relationship between PBS use and alcohol use is strongest among participants endorsing high drinking intentions during high school. Future research should further evaluate these constructs in similar samples to show generalizability.

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Received July 30, 2014
Revision received September 26, 2014
Accepted October 2, 2014 ■

STUDY 5

Alcohol Expectancies and Alcohol Outcomes:

Effects of Use of

Protective Behavioral Strategies

Alcohol Expectancies and Alcohol Outcomes: Effects of Use of Protective Behavioral Strategies

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This article was published in ***Journal of Studies on Drug and Alcohol,*** *76*(3), p. 452-458, 2015.

PhD candidate contribution:

VG conducted the background literature review, conceived the study and its design, participated in the statistical analyses and drafted the manuscript.

Alcohol Expectancies and Alcohol Outcomes: Effects of the Use of Protective Behavioral Strategies

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ABSTRACT. Objective: Alcohol expectancies (AEs) are positively associated with drinking behaviors, whereas the use of protective behavioral strategies (PBS) is negatively related to alcohol outcomes among young adults. PBS have been shown to weaken relationships between some alcohol risk factors and alcohol outcomes. This study aimed to examine longitudinally the moderating effect of PBS on the relationships between AEs and alcohol outcomes among young adults. **Method:** Participants (N = 188; 61.7% female) were U.S. young adults participating in a larger longitudinal study. Measures of PBS, AEs, alcohol use, and related consequences were used from the baseline and 12-month follow-up assessments. **Results:** Negative binomial hurdle models found that PBS (total score) significantly moderated the relationship between positive AEs and consequences, such that among high school seniors endorsing higher positive AEs, those using more PBS in high school reported fewer negative consequences 1 year later. PBS (Manner of Drinking) also moderated the relationship between negative AEs and alcohol use, revealing the use of PBS in high school as having a protective function against later drinking among participants with high positive AEs. Last, PBS (Serious Harm Reduction) significantly moderated the associations between positive AEs and alcohol use and between negative AEs and consequences, such that participants with higher AEs and higher PBS use in high school were at greatest risk for drinking and experiencing negative consequences later. **Conclusions:** Overall, these findings suggest that PBS use may be protective by weakening relationships between positive AEs and alcohol outcomes. Limitations and future directions are discussed. (*J. Stud. Alcohol Drugs, 76,* 452–458, 2015)

A SIZABLE PROPORTION OF YOUNG ADULTS drink in a manner that places them at risk for experiencing alcohol-related harm (e.g., Arata et al., 2003; Hingson, 2012; Perkins, 2002). Research has therefore aimed to identify alcohol-related protective factors, such as protective behavioral strategies (PBS). PBS are strategies that individuals can use to reduce the negative consequences associated with their drinking (Martens et al., 2005). Although some researchers use a broad definition of PBS including strategies to avoid drinking (Sugarman & Carey, 2007), researchers commonly use a narrower definition referring to strategies used immediately before, during, and after drinking (Martens et al., 2007b; Pearson, 2013). Students commonly use PBS (Haines et al., 2006), yet degrees of use vary across drinking groups, with moderate drinkers being more likely to use PBS than light and heavy drinkers (i.e., curvilinear effect; Sugarman & Carey, 2007; Walters et al., 2007). Previous research in college samples has established a negative cross-sectional relationship between the use of PBS and alcohol outcomes (e.g., Araas & Adams, 2008; Benton et al., 2004; Borden et al., 2011; Martens et al., 2007a). Longitudinal studies, however, have yielded mixed evidence, with some strategies only being related to alcohol outcomes over time (e.g., Luebbe et al., 2009; Martens et al., 2011) or having differential relationships at the event or daily level (Lewis et al., 2012; Pearson et al., 2013).

Recent studies among college samples have examined the moderating role of PBS in relationships between alcohol risk factors and alcohol outcomes. For instance, Borden and colleagues (2011) showed that the relationship between heavy drinking and negative consequences is stronger among students using fewer PBS. Similar findings have been revealed in the relationships between poor self-regulation (D'Lima et al., 2012) and negative urgency (Weaver et al., 2012) with alcohol-related consequences. Thus, PBS use appears to be protective by weakening relationships between alcohol risk factors and alcohol outcomes.

Alcohol expectancies (AEs) are predictors of drinking behaviors (e.g., Borsari et al., 2007; Ham & Hope, 2003), referring to beliefs regarding positive or negative effects of drinking (Fromme et al., 1993; Goldman et al., 1999). Research among young adults has established that positive AEs are associated with greater alcohol use (e.g., Fromme & D'Amico, 2000; Fromme et al., 1993; Ham et al., 2005) as well as concurrent and future hazardous alcohol use (Zamboanga, 2006; Zamboanga et al., 2006). Findings regarding the predictive role of negative AEs in the same populations have been less consistent. Whereas some studies have found a negative association between negative AEs and drinking

Received: July 30, 2014. Revision: December 12, 2014.

This research was supported by National Institute on Alcohol Abuse and Alcoholism Grant R01AA018276-03 (awarded to Mary E. Larimer) and Swiss National Science Foundation Grant PP1LAP3-148418 (awarded to Véronique S. Grazioli).

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(e.g., Fromme & D'Amico, 2000; Nicolai et al., 2010), others have found negative AEs to be related to problematic drinking (Zamboanga et al., 2010) or unrelated to drinking and/or problematic drinking (Neighbors et al., 2007; Zamboanga et al., 2006).

Few studies have examined the relationship between AEs and PBS. One study documented that college students who were the victim of unwanted sexual experiences reported greater positive AEs and alcohol outcomes and less PBS use than students reporting no unwanted sexual experiences (Palmer et al., 2010). Another study showed that PBS mediated the association between positive AEs and alcohol outcomes among women (Madson et al., 2013). Yet, as far as we are aware, the moderating role of PBS on the relationship between AEs and alcohol outcomes has not been tested.

This study aimed to examine longitudinally the moderating effect of PBS on the relationship between AEs and drinking behaviors among young adults. Based on previous research, we expected that PBS would moderate the relationship between positive AEs and alcohol outcomes, such that among participants endorsing positive AEs, those using more PBS would report fewer alcohol outcomes than participants using fewer PBS. Given the inconsistencies found in the literature regarding negative AEs, we were uncertain as to whether the use of PBS would moderate the relationship between negative AEs and alcohol outcomes.

Method

Participants

Participants were U.S. young adults who completed baseline and 12-month follow-up assessments as parts of a larger study. Participants were included in this study if they reported drinking at least once in the past month and were not randomized to the intervention in the parent study (including a PBS component). The final sample at baseline included 282 participants (59.2% female) with a mean age of 17.6 years (*SD* = 0.51) (see Table 1 for sample characteristics). One hundred eighty-eight participants completed a 12-month follow-up assessment (i.e., 66.7% of the baseline sample). Additional tests comparing completers with noncompleters on key variables found noncompleters to be significantly older at baseline ($p < .05$).

Recruitment, assessment procedure, and ethics

High school seniors were recruited during classroom visits. Interested students who were 17 or 18 years of age (and had parental consent if they were 17) were invited to complete a web-based baseline survey. Participants who completed baseline were invited to complete a web-based 12-month follow-up assessment. Participants were paid $20 for completion of each survey and were entered into a prize drawing for a laptop and iPods. All procedures were approved by the university institutional review board.

Table 1. Sample characteristics ($N = 282$)

Variable	% or *M* (*SD*)	*t*
Race and ethnicity		
White	78.1%	
Hispanic or Latino	10.4%	
Asian	3.2%	
American Indian or Alaska Native	1.8%	
Black or African American	1.4%	
Native Hawaiian or other Asian Pacific Islander	1.1%	
More than one race	10.1%	
Other	4.3%	
Occupational status baseline		4.85***
High school students	100.0%	
Occupational status, 12-month		4.85***
Students (e.g., college students)	85.6%	
Full- or part-time workers	34.6%	
Use of PBS total score[a]		4.85***
Baseline	3.71 (1.04)	
12-month follow-up	3.28 (1.09)	
Positive alcohol expectancies[b]		0.6
Baseline	2.80 (0.56)	
12-month follow-up	2.77 (0.53)	
Negative alcohol expectancies[b]		1.73
Baseline	2.62 (0.52)	
12-month follow-up	2.54 (0.57)	
Total drinks per week		-3.46**
Baseline	5.72 (8.66)	
12-month follow-up	8.17 (7.86)	
Alcohol-related consequences[c]		2.75**
Baseline	7.03 (10.47)	
12-month follow-up	10.04 (13.17)	

Notes: PBS = protective behavioral strategies. [a]PBS use frequency was measured with the Protective Behavioral Strategies Scale, using a 6-point scale, where 1 = *never* and 6 = *always;* [b]positive and negative alcohol expectencies were measured with the Brief Comprehensive Effects of Alcohol questionnaire using a 4-point scale, where 1 = *disagree* and 4 = *agree,* with 15 different positive or negative alcohol expectencies; [c]the Rutgers Alcohol Problem Index assessed frequency of alcohol-related consequences, with a 5-point scale, ranging from 0 = *never* to 4 = *more than 10 times.*
**$p < .01$; ***$p < .001$.

Measures

Protective Behavioral Strategies Scale. Consistent with most PBS research, we used the narrow definition of PBS (i.e., strategies used when drinking; Pearson, 2013). PBS use was measured with the Protective Behavioral Strategies Scale (PBSS; Martens et al., 2005), which assesses strategies used to be safer when drinking in the past 3 months on a scale ranging from 1 (*never*) to 6 (*always*) [i.e., total (α = .89), Limiting/Stopping (LS; seven items; α= .85), Manner of Drinking (MoD; five items; α = .7), and Serious Harm Reduction (SHR; three items; α = .64)]. Mean inter-item correlations ranged from .3 to .4 for the three subscales. Even though PBSS reliability and validity have been mostly established in college samples (Martens et al., 2005, 2007b), one study has used this measure among younger partici-

pants (Grazioli et al., 2015). Scores at baseline served as moderators.

Alcohol expectancies. Positive and negative AEs were assessed at baseline with the Brief Comprehensive Effects of Alcohol questionnaire (B-CEOA; Ham et al., 2005). Participants indicated how much they would expect positive or negative effects to occur if they were under the influence of alcohol, on a scale ranging from 1 (*disagree*) to 4 (*agree*) (i.e., positive subscale [eight items; $\alpha = .73$; mean inter-item correlation = .3], negative subscale [seven items; $\alpha = .66$; mean inter-item correlation = .2]).

Drinking behaviors. Alcohol use was measured with the Daily Drinking Questionnaire (Collins et al., 1985). Participants estimated typical drinking on each day of the week over the past 3 months, which was used to calculate the average total number of drinks per week. Alcohol-related consequences over the past year were assessed with the Rutgers Alcohol Problem Index (RAPI; White and Labouvie, 1989) ($\alpha = .95$). Participants indicated the frequency of 26 problems on a scale ranging from 0 (*never*) to 4 (*more than 10 times*). Three items were added to assess drinking and driving. Drinking behaviors at the 12-month follow-up served as dependent variables.

Data analysis plan

The analyses were conducted using SPSS version 19 (IBM Corp., Armonk, NY) and R 3.1.0 (http://cran.r-project.org/bin/windows/base). The alcohol outcomes were positively skewed and overdispersed with a large number of zeros. We thus used a count regression model. A Vuong test indicated that a hurdle negative binomial had the best fit. The hurdle model is appropriate for handling zero-inflated and overdispersed outcomes because it fit all zeros in a logistic regression submodel and the nonzero counts in a truncated count regression submodel, allowing simultaneous examination of the effects of the covariates on "any outcomes" (i.e., zero vs. nonzero; logistic regression submodel) and on the number of outcomes among participants reporting at least one outcome (i.e., nonzero outcomes; count regression submodel) (Atkins et al., 2013).

Two models were tested for each outcome (i.e., one with PBS total score, a second with the subscales). All the variables were included from the beginning. Moderation analyses were used to test for interactions between AEs and PBS in predicting alcohol outcomes (Aiken & West, 1991). We controlled for school (participants were recruited from several high schools) by using the robust cluster-adjusted standard errors. We also controlled for gender and age in each model and for drinks per week (at baseline) in the models with consequences as the outcome. Continuous covariates were mean-centered. Significant interactions were followed with an examination of the slopes to determine the direction and degree of the interaction.

Results

Table 2 presents results from the hurdle models. The magnitude of the associations between the covariates and the outcomes was examined with odds ratios [describing the increase (>1) or decrease (<1) in the odds of reporting ≥1 outcome vs. no outcome] in the logistic submodel and rate ratios [describing the percentage increase (>1) or decrease (<1) in outcomes for each unit increase in the covariate] in the count regression submodel (Atkins & Gallop, 2007).

Total drinks per week

Findings from the logit submodels indicated that positive AEs and PBS-LS were associated with reporting one or more drinks versus zero drinks per week, whereas PBS-MoD was associated with reporting zero drinks versus one or more drinks per week. Lastly, results indicated a significant interaction between PBS (total score) and negative AEs.

The count submodels revealed significant associations between gender (rate ratios [RRs] = 0.80–0.81) and PBS (total score, MoD; RRs = 0.79) and drinks per week, such that being male was associated with 20% more drinks, whereas each unit increase in PBS was associated with about 21% fewer drinks. Next, results indicated significant interactions between PBS-SHR and positive AEs and between PBS-MoD and negative AEs. As shown in Figure 1, among participants with lower positive AEs, those using more PBS-SHR reported fewer drinks than those using fewer PBS-SHR, whereas among participants with higher positive AEs, those using more PBS-SHR reported more drinks than those using fewer PBS-SHR. The second interaction indicated that among participants endorsing high negative AEs, those using more PBS-MoD reported fewer drinks than did those using fewer PBS-MoD.

Alcohol-related consequences

The logit submodels indicated that PBS-MoD was associated with reporting zero consequences versus one or more consequences. In the count submodels, the associations between age (RR = 0.59–0.65), gender (RR = 1.30), and drinks per week (RR = 1.01) with negative consequences were significant, such that being older and a male was associated with 40% fewer and 30% more consequences, respectively, whereas each increase in drinks was associated with about 1% more consequences. The association between PBS-MoD and consequences was significant (RR = 0.69), indicating that each increase in PBS-MoD was associated with about 31% fewer consequences. There was a significant moderating effect of PBS total score in the relationship between positive AEs and consequences, such that among participants endorsing higher positive AEs, those using more PBS reported fewer consequences than those using fewer PBS. Similarly,

TABLE 2. Total drinks per week and alcohol-related consequences at 12-month follow-up as a function of use of PBS (Total Score, Serious Harm Reduction, Limiting/Stopping, and Manner of Drinking subscales) and positive and negative alcohol expectancies

	Count submodel[a]						Logit submodel					
					95% CI for RR						95% CI for OR	
Covariates	*B*	*SE B*	*Z*	RR	Lower	Upper	*B*	*SE B*	*Z*	OR	Lower	Upper
PBS total score and alcohol expectancies predicting total drinks per week												
Intercept	2.42	0.10	25.37***	11.22	9.31	13.52	1.47	0.43	3.46***	4.36	1.90	10.03
PBS (total)	-0.23	0.06	-4.16***	0.79	0.71	0.88	0.27	0.23	1.16	1.31	0.83	2.05
PosAEs	0.19	0.18	1.01	1.20	0.84	1.72	1.16	0.36	3.23**	3.19	1.58	6.47
NegAEs	0.08	0.17	0.49	1.09	0.78	1.51	-0.56	0.44	-1.29	0.57	0.24	1.34
Gender	-0.21	0.09	-2.34*	0.81	0.68	0.97	-0.24	0.41	-0.59	0.79	0.35	1.76
Age	-0.11	0.38	-0.29	0.84	0.66	1.05	-0.11	0.38	-0.29	0.90	0.42	1.89
PBS × PosAEs	0.21	0.12	1.68	1.23	0.97	1.57	-0.56	0.33	-1.69	0.57	0.30	1.09
PBS × NegAEs	-0.01	0.12	-0.05	1.00	0.78	1.26	0.54	0.26	2.13*	1.72	1.04	2.83
PBS subscales and alcohol expectancies predicting total drinks per week												
Intercept	2.41	0.09	28.01***	11.13	9.40	13.17	1.66	0.46	3.60***	5.24	2.13	12.89
PBS-SHR	0.01	0.05	0.26	1.01	0.91	1.13	0.17	0.19	0.92	1.19	0.28	1.70
PBS-LS	-0.05	0.07	-0.67	0.95	0.83	1.10	0.66	0.19	3.55***	1.93	1.34	2.77
PBS-MoD	-0.24	0.05	-5.19***	0.79	0.72	0.86	-0.72	0.36	-1.99*	0.49	0.24	0.99
PosAEs	0.12	0.18	0.70	1.13	0.80	1.60	0.87	0.32	2.72**	2.40	1.30	4.50
NegAEs	0.06	0.17	0.34	1.06	0.76	1.47	-0.57	0.47	-1.20	0.57	0.23	1.43
Gender	-0.23	0.08	-2.75**	0.80	0.70	0.94	-0.29	0.38	-0.77	0.75	0.35	1.58
Age	0.04	0.36	0.10	0.86	0.67	1.11	0.04	0.36	0.10	1.04	0.51	2.10
SHR × PosAEs	0.20	0.10	1.99*	1.22	1.00	1.47	-0.17	0.38	-0.44	0.85	0.40	1.79
SHR × NegAEs	0.05	0.18	0.27	1.05	0.74	1.48	0.55	0.38	1.44	1.73	0.82	3.66
LS × PosAEs	-0.17	0.16	-1.06	0.84	0.61	1.16	-0.27	0.40	-0.68	0.76	0.34	1.68
LS × NegAEs	0.23	0.20	1.20	1.23	0.85	1.84	-0.19	0.60	-0.32	0.82	0.26	2.66
MoD × PosAEs	0.20	0.11	1.83	1.23	0.99	1.53	-0.16	0.39	-0.41	0.85	0.40	1.84
MoD × NegAEs	-0.38	0.14	-2.79**	0.68	0.52	0.89	0.27	0.66	0.40	1.31	0.36	4.81
PBS total score and alcohol expectancies predicting alcohol-related consequences												
Intercept	2.21	0.13	17.50***	9.08	7.10	11.63	1.75	0.35	4.93***	5.76	2.88	11.56
PBS (total)	-0.16	0.08	-1.96	0.85	0.73	1.00	-0.26	0.21	-1.23	0.77	0.51	1.17
PosAEs	0.06	0.16	0.37	1.06	0.77	1.47	0.07	0.40	0.18	1.07	0.49	2.34
NegAEs	0.14	0.18	0.75	1.15	0.80	1.65	0.19	0.47	0.40	1.21	0.48	0.06
Gender	0.21	0.14	1.50	1.23	0.94	1.61	-0.66	0.43	-1.53	0.52	0.22	1.20
Age	-0.51	0.13	-3.96***	0.59	0.46	0.77	-0.11	0.29	-0.39	0.89	0.50	1.56
Drinks/week	0.03	0.01	2.66**	1.03	1.01	1.06	0.06	0.05	1.15	1.07	0.96	1.19
PBS × PosAEs	-0.49	0.20	-2.49*	0.61	0.42	0.90	0.12	0.42	0.28	1.13	0.49	2.57
PBS × NegAEs	0.46	0.26	1.80	1.58	0.96	2.61	-0.02	0.47	-0.05	0.98	0.39	2.44
PBS subscales and alcohol expectancies predicting alcohol-related consequences												
Intercept	2.17	0.11	20.05***	8.72	7.06	10.78	1.82	0.32	5.66***	6.17	3.29	11.58
PBS-SHR	0.05	0.12	0.39	1.05	0.84	1.31	0.13	0.18	0.69	1.14	0.79	1.63
PBS-LS	0.04	0.14	0.33	1.05	0.80	1.37	0.05	0.22	0.21	1.05	0.68	1.61
PBS-MoD	-0.37	0.08	-4.38***	0.69	0.59	0.82	-0.55	0.22	-2.49*	0.58	0.38	0.89
PosAEs	-0.12	0.14	-0.89	0.89	0.67	1.16	-0.14	0.39	-0.35	0.87	0.40	1.88
NegAEs	0.15	0.16	0.89	1.16	0.84	1.60	0.20	0.48	0.41	1.16	0.84	1.60
Gender	0.30	0.13	2.05*	1.30	1.01	1.66	-0.73	0.39	-1.87	0.48	0.22	1.03
Age	-0.44	0.15	-2.93**	0.65	0.48	0.96	-0.07	0.32	-0.23	0.93	0.50	1.73
Drinks/week	0.02	0.01	3.10**	1.02	1.01	1.04	0.04	0.05	0.87	1.04	0.95	1.15
SHR × PosAEs	-0.26	0.23	-1.14	0.77	0.50	1.20	0.04	0.46	0.08	1.04	0.42	2.54
SHR × NegAEs	0.40	0.19	2.12*	1.49	1.03	2.16	-0.22	0.50	-0.43	0.81	0.30	2.16
LS × PosAEs	0.05	0.27	0.18	1.05	0.62	1.77	0.05	0.34	0.14	1.05	0.54	2.05
LS × NegAEs	0.03	0.17	0.19	1.03	0.74	1.45	0.56	0.38	1.50	1.75	0.84	3.66
MoD × PosAEs	-0.34	0.22	-1.55	0.71	0.46	1.09	0.05	0.46	0.12	1.05	0.43	2.59
MoD ×NegAEs	-0.08	0.24	-0.33	0.92	0.57	1.49	-0.57	0.53	-1.07	0.57	0.20	1.61

Notes: Gender was coded as follows for the analysis: 0 = male, 1 = female. PBS = protective behavioral strategies; CI = confidence interval; RR = rate ratios; OR = odds ratio; PosAEs = positive alcohol expectancies; NegAEs = negative alcohol expectancies; SHR = Serious Harm Reduction; LS = Limiting/Stopping; MoD = Manner of Drinking. [a]The distribution used for the count submodel comprised only outcomes > 0.
*$p < .05$; **$p < .01$; ***$p < .001$.

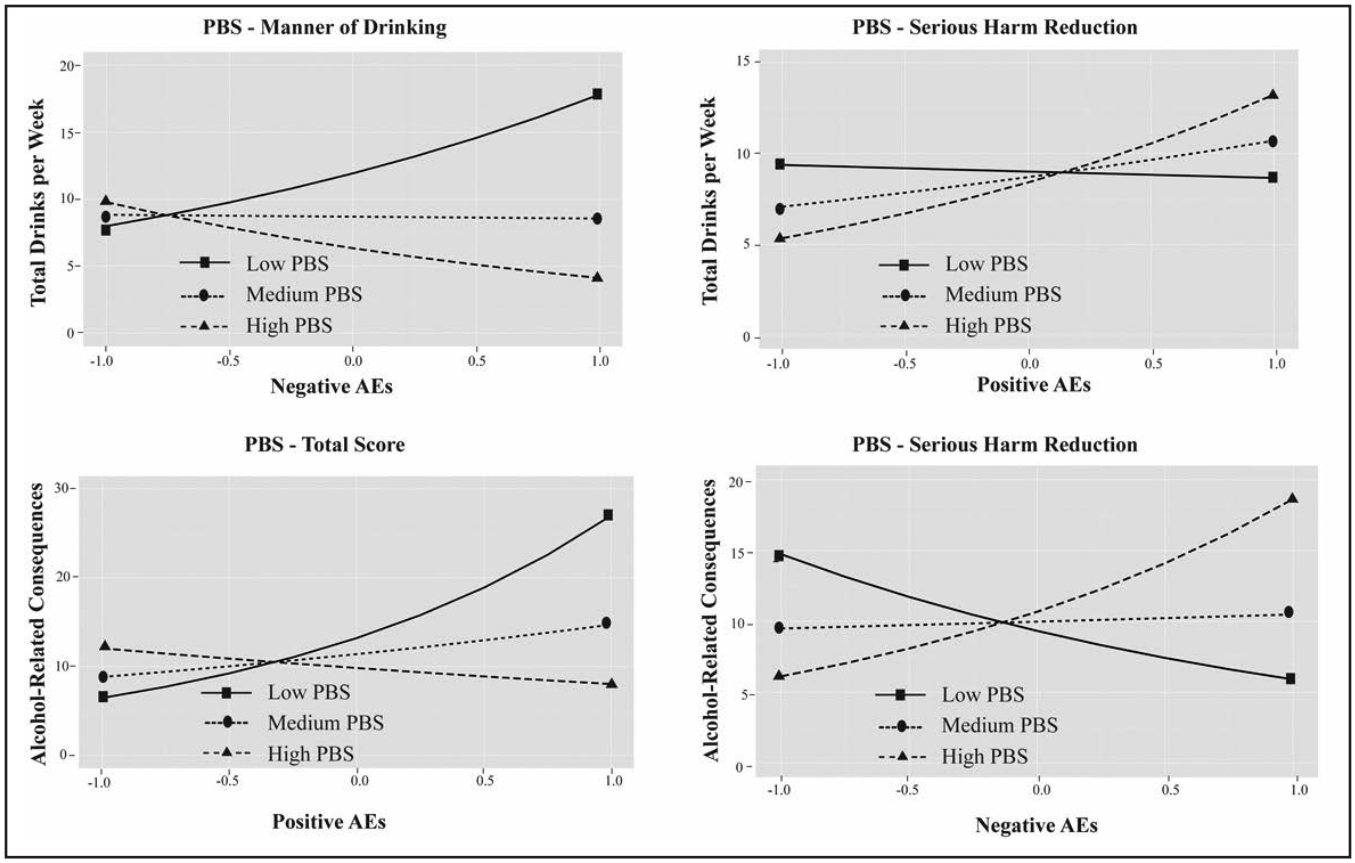

FIGURE 1. Relationships between positive and negative alcohol expectancies (AEs) endorsed at baseline and alcohol outcomes at 12-month follow-up among young adults with a low, medium, or high use of protective behavioral strategies (PBS).

the interaction between PBS-SHR and negative AEs was significant, indicating that among participants with lower negative AEs, participants using fewer PBS-SHR reported more consequences than those using more PBS-SHR, yet among participants with higher negative AEs, those using more PBS-SHR were the most at risk regarding consequences (Figure 1).

Discussion

This study examined the moderating effects of PBS in the relationships between AEs and alcohol outcomes in a longitudinal sample of young adults. Findings revealed that among participants endorsing high positive AEs, those using more PBS experienced fewer problems than those using fewer PBS. Similarly, among participants with high negative AEs, those using more PBS (MoD) reported drinking less than those using fewer PBS. These results are consistent with research that has shown PBS to be protective by weakening relationships between alcohol risk factors and alcohol outcomes (e.g., Benton et al., 2004; Borden et al., 2011; D'Lima et al., 2012). PBS may therefore serve as a buffer against the negative consequences associated with endorsing high positive AEs and alcohol consumption related to endorsing high negative AEs.

Next, we found that whereas PBS-SHR use was protective against drinking among participants with low positive AEs, its use was associated with more drinking among those endorsing high positive AEs. Similarly, we found that among participants with low negative AEs, those using more PBS-SHR experienced fewer consequences than those using fewer PBS, yet among participants with high negative AEs, those using more PBS-SHR were at greater risk for consequences. These results are consistent with longitudinal studies that have found positive relationships between the use of PBS and alcohol outcomes (Lewis et al., 2012; Pearson et al., 2013). It may be that students using more PBS while drinking are actually those who drink more and who use PBS while drinking in high-risk settings (Pearson, 2013; Prince et al., 2013). It is also possible that participants with high negative AEs who use more PBS are experiencing early symptoms of alcohol use disorders. In fact, a recent study identified young adults with high negative and positive AEs as a particularly problematic risk profile (Leeman et al., 2012).

To the best of our knowledge, this is the first study examining the moderating role of PBS in the relationships

between AEs and alcohol outcomes, and these results would need to be replicated to demonstrate generalizability. If replicated, these findings suggest that increasing PBS use may weaken the associations between positive AEs and negative consequences and between negative AEs and alcohol use. Next, our results that PBS did not have a protective function against alcohol use among participants endorsing high positive AEs suggest that strategies aiming to reduce the risks instead of reducing the amount of drinking may be a better fit for individuals endorsing high positive AEs.

This study has limitations that deserve mention. First, even though the PBSS has been widely used among young adults, only one study has used this measure among younger participants (Grazioli et al., 2015). Further, consistent with most PBS research, we used the narrow definition of PBS and did not assess the use of strategies to avoid drinking (Sugarman & Carey, 2007). Future research exploring the use of strategies to avoid drinking and further validating the PBSS on younger populations is needed. Second, our data relied on responses to self-report questionnaires, and their validity may be a concern, although participants were assured of confidentiality. Next, Cronbach's α for the negative AEs subscale was low, suggesting a low internal consistency possibly affecting the results. That being said, the inter-item correlation value corresponded to standards in the literature (Briggs & Cheek, 1986). Finally, whereas the longitudinal nature of our study is a contribution to the literature, our retention rate after 1 year was around 67%. Therefore, future studies are needed to replicate and extend findings from this study.

Despite these limitations, we believe that this study makes an interesting contribution to the literature on PBS by providing preliminary findings suggesting that PBS may be protective by weakening the relationships between high positive AEs and alcohol-related consequences and between high negative AEs and alcohol use among young adults. If replicated by future research, these findings suggest that PBS-based interventions targeted to high school seniors endorsing high AEs may represent a promising way to reduce future alcohol-related harm in this population.

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Appendix

APPENDIX 1

The materials below are supplementary material to the article entitled “Protective behavioral strategies and future drinking behaviors: Effects of drinking intentions”. This supplementary material includes Tables 4-9 presenting total drinks per week and alcohol-related consequences at 12-month follow-up as a function of drinking intentions, use of PBS subscales (i.e., Limiting/Stopping, Manner of Drinking and Serious Harm Reduction) and country of origin.

Table 4

Total Drinks per Week at 12-Month Follow-Up as a Function of Drinking Intentions, Use of Protective-Behavioral Strategies (Manner of Drinking Score) and Country

Variable	B	*SE* B	T	e ^ B	Low 95% e ^ B	Upper 95 e ^ B
Intercept	3.44	1.48	2.32†	31.31	1.70	575.55
Age	-0.12	0.08	-1.38	0.89	0.76	1.05
Gender	0.19	0.09	2.16†	1.21	1.02	1.44
Baseline Peak Drinking Quantity	0.02	0.01	1.39	1.02	0.99	1.04
Baseline Total Drinks Per Week	0.02	0.01	1.75	1.02	1.00	1.04
Drinking Intentions	0.05	0.01	5.57**	1.05	1.03	1.06
s (Manner of Drinking)	-0.09	0.05	-2.09†	0.91	0.84	1.00
Country	0.29	0.10	3.03*	1.35	1.11	1.63
Drinking Intentions X PBS (Manner of Drinking)	0.01	0.00	3.23*	1.01	1.01	1.02
Country X Drinking Intentions	0.00	0.01	0.17	1.00	0.98	1.03
Country X PBS (Manner of Drinking)	-0.00	0.08	-0.05	1.00	0.86	1.16

Note. †$p < 0.05$. *$p < 0.01$. **$p < 0.001$.

Table 5

Total Drinks per Week at 12-Month Follow-Up as a Function of Drinking Intentions, Use of Protective-Behavioral Strategies (Serious Harm Reduction Score) and Country

Variable	B	*SE* B	T	e ^ B	Low 95% e ^ B	Upper 95 e ^ B
Intercept	3.02	1.48	2.03†	20.39	1.11	375.00
Age	-0.09	0.08	-1.13	0.91	0.77	1.07
Gender	0.21	0.09	2.25†	1.23	1.03	1.47
Baseline Peak Drinking Quantity	0.02	0.01	1.72	1.02	1.00	1.04
Baseline Total Drinks Per Week	0.02	0.01	1.62	1.02	1.00	1.03
Drinking Intentions	0.05	0.01	6.00**	1.10	1.03	1.07
PBS (Serious Harm Reduction)	-0.02	0.04	-0.41	0.98	0.90	1.07
Country	0.31	0.10	3.10*	1.36	1.12	1.66
Drinking Intentions X PBS (Serious Harm Reduction)	0.01	0.00	1.57	1.01	1.00	1.01
Country X Drinking Intentions	0.00	0.01	0.12	1.00	0.98	1.03
Country X PBS (Serious Harm Reduction)	-0.04	0.07	-0.54	0.96	0.84	1.10

Note. †$p < 0.05$. *$p < 0.01$. **$p < 0.001$.

Table 6

Total Drinks per Week at 12-Month Follow-Up as a Function of Drinking Intentions, Use of Protective-Behavioral Strategies (Limiting/Stopping Score) and Country

Variable	B	*SE* B	T	e ^ B	Low 95% e ^ B	Upper 95 e ^ B
Intercept	2.93	1.46	2.00†	18.65	1.06	328.60
Age	-0.10	0.08	-1.07	0.92	0.78	1.08
Gender	0.22	0.09	2.44†	1.24	1.04	1.47
Baseline Peak Drinking Quantity	0.02	0.01	1.52	1.02	1.00	1.04
Baseline Total Drinks Per Week	0.02	0.01	1.62	1.02	1.00	1.03
Drinking Intentions	0.05	0.01	5.99**	1.05	1.03	1.07
PBS (Limiting/Stopping)	-0.07	0.05	-1.39	0.93	0.84	1.03
Country	0.30	0.10	3.10*	1.35	1.12	1.64
Drinking Intentions X PBS (Limiting/Stopping)	0.01	0.01	2.37†	1.01	1.00	1.02
Country X Drinking Intentions	-0.00	0.01	-0.00	1.00	0.98	1.02
Country X PBS (Limiting/Stopping)	0.07	0.08	0.91	1.07	0.92	1.25

Note. †$p < 0.05$. **$p < 0.001$. †$p < 0.05$

Table 7

Alcohol-Related Consequences at 12-Month Follow-Up as a Function of Drinking Intentions, Use of Protective-Behavioral Strategies (Manner of Drinking score) and Country

Note. $^{\dagger}p < 0.05$ $^{**}p < 0.001$.

Variable	B	*SE* B	T	e ^ B	Low 95% e ^ B	Upper 95 e ^ B
Intercept	0.14	2.77	-0.05	0.87	0.00	200.71
Age	0.08	0.16	0.49	1.08	0.80	1.46
Gender	0.19	0.16	1.20	1.21	0.89	1.66
Baseline Peak Drinking Quantity	0.02	0.02	1.59	1.02	1.00	1.06
Baseline Alcohol-Related Consequences	0.02	0.01	2.04†	1.02	1.00	1.04
Drinking Intentions	0.05	0.01	3.71**	1.06	1.03	1.09
PBS (Manner of Drinking)	-0.13	0.08	-1.56	0.88	0.75	1.03
Country	0.75	0.19	4.02**	2.12	1.47	3.07
Drinking Intentions X PBS (Manner of Drinking)	0.02	0.01	2.41†	1.02	1.00	1.04
Country X Drinking Intentions	-0.01	0.02	-0.58	1.00	0.96	1.03
Country X PBS (Manner of Drinking)	-0.01	0.15	-0.09	1.00	0.74	1.32

Table 8

Alcohol-Related Consequences at 12-Month Follow-Up as a Function of Drinking Intentions, Use of Protective-Behavioral Strategies (Serious Harm Reduction score) and Country

Variable	B	*SE* B	T	e ^ B	Low 95% e ^ B	Upper 95 e ^ B
Intercept	-0.62	2.73	-0.23	0.54	0.00	114.09
Age	0.10	0.15	0.65	1.10	0.82	1.49
Gender	0.17	0.16	1.07	1.86	0.87	1.62
Baseline Peak Drinking Quantity	0.03	0.02	1.45	1.03	0.99	1.06
Baseline Alcohol-Related Consequences	0.02	0.01	1.84	1.02	1.00	1.04
Drinking Intentions	0.06	0.01	4.05**	1.06	1.03	1.09
PBS (Serious Harm Reduction)	-0.18	0.09	-2.16†	0.83	0.71	0.98
Country	0.77	0.19	4.13**	2.17	1.50	3.13
Drinking Intentions X PBS (Serious Harm Reduction)	0.01	0.01	0.74	1.01	1.00	1.02
Country X Drinking Intentions	-0.01	0.02	-0.71	0.99	0.95	1.03
Country X PBS (Serious Harm Reduction)	0.12	0.13	0.96	1.13	0.88	1.46

Note.

†$p < 0.05$ **$p < 0.001$.

Table 9

Alcohol-Related Consequences at 12-Month Follow-Up as a Function of Drinking Intentions, Use of Protective-Behavioral Strategies (Limiting/Stopping score) and Country

Variable	B	*SE* B	T	e ^ B	Low 95% e ^ B	Upper 95 e ^ B
Intercept	-0.60	2.65	-0.22	0.55	0.00	100.93
Age	0.10	0.15	0.66	1.10	0.83	1.47
Gender	1.19	0.15	1.26	1.21	0.90	1.64
Baseline Peak Drinking Quantity	0.02	0.02	1.09	1.02	0.99	1.05
Baseline Alcohol-Related Consequences	0.02	0.01	1.97	1.02	1.00	1.04
Drinking Intentions	0.05	0.01	3.67**	1.05	1.02	1.08
PBS (Limiting/Stopping)	-0.24	0.09	-2.62*	0.79	0.66	0.94
Country	0.76	0.18	4.16**	2.15	1.50	3.08
Drinking Intentions X PBS (Limiting/Stopping)	0.01	0.01	0.69	1.01	0.99	1.02
Country X Drinking Intentions	-0.01	0.02	-0.44	0.99	0.95	1.03
Country X PBS (Limiting/Stopping)	0.21	0.14	1.49	1.23	0.94	1.61

Note.

$^{\dagger}p < 0.05$. $*p < 0.01$. $**p < 0.001$.

APPENDIX 2

The materials below are supplementary material to the articles entitled “Protective behavioral strategies and future drinking behaviors: Effects of drinking intentions” and “Alcohol expectancies and alcohol outcomes: Effects of use of protective behavioral strategies”. This supplementary material includes Tables 1 and 2 presenting additional descriptive statistics in samples.

Table 1.

Drug Use and Mental Distress : Means and Standard Deviations at Baseline by Country (Study 4)

	US sample		Swedish sample		
Variables	*M*	*SD*	*M*	*SD*	*t*
Drug use[1]					
Cannabis	12.25	22.68	0.77	6.71	7.35***
Amphetamines	0.64	6.16	0.01	0.22	1.65
Ecstasy	0.29	1.60	0.00	0.03	2.91**
Hallucinogens	0.33	2.34	0.01	0.11	2.23*
Cocaine or crack	0.17	1.17	0.00	0.03	2.28*
Illegal opiates	0.14	1.18	0.01	0.34	1.73
Sleep medications[2]	0.40	2.97	0.02	0.18	2.34*
Sedative medication[2]	0.22	1.59	0.14	3.43	0.70
Stimulant medication[2]	0.51	3.51	0.01	0.18	2.28*
Mental distress (SCL-8)[3]					
Sum score	1.92	0.65	2.11	0.68	-4.12***

Notes. ***$p<0.001$, ** $p<0.01$, * $p<0.05$. [1]Number of substance use over the past 3 months. [2]Not medically prescribed. [3]The Symptom Checklist-8 items scale measured mental distress ; participants were asked to indicate how much they had been bothered or distressed by 8 problems (e.g., *feeling blue*) over the past 3 months on a 4-point scale ranging from 1 = *not at all* to 4 = *extremely.* Average-item score were computed.

Table 2.

Drug Use and Mental Distress : Means and Standard Deviations at Baseline (Study 5)

Variables	*M*	*SD*
Drug use		
Cannabis	14.19	24.71
Amphetamines	0.73	6.69
Ecstasy	0.30	1.71
Hallucinogens	0.24	1.88
Cocaine or crack	0.18	1.30
Illegal opiates	0.20	1.61
Sleep medications	0.44	2.89
Sedative medication	0.23	2.14
Stimulant medication	0.56	3.78
Mental distress (SCL-8D)		
Sum score	1.92	0.65

Notes. [1]Number of substance use over the past 3 months. [2]Not medically prescribed. [3]The Symptom Checklist-8 items scale measured mental distress ; participants were asked to indicate how much they had been bothered or distressed by 8 problems (e.g., *feeling blue*) over the past 3 months on a 5-point scale ranging from 0 = *not at all* to 5 = *extremely*. Responses were dichotomized in the way that 0-1 = 0 and 2-5 = 1, and then summed up.