The Development Of A Drinking-Specific Compensatory Health Beliefs Scale

Sandra L. Oviedo Ramirez
University of Texas at El Paso, sloviedoramirez@miners.utep.edu

Follow this and additional works at: https://digitalcommons.utep.edu/open_etd
Part of the Other Psychology Commons

Recommended Citation
Oviedo Ramirez, Sandra L., "The Development Of A Drinking-Specific Compensatory Health Beliefs Scale" (2017). Open Access Theses & Dissertations. 518.
https://digitalcommons.utep.edu/open_etd/518

This is brought to you for free and open access by DigitalCommons@UTEP. It has been accepted for inclusion in Open Access Theses & Dissertations by an authorized administrator of DigitalCommons@UTEP. For more information, please contact lweber@utep.edu.
THE DEVELOPMENT OF A DRINKING-SPECIFIC COMPENSATORY HEALTH BELIEFS SCALE

SANDRA LETICIA OVIEDO RAMIREZ
Master’s Program in Experimental Psychology

APPROVED:

______________________________
Craig Field, Ph.D., Chair

______________________________
Osvaldo Morera, Ph.D.

______________________________
Lawrence Cohn, Ph.D.

______________________________
Leah Whigham, Ph.D.

______________________________
Charles Ambler, Ph.D.
Dean of the Graduate School
Copyright ©

by

Sandra Leticia Oviedo Ramirez

2017
Dedication

I would like to dedicate this achievement to my Mom and Dad. Without your sacrifices, I would have not been able to accomplish this milestone. This is also your accomplishment! I love you both more than words can describe. Thank you for everything. We did it!
THE DEVELOPMENT OF A DRINKING-SPECIFIC COMPENSATORY HEALTH BELIEFS SCALE

by

SANDRA LETICIA OVIEDO RAMIREZ, BA

Presented to the Faculty of the Graduate School of The University of Texas at El Paso in Partial Fulfillment of the Requirements for the Degree of

MASTER OF ARTS

Department of Psychology

THE UNIVERSITY OF TEXAS AT EL PASO

December 2017
Acknowledgements

I would like to thank the special people in my life who have made this journey possible. Thank you all for your endless love and support throughout this crazy journey. Mom and Dad- Words can’t describe how grateful I am for your unconditional love and support. I can’t thank you enough for sacrificing your dreams so that my siblings and I could have a better life. Thank you for also believing in me and for allowing me to always pursue my dreams. Valery and Jorge- Thank you for always being there for me whenever I’ve needed your help. I’m lucky to be your little sister. Owen and Roberto- Thank you for reminding me that it’s important to laugh, have fun, and be a kid at heart. I am beyond blessed to be your tia. Matthew- Despite all the craziness involved in dating a graduate student, I’m glad you’ve stuck around. I am grateful to have found my best friend and partner in crime. I would also like to thank my friends (there’s too many of you to list, but you know who you are) for making graduate life fun and becoming my family away from home! Lastly, I would like to thank my committee members Drs. Field, Morera, Cohn, and Whingham for your ideas, feedback and support throughout this project.
Abstract

The present study sought to investigate the applicability of the Compensatory Health Belief (CHB) model in relation to drinking by developing and validating the Drinking-Specific Compensatory Health Beliefs (CHBs) Scale in adults between the ages of 18 and 29 living in the United States. In phase 1, a pool of 41 items was administered to 293 undergraduate students. An Exploratory Factor Analysis (EFA) was used to construct the Drinking-Specific CHBs Scale, which consists of 13 items that encompass four different factors – physical activity, no consumption of other drugs, amount of alcohol consumed in future, and rest. In phase 2, a Confirmatory factor Analysis (CFA) with 272 M-Turk workers demonstrated that the four-factor model had adequate model fit indices and adequate reliability estimates. In phase 3, convergent and discriminant validity of the Drinking-Specific CHBs Scale was assessed by examining its relationship with other measures in a sample of 222 M-Turk workers. As expected, the Drinking-Specific CHBs Scale was positively correlated with substance use subscale from original CHBs Scale and negatively correlated with drinking refusal self-efficacy. Contrary to expectations, the Drinking-Specific CHBs scale was negatively and significantly correlated with two aspects from the Protective Behavioral Strategies Scale- serious hard reduction and manner of drinking. Limiting/stopping drinking was unrelated. Comparison between drinkers’ and abstainers’ showed higher endorsement of drinking-specific CHBs among drinkers in comparison to non-drinkers. Thus, results of phase 3 indicate that there was evidence for both convergent and discriminant validity. Limitations and future directions of this study are discussed. To conclude, the present study provides a unique contribution to the field of alcohol research and our understanding of the cognitive processes involved when we apply the use of CHBs to drinking.

Keywords: compensatory health beliefs, scale development, alcohol
Table of Contents

Acknowledgements .............................................................................................................. v
Abstract ............................................................................................................................... vi
Table of Contents ................................................................................................................ vii
List of Tables ........................................................................................................................ ix
List of Figures ....................................................................................................................... x

Introduction .......................................................................................................................... 1
  Alcohol Use and Public Burden ......................................................................................... 1
  Compensatory Health Belief Model ............................................................................... 2
    Conflict Resolution and Motivational Conflict ......................................................... 4
    The Role of Self-Efficacy on Compensatory Health Beliefs ................................... 6
Empirical Support for the Compensatory Health Belief Model ................................... 7
Adapted Compensatory Health Belief Scales ............................................................... 9
The Applicability of the CHB Model to Investigate Addictive Behaviors ................. 11
Rationale for Developing a Drinking-Specific CHB Measure ..................................... 13
Utilizing Amazon’s Mechanical Turk (M-Turk) Workers in Alcohol Use Research .... 14
Overview of Present Study ............................................................................................... 15

Phase 1. Developing the Drinking-Specific CHBs Scale: Conducting Exploratory Factor
  Analysis .............................................................................................................................. 17
Method ................................................................................................................................. 17
  Power Analysis ............................................................................................................... 17
  Participants ....................................................................................................................... 17
  Materials ......................................................................................................................... 18
  Procedure ......................................................................................................................... 20
Results .................................................................................................................................. 20
  Exploratory Factor Analysis of the Drinking-Specific Compensatory Health
  Belief Scale ....................................................................................................................... 20
  Internal Reliability of Drinking-Specific Compensatory Health Belief Scale ........ 22

Phase 2. Developing the Drinking-Specific CHBs Scale: Conducting a Confirmatory Factor
  Analysis on M-Turk Sample ............................................................................................. 23
Method ................................................................................................................................. 23
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>23</td>
</tr>
<tr>
<td>Materials</td>
<td>24</td>
</tr>
<tr>
<td>Procedure</td>
<td>24</td>
</tr>
<tr>
<td>Results</td>
<td>24</td>
</tr>
<tr>
<td>Confirmatory Factor Analysis of Drinking-Specific Compensatory Health Belief Scale</td>
<td>24</td>
</tr>
<tr>
<td>Internal Reliability of Drinking-Specific Compensatory Health Belief Scale</td>
<td>25</td>
</tr>
<tr>
<td>Phase 3. Assessing Construct Validity of the Drinking-Specific CHBs Scale</td>
<td>27</td>
</tr>
<tr>
<td>Method</td>
<td>27</td>
</tr>
<tr>
<td>Participants</td>
<td>27</td>
</tr>
<tr>
<td>Materials</td>
<td>27</td>
</tr>
<tr>
<td>Procedure</td>
<td>30</td>
</tr>
<tr>
<td>Results</td>
<td>31</td>
</tr>
<tr>
<td>Confirmatory Factor Analysis of Drinking-Specific Compensatory Health Belief Scale</td>
<td>31</td>
</tr>
<tr>
<td>Basic Descriptive Statistics, Intercorrelations, and Internal Reliability of Drinking-Specific Compensatory Health Belief Scale</td>
<td>32</td>
</tr>
<tr>
<td>Convergent Validity of the Drinking-Specific Compensatory Health Beliefs Scale</td>
<td>32</td>
</tr>
<tr>
<td>Discriminant Validity the Drinking-Specific Compensatory Health Beliefs Scale</td>
<td>33</td>
</tr>
<tr>
<td>Discussion</td>
<td>35</td>
</tr>
<tr>
<td>Conclusion</td>
<td>40</td>
</tr>
<tr>
<td>References</td>
<td>44</td>
</tr>
<tr>
<td>Appendix A</td>
<td>50</td>
</tr>
<tr>
<td>Appendix B</td>
<td>53</td>
</tr>
<tr>
<td>Appendix C</td>
<td>54</td>
</tr>
<tr>
<td>Appendix D</td>
<td>55</td>
</tr>
<tr>
<td>Appendix E</td>
<td>56</td>
</tr>
<tr>
<td>Appendix F</td>
<td>58</td>
</tr>
<tr>
<td>Curriculum Vita</td>
<td>75</td>
</tr>
</tbody>
</table>
List of Tables

Table 1: Demographic Information for Participants in Phase 1 ............................................. 59
Table 2. First Comparison of Factor Analysis and Parallel Analysis Eigenvalues .................. 60
Table 3. Second Comparison of Factor Analysis and Parallel Analysis Eigenvalues ............ 61
Table 4. Exploratory Factor Analysis with Varimax Rotation for the Drinking-Specific CHBs Scale in Phase 1 (Loadings Greater than .50 are in Bold Print). N = 293 ........................................... 62
Table 5. Demographic Information for Participants in Phase 2 ........................................... 64
Table 6. Factor Loadings and Unique Variances for Confirmatory Factor Analysis of the Drinking-Specific CHBs Scale in Phase 2 ................................................................. 65
Table 7. Model fit for the Drinking-Specific CHBs Scale in Phase 2 .................................... 66
Table 8. Inter-correlations of Drinking-Specific CHBs Factors in Phase 2 ............................... 67
Table 9. Demographic Information for Participants in Phase 3 ............................................ 68
Table 10. Factor Loadings and Unique Variances for Confirmatory Factor Analysis of the Drinking-Specific CHBs Scale in Phase 3 ................................................................. 69
Table 11. Model fit for the Drinking-Specific CHBs Scale in Phase 3 .................................... 70
Table 12. Inter-correlations of Drinking-Specific CHBs Factors in Phase 3 ............................... 71
Table 13. Means, Standard Deviations, and Intercorrelations for all of the Study Variables in Phase 3 ......................................................................................................................... 72
Table 14. One-Way Analysis of Variance of Drinking-Specific CHBs by AUDIT Groups ....... 73
Table 15. Means and Standard Deviations for AUDIT Groups ............................................ 74
List of Figures

Figure 1. Compensatory Health Belief Model ................................................................. 4
Introduction

ALCOHOL USE AND PUBLIC BURDEN

According to the National Survey on Drug Use and Health (NSDUH) conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA), in 2015, 87.6 percent of people ages 18 or older reported that they drank alcohol at some point in their lifetime; 71.0 percent reported that they drank in the past year; and 56.9 percent reported that they drank in the past month. Moreover, this national survey also indicated that 24.7 percent of people ages 18 or older reported that they engaged in binge drinking in the past month (i.e., a pattern of drinking that brings blood alcohol concentration (BAC) levels to 0.08 g/dL. This typically occurs after 4 drinks for women and 5 drinks for men—in about 2 hours; National Institute of Alcohol Abuse and Alcoholism, 2016); 6.7 percent reported that they engaged in heavy drinking in the past month (i.e., drinking 5 or more drinks on the same occasion on each of 5 or more days in the past 30 days; National Institute of Alcohol Abuse and Alcoholism, 2016; SAMHSA, 2015).

Alcohol abuse is a public health burden. Research has found alcohol abuse to be among the top 20 leading causes of premature death and disability in the United States. According to the Centers for Disease and Prevention (2014), excessive consumption of alcohol led to approximately 88,000 deaths and economic costs associated with alcohol use in 2010 were estimated at $249 billion. Alcohol consumption is associated with a variety of short- and long-term health risks, including motor vehicle crashes, violence, sexual risk behaviors, high blood pressure, and various cancers (e.g., breast cancer; CDC, 2016). Furthermore, alcohol use has been associated with negative social consequences such as relationship problems, employment, financial, and legal issues (Mulia, Ye, Thomas, Greenfield, & Zemore, 2009). Notably, alcohol use is the third preventable cause of death in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004).
Despite the negative impact alcohol use has on individuals and society, alcohol use is still widespread. According to Pinel, Assanand, and Lehman (2000), people are quite knowledgeable about the maladaptive effects of several health behaviors including alcohol use and attempt to adopt a healthier lifestyle. Many of these attempts, however, remain unsuccessful. Thus, the question arises as to what makes it so difficult for people to consistently engage in healthy behaviors and adhere to their health behavior choices such as low risk drinking (Knäuper, Rabiau, Cohen, & Patriciu, 2004). Alcohol use and its related negative consequences have been vastly investigated in the field of health research but have yet to be applied to the Compensatory Health Beliefs (CHB) model. Therefore, the CHB model can be used to investigate drinking behaviors among adults in the United States. More specifically, we can learn how people utilize compensatory health beliefs (CHBs) to self-regulate resisting temptations such as drinking too much.

**Compensatory Health Belief Model**

In the past decade, a new model was developed to understand human behavior, specifically health related behavior. According to Knäuper Rabiau, Cohen, and Patriciu (2004), most research investigating and attempting to explain and predict health behaviors has implicitly presumed that health behavior choices are the product of rational appraisal processes. Moreover, little attention has been given to motivational factors that may be related with people’s health choices. Thus, Knäuper, Rabiau, Cohen, and Patriciu (2004), aimed to develop a model that would focus on a specific motivational state as a determinant of health and risk behaviors: the cognitive dissonance, or mental conflict, that occurs when the pleasure of indulging in a desired behavior stands in conflict with potentially negative health effects.

The CHB model proposes that individuals may utilize certain types of beliefs to resolve
the so-called ‘‘guilty pleasure’’-dilemmas (Giner-Sorolla, 2001). Importantly, the CHB model attempts to explain why people develop CHBs and how people utilize CHBs to self-regulate resisting temptations, and their power in predicting an individual’s health choices and future health outcomes (Knäuper Rabiau, Cohen, & Patriciu, 2004). CHBs are beliefs that the negative effects of a volitional unhealthy behavior can be compensated for, or ‘neutralized,’ by engaging in another, volitional healthy behavior (Rabiau, Knäuper, & Miquelon, 2006). It is important to note that the concept of volition is emphasized in the definition to demonstrate that this construct is relevant to behaviors that require self-control (Rabiau, Knäuper, & Miquelon, 2006).

Moreover, if an individual does not have, or does not perceive having, control over a situation, he or she will not experience a self-regulation conflict. For example, in order to experience conflict upon performing an unhealthy behavior, this behavior cannot be one that an individual perceives as having no control over or be a behavior that occurs through automatic processes (As cited in Rabiau, Knäuper, & Miquelon, 2006).

The CHB model encompasses the following major components – 1) motivational conflict between desire and goal, 2) the extent to which individuals pursue their set of personal goals out of self-determination and self-efficacy, and 3) intentions and implementation intentions or plans (see Fig.1) These three major components make up the theoretical framework for the CHB model, which is based on the integration of the following models: Protection motivation theory (Rogers, 1975), the theory of planned behavior (Ajzen, 1991), health action process approach (HAPA; Schwarzer’s, 1999), and the self-concordance model (Sheldon & Elliot, 1999), which is based on the concepts of self- determination theory (SDT; Deci & Ryan, 2000). More specifically, the protection motivation theory infers that people’s health behavior is a function of perceived severity, vulnerability, response effectiveness, and self-efficacy (Rogers, 1975). The
theory of planned behavior (Ajzen, 1991) considers health behavior as being primarily determined by an individual’s intention to perform the behavior in combination with perceived behavioral control. As a result, intention to perform the behavior is predicted by three factors: positive and/or negative attitudes towards the behavior, perceived behavioral control and subjective norms. Under the HAPA model (Schwarzer, 1999), action plan refers to the individual’s intended action towards the achievement of a desired health behavior. Lastly, the self-concordance model extends SDT research by focusing on an individual’s personal goal statements rather than focusing on domain-specific motivation.

![Compensatory Health Belief Model](image)

**Figure 1.** Compensatory Health Belief Model

**Conflict Resolution and Motivational Conflict**

Humans are constantly struggling to find a balance between fulfilling their desires while adhering to their health goals. This is what is known as the hedonic principle (Higgins, 1997), which states that humans strive to maximize pleasure and minimize harm. For example, people are faced with daily temptations and desires such as eating delicious but unhealthy food or
drinking alcohol but also hold goals such as maintaining a balanced diet and engaging in physical activity regularly. Therefore, being able to employ self-control over health behaviors in the goal pursuit is a key factor in maintaining one’s health and preventing disease (Metcalf & Mishel, 1999).

When people are faced with a temptation, the conflict between their wish for the desired object or activity (e.g., having a drink to ease anxiety) and their other goals (e.g., staying healthy) may create a motivational conflict or anticipatory guilt (Giner-Sorolla, 2001). This motivational conflict has been described by Festinger (1957) as the perception of a discrepancy among cognitions generating a negative intra-personal state of cognitive, which in turn motivates the individual to seek and execute a strategy to reduce this unpleasant state. The CHB model as proposed by Rabiau, Knäuper, and Miquelon (2006) states that there are three self-regulatory strategies people engage in when presented with a temptation (see Fig. 1): (1) deciding to resist the desire, (2) modifying the perception of the degree of risk or harm caused by behavior and/or re-evaluating outcomes expectancies, and (3) creating or activating CHBs. For example, when faced with the temptation to drink, an individual may resist the desire to drink by simply not drinking (strategy 1). On the other hand, that same individual may choose to reevaluate their beliefs about the harm caused by drinking such as thinking that having one too many drinks is not so harmful (strategy 2). Lastly, an individual faced with the temptation to drink can plan to compensate for their drinking by engaging in a healthy behavior later, most likely by behavior they already engage in on a regular basis such as exercising or eating a healthy diet (strategy 3). Thus, Rabiau and colleagues (2006) suggest that by engaging in cognitive strategies (strategies 1 and 2) people who drink may justify their behavior and consequently perceive lower cognitive dissonance.
The first strategy, deciding to resist the desire and give in to the temptation, is classified as a behavioral strategy, whereas the other two are cognitive strategies (Rabiau, Knäuper, & Miquelon, 2006). The behavioral strategy involves making the decision that one will not give in to the temptation and therefore this action reduces the motivational conflict, as one did not engage in an unhealthy behavior. The first conflict resolution cognitive strategy is to adapt the outcome expectancies about the temptation or to re-evaluating the risk/harm of indulging in the temptation (Giner-Sorolla, 2001). It has been demonstrated that risk perception and outcome expectancy are two of the major cognitions involved in the formation of goals (Schwarzer, 1999). Thus, modifying either one of these cognitions or both will reduce the motivational conflict such that once a person no longer believes that the behavior is harmful or once they are less concerned about the negative health effects impacting them in particular, they may engage in the desired behavior freely-guilt free (Rabiau, Knäuper, Miquelon, 2006). The third conflict resolution strategy is creating or activating CHBs. By activating CHBs it becomes possible to indulge in the desired behavior (e.g., drinking) without experiencing motivational conflict. Rabiu and colleagues (2006) also propose that if one already indulged in the desired behavior, CHBs can relieve possible arising feelings of discomfort.

The Role of Self-Efficacy on Compensatory Health Beliefs

The importance of self-efficacy has been demonstrated for initiating and persistence in general behavior. Bandura (1977) suggested that efficacy beliefs are the product of complex cognitive processing of different sources of efficacy information including performance mastery experiences, vicarious experiences, verbal persuasion and physiological states or arousal. Accordingly, self-efficacy evaluations are hypothesized to mediate all behavior change by influencing motivation, information processing, effort and effective action. Self-efficacy as it
relates to various diverse health behaviors such as exercise/diet, smoking, and drug use has also been investigated.

Self-efficacy is crucial for action to occur and can impact different stages of the CHB model differently (see Fig. 1; Rabiau, Knäuper, & Miquelon, 2006). As previously mentioned, self-efficacy can have an influence on the goals that people set for themselves. Once the motivation conflict is in motion, self-efficacy may impact whether an individual will be able to resist the desire or instead, give in and resort to a cognitive strategy (e.g., changing their beliefs of risk perception and outcome expectancy). The creation and execution of a CHB plan is also highly influenced by self-efficacy such that if self-efficacy is low concerning the compensatory behavior, there is little chance an individual will perform the behavior as they lack the confidence necessary to be able to execute the behavior. Accordingly, not performing the compensatory behavior may lower an individual’s self-efficacy, which reinforces the negative cycle between low self-efficacy and not implementing the compensatory behavior. In contrast, when self-efficacy is high, it is predicted that an individual will complete the compensatory behavior. Moreover, once the compensatory behavior is executed and achieved, this may in turn strengthen the individual’s sense of self-efficacy (Knäuper, Rabiau, Cohen, & Patriciu, 2004; Rabiau, Knäuper, & Miquelon, 2006).

**Empirical Support for the Compensatory Health Belief Model**

To measure the construct of CHBs, Knäuper, Rabiau, Cohen, and Patriciu (2004) developed and validated a psychometric scale to measure individual differences in using CHBs. A factor analysis yielded a scale of 17 items with four subscales (substance use $\alpha = .74$, eating/sleeping habits $\alpha = .66$, stress $\alpha = .63$, and weight regulation $\alpha = .57$) explaining 51.02% of the total variance. The CHB scale demonstrated strong psychometric properties with good
internal consistency (α = .80), and high stability as measured by test–retest reliability at the 4.5–5-month interval (rtt α = .75, p < .0001). The CHB scale demonstrated convergent validity with health self-efficacy such that CHB scores were negatively correlated with health-related self-efficacy. More specifically, participants with high scores on the CHB scale displayed lower self-efficacy toward preventive nutrition (r = -0.19, p = 0.05) and alcohol resistance (r = -.20, p < .05). Moreover, the personality factor ‘conscientiousness’ as measured with the NEO Five-Factor Inventory (NEO-FFI) further supported convergent validity of the CHB scale (r = -0.19, p < .05). In other words, less conscientious participants had higher CHB scores. The personality sub-dimension of conscientiousness is assessed due to the fact that this sub-dimension includes thoughtfulness, with good impulse control, and goal-directed behaviors. The CHB scale also showed high-discriminant validity by demonstrating that holding CHBs was not related to the tendency to procrastinate (r = 0.10, p > 0.05). Knäuper and colleagues (2006) state that this is due to the fact that procrastination should mostly matter for carrying through with the planned compensatory behavior but not for holding CHBs. The CHB scale further demonstrated high-discriminant validity with all other measures of personality such as extraversion, openness, agreeableness, and neuroticism, procrastination, health locus of control, and importantly, with social desirability.

After the development of the CHB scale, the use of CHBs has been applied to investigating mainly dietary behaviors. For example, Miquelon, Knäuper, and Vallerand (2012) explored the relationship between CHBs and diet adherence. Results indicated that participants who were engaging in a diet for more autonomous reasons was associated with a lower endorsement of dieting CHBs. In turn, participants who held more dieting CHBs was associated to lower adherence to self-set dieting rules 2 months later, which, itself, negatively predicted
weight-loss success. Researchers have also found that holding CHBs and forming compensatory intentions are predictive of caloric intake in dieters such that higher calorie intake is associated with higher levels of CHBs (Kronick, Auerbach, Stich & Knäuper, 2011). Additionally, Kronick and Knäuper (2010) found that dieters who score high in CHBs are more likely to indulge in a high calorie cookie than those who score low in CHBs.

CHBs have also been demonstrated in the context of clinical populations. Tăut and Băban (2008) examined the use of CHB in patients with heart disease. Their results indicated that CHBs are linked to unhealthy eating choices. More specifically, CHBs were used more often by patients who failed to plan for unexpected situations in which they had to make dietary choices and by patients who were not as deeply concerned about the outcomes of their nutritional choices. Moreover, their results showed that individuals who had self-efficacy to meet their specific health goals were less likely to engage in CHB or were more likely to complete the compensatory behavior following the activation of CHB (Tăut & Băban, 2008).

**Adapted Compensatory Health Belief Scales**

Per the recommendation of the Knäuper et al. (2004) and Rabiau et al. (2006) to explore the applicability of CHBs as they relate to other health behaviors some have found the need to adapt the original CHB scale created by Knäuper and colleagues (2004) and or develop new CHB scales to better assess other health specific behaviors. For example, Rabiau, Knäuper, Nguyen, Sufrategui, and Polychronakos (2009) developed a CHB scale related to diabetes treatment adherence. Their glucose testing CHBs scale showed high internal reliability (Cronbach’s α = 0.81). Their results indicated that adolescents with type I diabetes who more frequently held CHB related to keeping track of their blood sugar had a greater difficulty adhering to their treatment plans. Moreover, this finding held true even for adolescents who were
knowledgeable about diabetes and its potential health consequences.

The CHB scale has also been adapted to investigate how CHBs are used in diet-related behaviors. Poelman Vermeer, Vyth, and Steenhuis (2012) developed and validated a scale to assess diet-related compensation beliefs. Results indicated that the diet-related compensatory belief scale consisted of the hypothesized factors of compensation beliefs with regard to portion sizes ($\alpha = .73$), front-of-package health logos ($\alpha = .77$) and exercise ($\alpha = .75$). The scale demonstrated to have high internal consistency (Cronbach’s $\alpha = .82$). The Diet-CHBS had a Pearson correlation of 0.32 with the original CHB scale (Knäuper et al., 2004), signifying satisfactory convergent validity. Moreover, the Diet-CHBs demonstrated adequate test-retest reliability ($r = .69$).

The CHB scale has also been culturally adapted. deNooijer, Puijk-Hekman, and van Assema (2009), attempted to adapt the CHB scale for use in the Netherland by translating the 17-item CHB scale. Their aim was to assess the following: (1) whether the words in the items had semantic equivalency, (2) whether expressions or terms were difficult to translate (idiomatic equivalence), (3) whether translations were feasible for the target situation, and (4) whether there was conceptual equivalence—meaning between concepts. For example, deNooijer, Puijk-Hekman, and van Assema (2009), note that one of the words that was discussed was the English word ‘diet’. The Dutch translation is ‘dieet’, which in the Dutch language and culture this term refers to a period of low-calorie intake to lose weight. However, this term can also be used to describe a person’s dietary pattern in general. Once there was consensus on the translation of the items as they relate to the Dutch culture, the CHB scale was tested among 145 Dutch students. While they found low internal consistency among the four subscales (substance use, eating/sleeping habits, stress and weight regulation), the overall adapted CHB scale
demonstrated high internal consistency (Cronbach’s α = 0.78). Additionally, results indicated good test-retest reliability (r = 0.82), suggesting the existence of an underlying construct, and good stability of measuring CHBs, respectively (deNooijer, Puijk-Hekman, & van Assema, 2009).

**The applicability of the CHB model to investigate addictive behaviors**

Notably, the CHB scale has also been adapted to investigate addictive behaviors such as smoking. Radtke, Scholz, Keller, Knäuper, and Hornung (2011) discuss how the CHB model may provide an explanation for smokers’ difficulty to engage in smoking cessation such that when smokers are faced with the temptation of smoking, a conflict between their desire to smoke and their knowledge about the maladaptive effects of smoking could arise. Radtke and colleagues (2011) further explain how feelings of ambivalence among smokers may arise because of the conflict between their desire to smoke and their goals to stay healthy and stop smoking to protect their own health. Thus, the question arises as to which strategies smokers apply to cope with such cognitive dissonance. Radtke and colleagues (2011) concluded that using CHBs, as one strategy to resolve a state of dissonance, could help alleviate such discomfort. However, consequently tobacco use might increase and the motivation to stop smoking might decline. Therefore, the use of CHBs may be an obstructive factor for smoking interventions in adolescence.

In order to investigate this question, Radtke and colleagues (2011) developed and validated a smoking-specific CHB scale for adolescent smokers. Their rationale for developing a smoking specific CHB scale was that general CHB scale developed by Knäuper and colleagues (2004), which measures CHBs in general, might not be suitable for the investigation of smoking behavior in particular. The smoking-specific CHB scale is comprised of 13 items. Each item was
scored on a scale of 1 (strongly disagree) to 5 (strongly agree). Examples items of this scale include “Smoking can be compensated for by physical activity, “It is alright to smoke if one takes in enough vitamins,” and “It is alright to smoke when going out as long as one smokes less or not at all the next day.” An exploratory factor analysis including 244 participants revealed that the smoking-specific CHB scale had three-factor structure. The first factor, labeled as ‘exercise’ reflected the belief that engaging in physical exercise can compensate for the negative health effects of smoking. The second factor labeled ‘food and drink’ reflected the belief that the negative health effects may be neutralized by eating healthy or by reducing alcohol consumption. The third factor labeled ‘amount of smoking’ reflected the belief that a reduction in the number of cigarettes smoked would compensate for the negative health consequences of smoking. The smoking-specific CHB scale demonstrated strong psychometric properties with good internal consistency ($\alpha = .80$), and high stability as measured by test–retest reliability ($r_{tt} \alpha = .71$). The internal consistency of the subscales ranged from .71 to .78. Convergent validity of the smoking-specific CHB scale was observed with a significant positive relationship between the general CHB scale and the smoking-specific CHB scale, which demonstrated support for convergent validity. Moreover, smoking-specific CHBs showed a significant negative relationship with the smoking-specific self-efficacy. Additionally, smoking-specific CHBs were negatively correlated with the personality dimension of conscientiousness. In other words, adolescents with higher scores on the smoking-specific CHBs or the general CHB scale were less conscientious.

Results indicated that personality dimensions such as neuroticism, openness, and agreeableness did not correlate with the smoking-specific CHBs and the general CHBs, thus providing support for divergent validity. Contrary to their predictions, the personality dimension
of extraversion was found to be significantly negatively correlated to the smoking-specific CHBs. Lastly, as hypothesized, the smoking-specific CHBs and the general CHBs were not correlated with procrastination. Furthermore, results indicated that smokers displayed higher smoking-specific CHB scores than non-smokers. On the other hand, smokers and non-smokers did not differ with regard to the general CHBs. Furthermore, no gender differences were found between male and female smokers with regard to smoking-specific CHBs. Notably, results showed that smoking- specific CHBs impacted the smokers’ readiness to quit. More specifically, it was shown that the more that smokers engaged in CHBs, the less ready and willing they were to stop smoking. In other words, the adolescent smokers were convincing themselves that they were compensating for smoking with other behaviors, which in turn influenced the continuation of the unhealthy smoking behavior.

**Rationale for Developing a Drinking-Specific CHB Measure**

Currently, CHBs have not been fully investigated in detail regarding drinking among adults, although Knäuper, Rabiau, Cohen, and Patriciu (2004) suggested that CHBs should be investigated for behaviors that people are ambivalent about. Ambivalence is conceptualized as an internal conflict caused by holding opposing cognitions (e.g., I enjoy the buzzed feeling I get from drinking, however, I dislike the hangover I feel in the morning). Ambivalence can exist in degrees that increase or decrease with time as an individual struggles with the experience of dissonant and conflicting motivations (Miller & Rollnick, 2002). Drinking is such a behavior that has shown to be associated with ambivalence. For example, it has been demonstrated that many individuals who engage in alcohol misuse experience ambivalence toward alcohol (Cameron Cameron, Stritzke, Durkin, 2003; Conner, Povey, Sparks, James, & Shepherd, 2002; Graham, 2003; Miller & Rollnick, 2002).
Understanding beliefs can aid the development and evaluation of interventions. More specifically, alcohol prevention programs can be developed to shape people’s beliefs or make them aware about the ineffectual consequences of compensation behavior in reaction to alcohol use. Thus, following the approach from Radtke and colleagues (2011) who believed that the general CHB scale developed by Knäuper and colleagues (2004), which measures CHBs in general, might not be suitable for the investigation of smoking behavior in particular, we believe an additional advancement in the field of health, specifically alcohol use, could lie in assessing CHBs with regard to drinking behaviors with a drinking-specific CHBs scale.

**Utilizing Amazon’s Mechanical Turk (M-Turk) Workers in Alcohol Use Research**

M-Turk is an online crowdsourcing tool that allows “workers” to access and complete online tasks or “human intelligence tasks” for relatively small amounts of money. During the past several years, M-Turk has become a popular data collection source for both experimental and survey-based social science research. As M-Turk’s popularity continues to grow, researchers have expressed their concerns about the external validity of the inferences made using M-Turk samples (Huff & Tingley, 2015). However, it has been shown that Mechanical Turk can provide high-quality data at least as reliable as what could be obtained through traditional recruitment methods, with significantly more diversity than the average college sample commonly used in psychological research studies (Buhrmester, Kwang, & Gosling 2011; Ramsey, Thompson, McKenzie, & Rosenbaum, 2016). Notably, several studies have recently examined alcohol use using M-Turk samples. All studies have yielded positive and reliable results (Boynton & Richman, 2014; Hershberger, Karyadi, VanderVeen, & Cyders, 2016, Kim & Hodgins, 2017). Thus, M-Turk shows promise as a recruitment tool for alcohol use research.
**Overview of Present Study**

Currently, the applicability of the Compensatory Health Beliefs (CHBs) model and drinking behaviors is not well understood. Therefore, the proposed research sought to investigate the applicability of the CHB model in drinking behaviors. More specifically, the overarching goal for this study was to develop and validate a Drinking-Specific Compensatory Health Beliefs (CHB) Scale among adults between the ages of 18 and 29 living in the United States. This study had three phases. The Institutional Review Board (IRB) at the University of Texas at El Paso approved all three phases.

In phase one the aim was to develop a Drinking-Specific Compensatory Health Beliefs (CHB) Scale. It was hypothesized that the Drinking-Specific CHBs Scale would be comprised of five different factors (physical activity, healthy diet, amount of alcohol consumed in future, no other use of drugs, and rest). In phase two, the objective was to confirm the factor pattern solution observed in phase one by using a different sample. The goal for phase three was to validate the Drinking-Specific CHBs Scale. More specifically, convergent and discriminant validity were assessed. Phase three had five main hypotheses. First, endorsement of Drinking-Specific CHBs would be negatively associated with drinking refusal self-efficacy (convergent validity). Second, Drinking-Specific CHBs Scale would be positively correlated with substance use CHB subscale (Convergent validity). Third, Drinking-Specific CHBs Scale would be negatively correlated with positive outcome expectancies subscale on the Alcohol Outcome Expectancies Scale (convergent validity. Additionally, the Drinking-Specific CHBs Scale would be positively correlated with negative outcome expectancies subscale on the Alcohol Outcome Expectancies Scale. Fourth, the association between the Protective Behavioral Strategies Scale (PBSS-20) and the Drinking-Specific CHBs Scale would be low and negative (discriminant validity). Lastly, drinkers and non-drinkers would endorse the use of Drinking-Specific CHBs.
differently such that drinkers would have a higher endorsement of Drinking-Specific CHBs compared to abstainers (discriminant validity).
Phase 1. Developing the Drinking-Specific CHBs Scale: Conducting Exploratory Factor Analysis

The aim of phase 1 was to develop a measure that would assess drinking-specific compensatory health beliefs among adults between the ages of 18 and 29 in the US. The age range was selected because although alcohol misuse is reported throughout the lifespan, it has been shown that it is more common in younger adults ages 18-34 (Centers for Disease and Prevention, 2017). According to the 2015 National Survey on Drug Use and Health (NSDUH), 39% of persons ages 18-25 reported binge drinking in the past month and 10.9% reported heavy alcohol use in the past month. Furthermore, 38.3% of individuals ages 26-34 reported binge drinking in the past month and 9.7% reported heavy alcohol use in the past month (SAMHSA, 2015). Given this, it was decided that the best age group to target would be those between the ages of 18 to 29.

Method

Power Analysis

A power analysis was performed for sample size estimation for all three phases. The power analysis was conducted using sample size estimation for RMSEA test of not-close fit (Preacher & Coffman, 2006). The power analysis was tested with degrees of freedom = 51, power = .85, and α= .05. Results from the power analysis indicated that the projected sample size needed for a RMSEA test of not-close fit was approximately N = 288. This sample size is adequate for the main objective of this study, which was to develop and validate a Drinking-Specific CHBs Scale among adults between the ages of 18 to 29.

Participants

Participants were 341 undergraduate psychology students, who were recruited via Sona Systems, which is the participant recruitment software used by the University of Texas at El
Paso’s Psychology department. This software allows participants to sign up for the studies for which they are interested, in exchange for course credit. Of these 341, 48 were excluded from the data analyses for the following reasons:

a) Eight cases were removed because they were over the age of 29.

b) Thirty-three cases did not meet the criteria for having consumed at least one alcoholic beverage in the past 30 days.

c) Six cases were excluded for the following reasons: completion of survey time was less than 10 minutes or participants had too many missing data points.

d) One participant asked for their data to be excluded from all analyses.

Data from the remaining 293 participants were analyzed in phase 1. The mean age of these 293 participants was 20.09 years, $SD=2.264$, with 71.7% being females, and 90.8% self-identified as Hispanic/Latino. Additional demographic information is provided in Table 1.

**Materials**

**Drinking-Specific Compensatory Health Belief Scale.** This scale was administered to all participants. The measure included a pool of 41 items and five careless-responding questions. The content of the 41 items reflected five proposed factors were intended to assess people’s beliefs regarding the use of compensatory health beliefs in relation to drinking alcohol. The pool of items were created by performing the following steps described below.

First, we identified, reviewed, and examined existing questionnaires that assess compensatory health beliefs related to other health behaviors (Knäuper, Rabiau, Cohen, & Patriciu, 2004; Radtke, Scholz, Keller, Knäuper, & Hornung, 2011; Poelman Vermeer, Vyth, & Steenhuis, 2012; Rabiau, Knäuper, Nguyen, Sufrategui, & Polychronakos, 2009) and derived relevant factors that could be assessed in the Drinking-Specific Compensatory Health Belief Scale.
Scale. Second, we discussed possible items with members of an alcohol and health disparities laboratory and asked them for their expertise about what healthy behavior individuals may engaged in to compensate for their drinking. Next, items were written for each hypothesized factor (described in detail below). Lastly, items were reviewed by the members of an alcohol and health disparities laboratory and were revised accordingly to the feedback provided.

At the end of this process, the generated items were used to create the Drinking-Specific Compensatory Health Belief Scale. The items of the Drinking-Specific Compensatory Health Belief Scale are listed in Appendix A. Participants were asked to rate all items on a 7-point Likert type scale where 1 (strongly disagree) to 7 (strongly agree). Higher scores indicate holding more compensatory health beliefs in relation to drinking too much. The following paragraphs provide greater detail about the five factors that the 41 items of the Drinking-Specific Compensatory Health Belief Scale were intended to measure. Note that all items were written to convey engaging in at-risk drinking without being explicit. Terms such as drinking over the limit, drinking too many drinks, and drinking more than you planned were used.

**Factor One.** The factor of ‘physical activity’ was hypothesized to assess people’s beliefs that engaging in physical activity could reduce the negative effects of alcohol use. Example items: “The effects of regularly drinking alcohol can be compensated by going to the gym regularly.”

**Factor Two.** The factor of ‘healthy diet’ was hypothesized to measure people’s beliefs that engaging in healthy eating could counteract for the effects of consuming more alcohol than they planned. Example items: “You can eat fruits and vegetables to compensate for the effects of drinking excessively.”


**Factor Three.** The factor of ‘amount of alcohol consumed in future’ was hypothesized to assess people’s beliefs that the amount of alcohol consumed could compensate for the negative effects of alcohol use. Example items: “Drinking a lot is not bad for you as long as you abstain from drinking for a while afterwards.”

**Factor Four.** The factor of ‘no consumption of other drugs’ was hypothesized to measure individuals’ beliefs that not consuming other substances could balance out the effects of drinking too much. Example item: “The effects of drinking too much can be neutralized by staying away from caffeine the next day.”

**Factor Five.** The factor of ‘rest and relaxation’ was hypothesized to assess individuals’ beliefs that resting/relaxing could neutralize the effect of consuming more alcohol than intended. Example item: “The effects of having more drinks than you planned can be neutralized by sleeping more hours.”

**Procedure**

The study was administered online using Qualtrics systems, which is an online survey system that allows researchers to create surveys and questionnaires to collect data online. Participants consented to participate in this study. Following the informed consent, participants completed the Drinking-Specific Compensatory Health Belief Scale and demographic information. Upon completion of survey, participants were debriefed and compensated for their time with course credit. The average completion time of phase one was on average 20 minutes.

**Results**

**Exploratory Factor Analysis of the Drinking-Specific Compensatory Health Belief Scale**

An exploratory factor analysis (EFA) was conducted using IBM SPSS Statistics 22 (2013) with maximum likelihood estimation and varimax rotation. This rotation was used since it
provided the best defined factor structure. A visual inspection of the scree plot indicated the presence of a single factor. Given that the items were intended to reflect a five-factor solution, a Parallel Analysis (PA) was conducted. The PA is a method introduced by Horn (1965) as a way for determining the number of factors to retain from a factor analysis. By using this procedure, eigenvalues from a data set are compared with those from a matrix of random values of the same dimensionality (Franklin, Gibson, Robertson, Pohlmann, & Fralish, 1995). The EFA’s eigenvalues from the data that are greater than PA eigenvalues from the corresponding random data represent the number of factors that can be retained.

The PA was conducted using a software developed by Patil, Surendra, Mishra, and Donovan (2007). After comparing the eigenvalues (see Table 2), results indicated that the hypothesized a five factor solution should be retained. However, a visual inspection of the different factors showed that the items for ‘healthy diet’ had significant loadings greater than .05 in multiple factors. Thus, it was decided that the ‘healthy diet’ items should be removed. After removing these items, a second EFA was calculated using the remaining 22 items. Similarly to the first EFA, a visual inspection of the scree plot indicated that only one factor should be retained. Thus, a second PA was conducted to assess the number of factors that should be retained based on the comparison of eigenvalues. After comparing the eigenvalues, results indicated that four factors should be retained (Table 3). All items in this analysis had primary loadings over 0.50 in just one factor. The four factors explained 47% of the variance (see Table 4).

The first factor, which accounted for 13% of the common variance after rotation, was labeled ‘no consumption of other drugs’. Agreement with these items means respondents perceived not consuming other drugs such as cigarettes or caffeine as one strategy to compensate
for drinking too much alcohol. The second factor, accounting for 13% of the variance, was labeled ‘amount of alcohol consumed in future’. The four items connote the participants’ belief that a reduction in the consumption of alcohol in the future (i.e., next day) would compensate for health consequences of drinking more than intended. The third factor, accounting for 12% of the variance, was labeled ‘physical activity’. Its three items reflected respondents’ belief that engaging in physical activity could counteract the effects of drinking too much. Lastly, the fourth factor, accounting for 9% of the common variance was labeled ‘rest ’ Agreement with these three items means respondents perceived that resting (i.e. sleeping or sleeping in ) could neutralize the effects of drinking too many drinks.

**Internal Reliability of Drinking-Specific Compensatory Health Belief Scale**

All Cronbach reliability analyses were conducted using IBM SPSS Statistics 22 (2013). Following Hunsley and Mash’s (2008) recommendations on standards for evaluating the internal reliability of psychological scales, coefficient alpha values greater than .90 are considered excellent; values between .80-.89 are considered good; values between .70-.79 are considered adequate; and values below .70 are considered inadequate. The internal reliability of the Drinking-Specific Compensatory Health Belief Scale was $\alpha = .872$. Moreover, the internal reliabilities of the subscales are as follows: physical activity ($\alpha = .734$), amount of alcohol consumed in future ($\alpha = .783$), not using other substances ($\alpha = .829$), and rest ($\alpha = .781$). According to the Hunsley and Mash (2008) standards, all scales had good to adequate reliability.
Phase 2. Developing the Drinking-Specific CHBs Scale: Conducting a Confirmatory Factor Analysis on M-Turk Sample

The aim of phase two was to confirm the four-factor model found in phase one by using a different sample of adults between the ages of 18 to 29 living in the United States. Additionally, model fit indices and reliability estimates were assessed.

**METHOD**

**Participants**

Participants were 323 M-Turk workers, who were recruited via Amazon Mechanical Turk (M-Turk). M-Turk is an online system in which allows researchers to pay small amounts of money for workers to complete tasks. Of these 323, 51 were excluded from the data analyses for the following reasons:

a) Ten participants did not meet the age requirement. They indicated being over the age of 29.

b) Nine participants did not meet the criteria for having consumed at least one alcoholic beverage in the past 30 days.

c) Twenty-one cases were excluded because their completion time was too fast (e.g., less than 10 minutes), or they had too much missing data.

d) Eleven participants indicated they were currently not college students.

Data from the remaining 272 participants were analyzed in phase 2. The mean age of these 293 participants was 24.05 years, $SD= 2.92$, with 42.6% being females, and 74.6% self-identified as Non-Hispanic white. Additional demographic information is provided in Table 5.
Materials

**Drinking-Specific Compensatory Health Belief Scale.** This scale was administered to all participants. The measure consists of 13 items all rated on a 7-point Likert type scale where 1 (*strongly disagree*) to 7 (*strongly agree*). A higher score indicates greater frequency of CHBs in relation to drinking too much. Sample items include “You can cancel the effects of drinking over the limit by going to the gym regularly,” and “Drinking a lot is not bad for you as long as you abstain from drinking for a while afterwards.” This measure can be found in Appendix B.

Procedure

To participate in the present study, participants had to be registered as an M-Turk ‘worker’ and voluntarily respond to the study posting on the M-Turk website. At the beginning of the study, each participant was asked preliminary questions. These questions were designed to determine whether the participant met the inclusion criteria for the study which were the following: (a) be between the ages of 18 to 29 (b) currently a college student, (c) must have consumed at least one alcoholic beverage (i.e., beer, wine, cocktail, etc) in the past 30 days, and (d) be residing in the United States. Participants who met these criteria were directed to the informed consent form. Once informed consent was provided participants completed a survey containing the Drinking-Specific Compensatory Health Belief Scale and demographic information. At the end of the study, participants were debriefed, thanked for their participation, and paid $0.40, which was directly deposited to their Amazon account. Total completion time of the study was on average 15 minutes.

**Results**

**Confirmatory Factor Analysis of Drinking-Specific Compensatory Health Belief Scale**

Confirmatory Factor Analysis (CFA) was used to examine model fit for the four-factor structure of the Drinking-Specific CHBs Scale demonstrated in phase one. The CFA was
conducted using Mplus 7.11 (Muthén & Muthén, 1998–2013) with maximum likelihood estimation with robust standard errors that accounts for missing data (MLR). Across the items, no item had more than 1% of missing responses. The first factor loading for each of the four latent variables was fixed to one and the associations between all four latent variables were estimated. Model fit was assessed using the following fit indices: Chi-Square Test ($X^2$), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Standardized Root Mean Square Residual (SRMR). Assessing model fit is necessary since this allows us to understand how well the proposed model reflects the underlying theory. A fit index is used to quantify the degree of fit along a continuum. Fit indexes are classified into two categories: absolute and incremental fit indexes (for a review see Hu & Bentler, 1999). According to Crowley and Fan (1997), there are no golden rules for assessing model fit, however, it is important to report a variety of indices because different indices reflect a different aspect of model fit. In the last decade, researchers have strongly advocated for the use of the Chi-Square test, the RMSEA, the CFI and the SRMR (Boomsma, 2000; Kline, 2005). According to Hooper, Coughlan, and Mullen (2008), these indices were selected over other indices since these indices have demonstrated to be the most insensitive to sample size, model misspecification and parameter estimates. The results from the CFA were $X^2$ (59) = 91.806, $p$ = 0.0040; TLI = 0.965; RMSEA = 0.045, 90% CI (.026, .063); CFI = 0.973, and SRMR = 0.041 (See Tables 6 and 7). Following the recommendations from Hu and Bentler’s (1999) indices of model fit, TLI $\geq$ 0.95, RMSEA $\leq$ 0.06, CFI $\geq$ 0.90, and SRMR $\leq$ 0.08, results indicated that the model displayed adequate model fit.

**Internal Reliability and intercorrelations of Drinking-Specific Compensatory Health Belief Scale**

The inter-correlations of the Drinking-Specific CHBs are displayed in Table 8.
Furthermore, all Cronbach reliability analyses were conducted using IBM SPSS Statistics 22 (2013). The reliability estimates for each factor in the model were assessed using McDonald’s omega (ω) and Cronbach’s alpha (α). The reliability estimates for the four factors were as follows: physical activity ω=0.749 and α = .849, amount of alcohol consumed in future ω=0.733 and α = .791, not using other substances ω=0.748 and α = .795, and rest ω=0.725 and α = .828, C.I. 95%. According to the Hunsley and Mash (2008) standards, all scales had good to adequate reliability.
Phase 3. Assessing Construct Validity of the Drinking-Specific CHBs Scale

The aim of phase three was to assess convergent and discriminant validity of the Drinking-Specific CHBs Scale by examining its relationship with other measures described in detail below.

**METHOD**

**Participants**

Participants were 338 M-Turk workers, who were recruited via Amazon Mechanical Turk (M-Turk). M-Turk is an online system in which allows researchers to pay small amounts of money for workers to complete tasks. Of these 338, 54 were excluded from the data analyses for the following reasons:

a) Twenty-eight participants did not meet the age requirement. They were over the age of 29.

b) Thirteen cases were remove because completion time was under 10 minutes and/or had too much missing data points.

c) Thirteen participants indicated they were currently not college students.

Data from the remaining 279 participants were analyzed in phase 3. The mean age of these 279 participants was 24.70 years, \(SD=2.82\), with 45.5% being females, and 68.7% self-identified as Non-Hispanic white. Additional demographic information is provided in Table 9.

**Materials**

**Drinking-Specific Compensatory Health Belief Scale.** This scale was administered to all participants. The measure consists of 13 items all rated on a 7-point Likert type scale where 1 (*strongly disagree*) to 7 (*strongly agree*). A higher score indicates greater frequency of CHBs in relation to drinking too much. Sample items include “You can cancel the effects of drinking over the limit by going to the gym regularly,” and “Drinking a lot is not bad for you as long as
you abstain from drinking for a while afterwards.” The full DCHBs demonstrated good reliability ($\alpha = .915$). The coefficient alphas of the four subscales: physical activity ($\alpha = .862$), amount of alcohol consumed in future ($\alpha = .822$), no other drugs consumed ($\alpha = .881$), and rest ($\alpha = .884$) also displayed good internal reliabilities. This scale can be found in Appendix B.

**Compensatory Health Belief Substance Use Subscale.** The Compensatory Health Belief scale (Knäuper, Rabiau, Cohen, & Patriciu, 2004) consists of 17 items. The scale includes four areas where CHBs may be used: substance use (i.e., alcohol, nicotine, and caffeine), eating and sleeping habits, stress, and weight regulation. For purposes of this study, only the substance use CHB sub-scale will be administered to participants. The substance use subscale consists of 6 items rated 1 (*totally disagree*) to 5 (*totally agree*). Sample questions for substance abuse are “Exercising can compensate for smoking” and “Not drinking alcohol during the week can make up for the effects of drinking too much alcohol during the weekend.” A higher score indicates greater frequency of CHBs related to that area of life. The substance use CHB sub-scale had adequate reliability ($\alpha = .789$). This scale can be found in Appendix C.

**Drinking Refusal Self-Efficacy Questionnaire — Revised (DRSEQ-R).** This measure assesses a person's belief in their ability to resist alcohol will be assessed by the 19-item Drinking Refusal Self-Efficacy Questionnaire — Revised (Oei, Hasking, & Young, 2005). Items are assessed from 1 (*very sure I could not resist*) to 6 (*very sure I could resist*). These items assess the participants' ability to refuse alcohol in a variety of situations such that higher scores reflect a greater perceived ability to refuse. This questionnaire includes three subscales: social pressure (5 items), opportunistic (7 items), and emotional relief (7 items). “How sure are you that you could resist drinking alcohol when you are at a party?” is a sample item of social pressure. A sample item of opportunistic is “How sure are you that you could resist drinking
alcohol when you are watching TV?”, and a sample item of emotional relief is “How sure are you that you could resist drinking alcohol when you are angry?”). The coefficient alphas of the three subscales—social pressure ($\alpha = .896$), opportunistic ($\alpha = .941$), and emotional relief ($\alpha = .957$) all demonstrated high internal reliability. This measure can be found in Appendix D.

**Alcohol Outcome Expectancies Scale (AOES).** The Alcohol Outcome Expectancies Scale (Leigh & Stacy, 1993) is a 34-item measure developed to assess alcohol expectancies. This measure was designed to address limitations of previous alcohol expectancies measures. The AOES measures positive and negative alcohol expectancies and consists of two factors, positive and negative alcohol effects. Each factor has four sub-categories; the positive factor includes: social facilitation, fun, sex, and tension reduction. The negative factor includes: social performance, emotions, physical, and cognitive performance. The measure is scored using a 6-point likelihood scale with 1 (*no chance*) to 6 (*certain to happen*). Participants are asked to rate how likely the consequences listed are to take place if they drank alcohol. The AOES has demonstrated good test-retest reliability, discriminant and convergent validity. Sample items include “When I drink alcohol I am more accepted socially?” “When I drink alcohol I become clumsy or uncoordinated?” The coefficient alphas of the two subscales in the present study—positive alcohol outcome expectancies subscale ($\alpha = .930$) and negative alcohol outcome expectancies subscale ($\alpha = .883$) had good to adequate reliability. The AOES can be found in Appendix E.

**Protective Behavioral Strategies (PBS).** The Protective Behavioral Strategies Scale-20 (PBSS-20: Treloar, Martens, & McCarthy, 2015) was used to assess frequency of engagement in PBS related to alcohol use. The PBSS-20 consists of three subscales: Stopping/Limiting Drinking (S/LD, 7 items; e.g., “Alternate alcoholic and nonalcoholic drinks”), Manner of

29
Drinking (MOD, 5 items; “Avoid drinking games”), and Serious Harm Reduction (SHR, 8 items; e.g., “Use a designated driver”). Each item is responded to on a 6-point Likert-type scale ranging from 1 (Never) to 6 (Always). The coefficient alphas of the three subscales for the present study - S/LD ($\alpha = .844$), MOD ($\alpha = .809$), and SHR ($\alpha = .834$) all displayed good internal validity.

**AUDIT.** The Alcohol Use Disorders Identification Test (AUDIT; Barbor, La Fuente, Junior, & Grant, 1992) is a 10-item screening tool developed by the World Health Organization (WHO) to measure alcohol consumption, drinking behaviors, and alcohol-related problems. Each item ranges from 0-4. Total score ranges from 0-40. A score of 1-7 is considered low-risk. A score of 8 or more is considered to indicate hazardous or harmful alcohol use. The AUDIT has been validated across genders and in a wide range of racial/ethnic groups. A sample items include “How often during the past year have you had a feeling of guilt or remorse after drinking?” and “How often during the past year days have you found that you were not able to stop drinking once you had started?. Please note that for the purposes of the present study, all items were change to reflect a different time frame. Participants were asked to answer AUDIT items based on the past 3 months. The AUDIT can be found in Appendix F.

**Procedure**

Similar to phase two, to participate in the present study, participants had to be registered as an M-Turk ‘worker’ and voluntarily respond to the study posting on the M-Turk website. At the beginning of the study, each participant was asked preliminary questions. These questions were designed to determine whether the participant met the inclusion criteria for the study which were the following: (a) be between the ages of 18 to 29 and (b) currently a college student, and (c) residing in the United States. Participants who met these criteria were directed to the informed consent form. Once informed consent was provided participants completed a survey.
containing the following measures: Drinking-Specific Compensatory Health Belief Scale, Compensatory Health Belief Substance Use subscale, Drinking Refusal Self-Efficacy Questionnaire — Revised (DRSEQ-R), Alcohol Outcome Expectancies Scale (AOES), and AUDIT. Demographic and drinking information was also collected. All scales were randomized using the UTEP’s Qualtrics survey system. The order of the administration of the scales was also counterbalanced. A skip pattern was also incorporated to allow abstainers to only respond to the appropriate scales. Upon completion, participants were debriefed, thanked for their participation, and paid $0.60, which was directly deposited to their Amazon account. Total completion of the study was approximately 20-32 minutes.

RESULTS
For the analyses presented in this section, participants who scored 20+ on the AUDIT (n=18) were removed since this category is classified as ‘probable alcohol dependence’. Similarly, those who received a 0 on the AUDIT (n =39) were also removed since this group is classified as ‘abstainers. Both of these groups were removed because this measure was not intended for use with people who may have an alcohol use disorder or for people who abstain from drinking alcohol. However, abstainers were only included in the comparison between drinkers and abstainers regarding mean differences in the Drinking-Specific CHBs Scale. The remaining 222 participants had scores ranging from 1-19, indicating that these individuals were ‘low-risk drinkers’ (n =139) and ‘high-risk drinkers’ (n=83).

Confirmatory Factor Analysis of Drinking-Specific Compensatory Health Belief Scale
Confirmatory Factor Analysis (CFA) was used to examine model fit for the four-factor structure of the DCHBs demonstrated in phase two. The CFA was conducted using Mplus 7.11 (Muthén & Muthén, 1998–2013) with maximum likelihood estimation with robust standard
errors that accounts for missing data (MLR). Across the items, no item had more than 1% of missing responses. The first factor loading for each of the four latent variables was fixed to one and the associations between all four latent variables were estimated. Model fit was assessed using the same fit indices used in Phase 2: Chi-Squared Test ($\chi^2$), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Standardized Root Mean Square Residual (SRMR). The results obtained were $\chi^2 (59) = 76.972$, $p = 0.0581$; TLI = 0.981; RMSEA = 0.037, 90% CI (.000, .059); CFI = 0.985, and SRMR = 0.043 (See Tables 10 and 11). Following the recommendations from Hu and Bentler’s (1999) indices of model fit, TLI ≥ 0.95, RMSEA ≤ 0.06, CFI ≥ 0.90, and SRMR ≤ 0.08, results demonstrated that the model in Phase 3 displayed adequate model fit.

**Basic Descriptive Statistics, Intercorrelations, and Internal Reliability of Drinking-Specific Compensatory Health Belief Scale**

The inter-correlations of the Drinking-Specific CHBs factors are displayed in Table 12. Moreover, inter-correlations of the Drinking-Specific CHB scale with the other scales in this phase are reported in Table 13. Basic descriptive statistics of all scales, including mean and standard deviation are also reported in Table 13. The reliability estimates for each factor in the model were assessed using McDonald’s omega ($\omega$) and Cronbach’s alpha ($\alpha$). The reliability estimates for the four factors are as follows: physical activity $\omega=0.817$ and $\alpha = 862$, amount of alcohol consumed in future $\omega=0.757$ and $\alpha = 822$, not other drugs consumed $\omega=0.758$ and $\alpha = .881$, and rest $\omega=0.786$ and $\alpha = 884$. Based on Hunsley and Mash (2008) standards (described in previous section), all scales demonstrated good reliability.

**Convergent Validity of the Drinking-Specific Compensatory Health Beliefs Scale**

The results of the correlation analysis (conducted in IBM SPSS 22) displayed a significant positive relationship between the Drinking-Specific CHBs Scale and the substance
use subscale from the original CHBs scale \( r (222) = 0.703, p < .001 \), indicating that participants had high endorsement of CHBs in both scales assessing a similar construct. The Drinking-Specific CHBs showed a significant negative relationship with drinking refusal self-efficacy. Participants with lower scores on the CHB scale showed higher self-efficacy in social pressure drinking \( r (220) = -0.381, p < .001 \), emotional relief drinking \( r (220) = -0.470, p < .001 \), and opportunistic drinking \( r(222) = -0.523, p < .001 \). There was a negative correlation between Drinking-Specific CHBs scale and the positive alcohol outcome expectancies subscale however, the relationship was not statistically significant \( r(222) = -0.089 p = .189 \). Similarly, the relationship between the Drinking-Specific CHB and the negative alcohol outcome expectancies subscale was also negative and not statistically significant \( r(222) = -0.017, p = .799 \).

**Discriminant Validity the Drinking-Specific Compensatory Health Beliefs Scale**

The results of the correlation analysis (conducted in IBM SPSS 22) displayed significant small to moderate negative relationships between Drinking-Specific CHBs scale and the use of two protective behavioral strategies for alcohol use. Participants with higher scores on the Drinking-Specific CHBs Scale had lower scores in serious hard reduction \( r (220) = -0.372, p < .001 \) and manner of drinking \( r (220) = -0.209, p = .002 \) behaviors. The Drinking-Specific CHBs scale was unrelated to limiting/stopping drinking \( r (220) = -0.097, p = 0.153 \).

A comparison between drinkers and abstainers regarding differences in drinking-specific CHBs scores was conducted doing an independent samples t-test. There was a significant difference in the drinking-specific CHBs scores for abstainers \( M=2.897, SD=1.402 \) and drinkers \( M=3.408, SD=1.264 \); \( t (49.46) = -2.127, p = .038 \). A further examination, revealed that there was a statistically significant difference between AUDIT groups (i.e., abstainers, low-risk drinkers, high-risk drinkers, and probable alcohol dependence) on the endorsement of drinking-
specific CHBs, as determined by one-way ANOVA ($F$ (3, 275) = 22.108, $p > .001$; see Table 14). Post-hoc analyses were conducted given the statistically significant omnibus ANOVA F test. Specifically, Sidak-Bonferroni tests were conducted on all possible pairwise contrasts. Results indicate that abstainers’ scores ($M = 2.90, SD = 1.402$) significantly differed from high-risk drinkers ($M = 4.12, SD = 1.173$) and probable alcohol dependence drinkers’ scores ($M = 4.26, SD = .868$), but did not differ from low-risk drinkers ($M = 2.983, SD = 1.173$) scores. Low-risk drinkers’ scores ($M = 2.983, SD = 1.173$) also significantly differed from drinkers ($M = 4.12, SD = 1.173$) and probable alcohol dependence drinkers ($M = 4.26, SD = .868$) scores. There was no statistical difference in the scores of high-risk drinkers and probable alcohol dependence drinkers (see Table 15).
Discussion

The aim of the present study was to investigate the applicability of the CHB model in relation to drinking. More specifically, the objective was to develop and validate a Drinking-Specific CHBs Scale in adults between the ages of 18 and 29 living in the United States. In phase one the aim was to develop a Drinking-Specific CHBs Scale. It was hypothesized that the Drinking-Specific CHBs Scale would be comprised of five different factors (i.e. physical activity, healthy diet, amount of alcohol consumed in future, no other use of drugs, and rest). The hypothesis of phase one was not supported. The five-factor structure was not attainable. However, a four-factor structure was obtained using maximum likelihood estimation and varimax rotation. The four factors explained 47% of the variance. Below is a description of the four factors.

The factor of ‘physical activity’ consists of three items that are related to people’s beliefs that engaging in physical activity can reduce the effects of drinking too much. Example item: “The effects of regularly drinking alcohol can be compensated by going to the gym regularly.”

The factor of ‘amount of alcohol consumed in future’ consists of four items that are related to people’s beliefs that the amount of alcohol consumed in the future can make up for the effects of drinking more than planned. Example items: “Drinking a lot is not bad for you as long as you abstain from drinking for a while afterwards.”

The factor of ‘no consumption of other drugs’ consists of three items that relate to individuals’ beliefs of not consuming other drugs such as cigarettes or caffeine as a strategy to compensate for drinking too much alcohol. Example item: “The effects of drinking too much can be neutralized by staying away from caffeine the next day.”

The factor of ‘rest’ consists of three items that are related to individuals’ beliefs that resting could neutralize the effects of consuming more alcohol than intended. Example item: “The effects of having more drinks than you planned can be neutralized by sleeping more hours.”
In phase two, the objective was to confirm the factor pattern solution observed in phase one in a different sample. The results of the Confirmatory Factor Analysis (CFA) revealed that the four factor model had adequate model fit indices. Additionally, the reliability estimates indicated that the four factors had good to adequate reliabilities.

The goal for phase three was to validate the Drinking-Specific CHBs Scale. More specifically, convergent and discriminant validity were assessed. There were five hypotheses related to assessing validity of the Drinking-Specific CHBs Scale. First, it was hypothesized that endorsement of Drinking-Specific CHBs would be negatively associated with drinking refusal self-efficacy (convergent validity). Second, Drinking-Specific CHBs Scale would be positively correlated with substance use CHB sub-scale (convergent validity). Third, Drinking-Specific CHBs Scale would be negatively correlated with positive outcome expectancies subscale on the Alcohol Outcome Expectancies Scale, whereas the Drinking-Specific CHBs Scale would be positively correlated with negative outcome expectancies subscale on the Alcohol Outcome Expectancies Scale (convergent validity). Fourth, the Protective Behavioral Strategies Scale (PBSS-20) and the Drinking-Specific CHBs Scale would not be correlated (discriminant validity). Lastly, drinkers and non-drinkers would endorse the use of Drinking-Specific CHBs differently such that drinkers would have a higher endorsement of Drinking-Specific CHBs compared to abstainers (discriminant validity).

Two out of the three hypotheses related to convergent validity were supported. As expected, there was a significant positive relationship between Drinking-Specific CHBs Scale and the substance use CHB subscale, indicating that participants displayed high endorsement of CHBs related to both alcohol and other substance use. The second hypothesis was also supported. Drinking-Specific CHBs showed a significant negative relationship with all three
drinking refusal self-efficacy subscales such that participants with lower scores on the CHB scale scored higher in self-efficacy related to social pressure drinking, emotional relief drinking, and opportunistic drinking. The third hypothesis was partially supported. As expected, the Drinking-Specific CHBs scale was negatively correlated with the positive alcohol outcome expectancies subscale; however statistical significance was not achieved. Contrary to expectations, the Drinking-Specific CHBs scale was negatively related to negative alcohol outcome expectancies subscale; however this relationship was also not statistically significant.

The hypotheses related to discriminant validity were partially supported. Contrary to expectations, results indicated that there was a relationship between the Drinking-Specific CHBs scale and the use of protective two behavioral strategies for alcohol. These relationships were significant small to moderate negative relationships, indicating that participants with higher scores on the Drinking-Specific CHBs scale had lower scores in serious hard reduction and manner of drinking. Limiting/stopping drinking was the only subscale that was unrelated to the Drinking-Specific CHBs Scale. Moreover, a comparison between drinkers’ and abstainers’ drinking-specific CHBs scores found that there was a significant difference between the scores of these two groups. Thus, providing support for the hypothesis that the endorsement of drinking-specific CHBs would be higher among drinkers than non-drinkers.

Further analyses with all AUDIT categories revealed that the drinking-specific CHBs scores of high-risk drinkers and probable alcohol dependence drinkers did not differ statistically. However, abstainers’ scores significantly differed from high-risk drinkers’ and probable alcohol dependence drinkers’ scores but did not differ from low-risk drinkers’ scores. Similarly, low-risk drinkers’ scores significantly differed from high-risk drinkers and probable alcohol
dependence drinkers’ scores. Therefore, these results suggest that the Drinking-Specific CHBs scale may be able to differentiate between different types of drinkers.

It is important to note that the results of the present study are congruent with what has been observed in previous studies. For example, Knäuper, et al. (2004) who developed the original CHBs scale and Radtke et al., (2011) who developed the smoking-specific CHB scale found that self-efficacy played a significant role in the use of CHBs. More specifically, they found that self-efficacy was negatively correlated with the endorsement of CHBs such that participants with high scores on their CHBs scales displayed lower self-efficacy toward preventive nutrition, alcohol resistance, and smoking. Radtke et al., (2011) also found that endorsement of smoking-specific CHBs was dependent on smoking status. More specifically, their results revealed that smokers had higher smoking-specific CHB scores than non-smokers. Notably, present results also found that endorsement of drinking-specific CHBs were dependent of drinking-status such that drinkers had higher Drinking-Specific CHBs scores than non-drinkers.

The results of present study are also in line with the results of recent studies that have investigated the use of CHBs and alcohol use. For example, Abrantes, Scalco, O’Donnell, Minani, and Read (2017) found a positive association between alcohol and exercise among college students, indicating that participants reported exercising to compensate for calories of alcohol consumption. Abrantes and colleagues (2017) also observed that participants who reported exercising more tended to drink less and individuals who exercised more during the week tended to have declines in weekend drinking over time. Furthermore, Matley and Davies (2017) recently examined the relationship between alcohol specific compensatory health beliefs (ACH-Beliefs) and behaviors (ACH-Behaviors), alcohol consumption and alcohol specific self-
efficacy (ASE). Their results demonstrated that there was a positive relationship between ACH-Beliefs and ACH-Behaviors. Both of these predicted alcohol consumption among the participants; however, alcohol specific self-efficacy was shown to mediate this relationship. The authors concluded that those with higher alcohol specific self-efficacy might be better equipped to regulate drinking behavior. These results all provide support for the importance of investigating the applicability of the CHB model in alcohol use. More importantly, these findings including those of the present study all warrant the need for more research related to CHBs and other addictive behaviors.
Conclusion

The present study provides a unique contribution to the field of alcohol research and our understanding of the cognitive processes involved when we apply the use of CHBs to drinking. Much of the literature on compensatory health beliefs has focused primarily on diet and smoking. Thus, the present study is one of the first to investigate the use of compensatory health belief model in relation to alcohol use; however, the present study had several limitations worth noting.

First, data was collected online using M-Turk, which did not allow for the direct observation of participants while they completed the study. There was evidence that some participants completed the study in an unrealistically short period of time, indicating that they may have not answered questions carefully. To address this, participants who completed the study in a very short period of time were excluded from data analyses. Importantly, studies have shown that online data collection can provide useful and reliable data (Paolacci, Chandler, & Ipeirotis, 2010; Buhrmester, Kwang & Gosling, 2011; Ramsey, Thompson, McKenzie, & Rosenbaum, 2016).

A second limitation was that inability after multiple attempts of obtaining the hypothesized five-factor analytic solution, it was decided that the ‘healthy diet’ items would be removed. Healthy diet was hypothesized as a factor because Radtke et al., (2011) found that it was related to smoking-specific CHBs. However, it may be possible that this factor is not as relevant to drinking for two reasons. First, many individuals may believe that consuming food is not a way to compensate for their drinking but rather a strategy to prevent over-drinking or a way to sober up. Second, the consumption of alcohol involves consuming calories, whereas, smoking is an appetite suppressant; thus, eating healthy may be more relevant to smoking.

A third limitation is regarding validity issues. More specifically, discriminant validity
was not fully achieved. The PBSS-20 was chosen due to its nature of measuring actual behaviors individuals engage in to reduce alcohol use and its associated consequences. In contrast, the Drinking-Specific CHBs Scale’s aim was to assess people’s beliefs about engaging in behaviors to compensate for their alcohol use. It may be possible, however, that it was not clear to respondents that the Drinking-Specific CHBs Scale was measuring beliefs.

A fourth limitation present in this study was the drinking criteria for phases 1 and two. For these two phases, participants were asked to answer if they had consumed at least one alcoholic beverage in the past 30 days. As previously noted, this resulted in the participants of many who are non-drinkers. These participants were excluded from the study. To remedy this flaw, in phase 3 it was decided that participants would complete drinking screening tool (e.g., AUDIT) and drinking questions to confirm their drinking status.

Lastly, the Drinking-Specific CHB Scale was only tested on a sample of participants residing in the United States; therefore, generalizability to other societies is limited due to potential cultural differences in how drinking is viewed along with possible differences in cognitive processes involved when we apply the use of CHBs to drinking.

CHBs allow people the best of both worlds, namely, to indulge their temptations such as drinking while working toward their health goals (e.g., staying healthy). Notably, by investigating the role CHBs in different behaviors, we are changing our understanding of health behaviors, such that we are looking at them from a different perspective. The present study found adequate psychometric properties for the Drinking-Specific CHBs scale. Future studies, however, may want to re-examine the discriminant validity of the Drinking-Specific CHBs scale by selecting a different measure than PBSS-20 as well as administering the Drinking-Specific CHBs scale to more non-drinkers.
Establishing predictive validity would also be an important next step. Radtke at el. (2011) found that smoking-CHBs were related to readiness to quit smoking. More specifically, high endorsement of smoking-CHBs was impacting the smokers’ readiness to quit such that smokers were convincing themselves that they were compensating for smoking with other healthy behaviors, which in turn influenced the continuation of the unhealthy behavior (i.e. smoking). The use of drinking-specific CHBs may also serve as a predictor of readiness to quit in relation to alcohol. If this relationship is detected, this may serve as a tool for interventions. For example, results of present study indicate that both low-risk and high–risk drinkers believed that it is possible for one to compensate for the effects of drinking too much by engaging in healthy behaviors. Therefore, as suggested by Matley and Davies (2017), interventions aimed at reducing alcohol use may want to consider the potential roles that compensatory beliefs and compensatory behaviors play in facilitating maladaptive coping strategies, and how addressing these cognitive processes may reduce harm.

Lastly, the association between Drinking-Specific CHBs and health outcomes may be worth exploring. Knauper and colleagues (2004) suggested that CHBs might contribute to negative health outcomes such that one can use compensatory health beliefs to reduce motivational conflict; however, doing so does not always result in one completing the compensatory health behavior that was outlined in the compensatory health belief. An initial outcomes of interest that would be important to assess is alcohol-related problems since it has been demonstrated that people who engage in alcohol misuse often report experiencing more alcohol-related problems. Thus, learning about the relationship may further our understanding of how we can tailor interventions so we can best be suited to help individuals who use drinking-specific CHBs improve their health outcomes and make better future health choices. Importantly,
expanding the work in this thesis would make a contribution to the field of alcohol research and may help us gain a better understanding of how the use of cognitive processes such as CHBs may be contributing to the existing health disparities.
References


introduction to assessments that work. In J. Hunsley & E. J. Mash (Eds.), A guide to assessments that work (pp. 3-14). New York: Oxford University Press.


Appendix A

Drinking-Specific Compensatory Health Belief Scale Developed for Phase One

Instructions:

Different people believe different things about their health. Below is a list of beliefs that someone might have about staying healthy. Please read each sentence carefully and tell us how much you agree or disagree with each statement by selecting: Totally disagree; Somewhat disagree; Neither agree nor disagree; Somewhat agree; or Totally agree. Remember that there are no right or wrong answers, because everybody believes different things.

1. You can exercise the day after to cancel the effects of having extra drinks.
2. The effects of drinking too much can be neutralized by exercising regularly every week.
3. No amount of exercise can make up for drinking a lot.
4. You can cancel out the effects of drinking over the limit by going to the gym regularly.
5. Staying physically active can make up for the effects of drinking too much.
6. Drinking more than normal is fine if you work out.
7. The effects of drinking a lot can be canceled out by going on a hike the next day.
8. Drinking excessively is not bad if you have a regular active lifestyle.
9. The effects of drinking more than normal can be reduced by going for a run the day after.
10. Longer workouts are a way to even out the effects of drinking a lot.
11. Taking vitamin supplements can counteract the effects of drinking more than usual
12. Eating healthy regularly does not undo the effects of drinking too much.
13. You can eat fruits and vegetables to compensate for the effects of drinking excessively.
14. You can avoid eating a poor diet to balance out the effects of having too many drinks.
15. As long as you follow a balanced diet, drinking more than normal is all right.
16. Drinking a glass of water right before bed can offset the effects of too many drinks.
17. Drinking water after a night of drinking can counterbalance the effects of drinking over the limit.
18. No amount of water can flush out the effects of drinking more than you planned.
19. Drinking once in a blue moon can cancel out the effects of drinking more than normal.
20. You can compensate for the effects of drinking over the limit during the weekend by not drinking at all during the week.
21. Drinking a lot is not bad for you as long as you abstain from drinking for a while afterwards.
22. No amount of time can undo the effects of drinking excessively during the weekend.
23. You can drink more than you planned as long as you don’t drink at all the next day.
24. You can have extra drinks as long as you drink less the next day.
25. Having more drinks than you planned is fine if you don’t do it that often.
26. Drinking excessively is not bad for you if you don’t smoke.
27. Smoking less marijuana can neutralize the effects of drinking a great deal.
28. Drinking less coffee can balance the effects of too many drinks.
29. Smoking less cigarettes does not counterbalance the effects of drinking more than you planned.
30. Drinking over your limit is not bad for you if you don’t use illicit drugs.
31. If you’re not a smoker, drinking over the limit is not bad for you.
32. As long as you don’t smoke, it’s okay to drink more than you planned.
33. The effects of drinking too much can be neutralized by staying away from caffeine the next day.
34. Following a detox plan can undo the effects of drinking too much.
35. Sleeping in can help balance out the effects of drinking over the limit.
36. You can neutralize the effects of too many drinks by resting.
37. Meditation can cancel the effects of drinking over and above.
38. You can do a cleanse to reverse the effects of drinking more than normal.

39. The effects of having more drinks than you planned can be neutralized by sleeping more hours.

40. No amount of rest can undo the effects of drinking too much.

41. You can drink less energy drinks to balance out the effects of drinking over
Appendix B

Drinking-Specific Compensatory Health Belief Scale Used in Phases 2 and 3

Instructions:

Different people believe different things about their health. Below is a list of beliefs that someone might have about staying healthy. Please read each sentence carefully and tell us how much you agree or disagree with each statement by selecting: Totally disagree; Somewhat disagree; Neither agree nor disagree; Somewhat agree; or Totally agree. Remember that there are no right or wrong answers, because everybody believes different things.

1 Strongly Disagree 2 3 4 5 6 7 Strongly Agree

1. You can exercise the day after to cancel the effects of having extra drinks.
2. The effects of drinking too much can be neutralized by exercising regularly every week.
3. You can cancel out the effects of drinking over the limit by going to the gym regularly.
4. Drinking a lot is not bad for you as long as you abstain from drinking for a while afterwards.
5. You can drink more than you planned as long as you don’t drink at all the next day.
6. You can have extra drinks as long as you drink less the next day.
7. Having more drinks than you planned is fine if you don’t do it that often.
8. If you’re not a smoker, drinking over the limit is not bad for you.
9. As long as you don’t smoke, it’s okay to drink more than you planned.
10. The effects of drinking too much can be neutralized by staying away from caffeine the next day.
11. Sleeping in can help balance out the effects of drinking over the limit.
12. You can neutralize the effects of too many drinks by resting.
13. The effects of having more drinks than you planned can be neutralized by sleeping more hours.
Appendix C

Compensatory Health Beliefs Scale

(Knäuper, Rabiau, Cohen, & Patriciu, 2004)

Instructions:
Different people believe different things about their health. Below is a list of beliefs that someone might have about staying healthy. Please read each sentence carefully and tell us how much you agree or disagree with each statement by selecting: Totally disagree; Somewhat disagree; Neither agree nor disagree; Somewhat agree; or Totally agree. Remember that there are no right or wrong answers, because everybody believes different things.

1. Exercising can compensate for smoking.
2. Not drinking alcohol during the week can make up for the effects of drinking too much alcohol during the weekend.
3. Eating healthy can make up for the effects of regularly drinking alcohol.
4. The effects of drinking coffee can be balanced by drinking equal amounts of water.
5. It is all right to drink a lot of alcohol as long as one drinks lots of water to flush it.
6. Smoking from time to time is OK if one eats healthy.
Appendix D

Drinking Refusal Self-Efficacy Questionnaire — Revised
(Oei, Hasking, & Young, 2005)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very sure I could NOT resist</td>
<td>Very sure I could resist</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How sure are you that you could resist drinking alcohol when you are…

1. When I am out to dinner?
2. When someone offers me a drink?
3. When my spouse or partner is drinking?
4. When my friends are drinking?
5. When I am at a pub or club?
6. When I am angry?
7. When I feel frustrated?
8. When I am worried?
9. When I feel upset?
10. When I feel down?
11. When I feel nervous?
12. When I feel sad?
13. When I am watching T.V.?
14. When I am at lunch?
15. When I am on the way home from work?
16. When I am listening to music or reading?
17. When I am by myself?
18. When I have just finished playing a sport?
19. When I first arrive home?
Appendix E

Alcohol Outcome Expectancies Scale (AOES)
(Leigh & Stacy, 1993)

Instructions:

Here is a list of some effects or consequences that some people experience after drinking alcohol. How likely is it that these things happen to you when you drink alcohol? Please select the number that best describes how drinking alcohol would affect you.

(If you do not drink at all, you can still complete the measure: Just answer it according to what you think would happen to you if you did drink.)

When I drink alcohol:
How Likely is it that this would happen?

1. I am more accepted socially
2. I become more aggressive
3. I am less alert
4. I feel ashamed of myself
5. I enjoy the buzz
6. I become clumsy or uncoordinated
7. I feel good
8. I get into fights
9. I can’t concentrate
10. I have a good time
11. I have problems driving
12. I feel guilty
13. I get a hangover
14. I feel happy
15. I get a headache
16. I am more sexually assertive
17. It is fun
18. I get mean
19. I have problems with memory and concentration
20. I am more outgoing
21. It takes away my negative moods and feelings
22. I have more desire for sex
23. It is easier for me to socialize
24. I feel pleasant physical effects
25. I am more sexually responsive
26. I feel more sociable
27. I feel sad or depressed
28. I am able to talk more freely
29. I become more sexually active
30. I feel sick
31. I feel less stressed
32. I am friendlier
33. I experience unpleasant physical effects
34. I am able to take my mind off my problems
## Appendix F

AUDIT

World Health Organization (WHO)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Scoring system</th>
<th>Your score</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you have a drink containing alcohol?</td>
<td>Never</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Monthly or less</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2 - 4 times per month</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2 - 3 times per week</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4+ times per week</td>
<td>4</td>
</tr>
<tr>
<td>How many units of alcohol do you drink on a typical day when you are drinking?</td>
<td>1 - 2, 3 - 4, 5 - 6, 7 - 9, 10+</td>
<td>0</td>
</tr>
<tr>
<td>How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?</td>
<td>Never, Less than monthly, Monthly, Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>How often during the last year have you found that you were not able to stop drinking once you had started?</td>
<td>Never, Less than monthly, Monthly, Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>How often during the last year have you failed to do what was normally expected from you because of your drinking?</td>
<td>Never, Less than monthly, Monthly, Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>How often during the last year have you needed an alcoholic drink in the morning to get yourself going after a heavy drinking session?</td>
<td>Never, Less than monthly, Monthly, Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>How often during the last year have you had a feeling of guilt or remorse after drinking?</td>
<td>Never, Less than monthly, Monthly, Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>How often during the last year have you been unable to remember what happened the night before because you had been drinking?</td>
<td>Never, Less than monthly, Monthly, Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>Have you or somebody else been injured as a result of your drinking?</td>
<td>No</td>
<td>Yes, but not in the last year</td>
</tr>
<tr>
<td>Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested that you cut down?</td>
<td>No</td>
<td>Yes, during the last year</td>
</tr>
</tbody>
</table>
Table 1: Demographic Information for Participants in Phase 1

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>82</td>
<td>28.0</td>
</tr>
<tr>
<td>Female</td>
<td>210</td>
<td>71.7</td>
</tr>
<tr>
<td>No Response</td>
<td>1</td>
<td>0.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic White</td>
<td>10</td>
<td>3.4</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>266</td>
<td>90.8</td>
</tr>
<tr>
<td>Black/African American</td>
<td>7</td>
<td>2.4</td>
</tr>
<tr>
<td>Asian American/Pacific Islander</td>
<td>7</td>
<td>2.4</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>0.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do you smoke?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39</td>
<td>13.3</td>
</tr>
<tr>
<td>No</td>
<td>254</td>
<td>86.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Place of birth</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>256</td>
<td>87.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>30</td>
<td>10.2</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>2.4</td>
</tr>
</tbody>
</table>
Table 2. First Comparison of Factor Analysis and Parallel Analysis Eigenvalues

<table>
<thead>
<tr>
<th>Component</th>
<th>FA eigenvalue</th>
<th>PA eigenvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13.618</td>
<td>1.899</td>
</tr>
<tr>
<td>2</td>
<td>2.188</td>
<td>1.751</td>
</tr>
<tr>
<td>3</td>
<td>2.061</td>
<td>1.694</td>
</tr>
<tr>
<td>4</td>
<td>1.829</td>
<td>1.628</td>
</tr>
<tr>
<td>5</td>
<td>1.534</td>
<td>1.569</td>
</tr>
<tr>
<td>6</td>
<td>1.316</td>
<td>1.508</td>
</tr>
<tr>
<td>7</td>
<td>1.179</td>
<td>1.461</td>
</tr>
<tr>
<td>8</td>
<td>1.090</td>
<td>1.420</td>
</tr>
</tbody>
</table>
Table 3. Second Comparison of Factor Analysis and Parallel Analysis Eigenvalues

<table>
<thead>
<tr>
<th>Component</th>
<th>FA eigenvalue</th>
<th>PA eigenvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8.161</td>
<td>1.514</td>
</tr>
<tr>
<td>2</td>
<td>1.813</td>
<td>1.424</td>
</tr>
<tr>
<td>3</td>
<td>1.456</td>
<td>1.361</td>
</tr>
<tr>
<td>4</td>
<td>1.321</td>
<td>1.305</td>
</tr>
<tr>
<td>5</td>
<td>1.070</td>
<td>1.254</td>
</tr>
<tr>
<td>6</td>
<td>.998</td>
<td>1.207</td>
</tr>
</tbody>
</table>
Table 4. Exploratory Factor Analysis with Varimax Rotation for the Drinking-Specific CHBs Scale in Phase 1 (Loadings Greater than .50 are in Bold Print). N = 293

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>You can exercise the day after to cancel the effects of having extra drinks.</td>
<td>.067</td>
<td>.189</td>
<td>.581</td>
<td>.057</td>
</tr>
<tr>
<td>The effects of drinking too much can be neutralized by exercising regularly every week.</td>
<td>.169</td>
<td>.174</td>
<td>.688</td>
<td>.184</td>
</tr>
<tr>
<td>You can cancel out the effects of drinking over the limit by going to the gym regularly.</td>
<td>.253</td>
<td>.185</td>
<td>.709</td>
<td>.134</td>
</tr>
<tr>
<td>Drinking once in a blue moon can cancel out the effects of drinking more than normal.</td>
<td>.176</td>
<td>.325</td>
<td>.329</td>
<td>-.116</td>
</tr>
<tr>
<td>You can compensate for the effects of drinking over the limit during the weekend by not drinking at all during the week.</td>
<td>.345</td>
<td>.301</td>
<td>.367</td>
<td>.220</td>
</tr>
<tr>
<td>Drinking a lot is not bad for you as long as you abstain from drinking for a while afterwards.</td>
<td>.197</td>
<td>.533</td>
<td>.157</td>
<td>.148</td>
</tr>
<tr>
<td>You can drink more than you planned as long as you don’t drink at all the next day.</td>
<td>.376</td>
<td>.649</td>
<td>.179</td>
<td>.236</td>
</tr>
<tr>
<td>You can have extra drinks as long as you drink less the next day.</td>
<td>.396</td>
<td>.660</td>
<td>.203</td>
<td>.178</td>
</tr>
<tr>
<td>Having more drinks than you planned is fine if you don’t do it that often.</td>
<td>-.055</td>
<td>.575</td>
<td>.276</td>
<td>.154</td>
</tr>
<tr>
<td>Drinking excessively is not bad for you if you don’t smoke.</td>
<td>.445</td>
<td>.244</td>
<td>.246</td>
<td>.245</td>
</tr>
<tr>
<td>Smoking less marijuana can neutralize the effects of drinking a great deal.</td>
<td>.336</td>
<td>.015</td>
<td>.356</td>
<td>.253</td>
</tr>
<tr>
<td>Drinking less coffee can balance the effects of too many drinks.</td>
<td>.246</td>
<td>.271</td>
<td>.353</td>
<td>.159</td>
</tr>
<tr>
<td>Smoking less cigarettes does not counterbalance the effects of drinking more than you planned.</td>
<td>.209</td>
<td>-.072</td>
<td>.021</td>
<td>-.133</td>
</tr>
<tr>
<td>Drinking over your limit is not bad for you if you don’t use illicit drugs.</td>
<td>.480</td>
<td>-.072</td>
<td>.021</td>
<td>-.133</td>
</tr>
</tbody>
</table>
You can drink less energy drinks to balance out the effects of drinking over and above.  
If you’re not a smoker, drinking over the limit is not bad for you.  
As long as you don’t smoke, it’s okay to drink more than you planned.  
The effects of drinking too much can be neutralized by staying away from caffeine the next day.  
Following a detox plan can undo the effects of drinking too much.  
Sleeping in can help balance out the effects of drinking over the limit.  
You can neutralize the effects of too many drinks by resting.  
Meditation can cancel the effects of drinking over and above.  
The effects of having more drinks than you planned can be neutralized by sleeping more hours.
Table 5. Demographic Information for Participants in Phase 2

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>156</td>
<td>57.4</td>
</tr>
<tr>
<td>Female</td>
<td>116</td>
<td>42.6</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>203</td>
<td>74.6</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>25</td>
<td>9.2</td>
</tr>
<tr>
<td>Black/African American</td>
<td>15</td>
<td>5.5</td>
</tr>
<tr>
<td>Native American or American Indian</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>Asian American/Pacific Islander</td>
<td>26</td>
<td>9.6</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Do you smoke?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>86</td>
<td>31.6</td>
</tr>
<tr>
<td>No</td>
<td>186</td>
<td>68.4</td>
</tr>
<tr>
<td><strong>Place of birth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.</td>
<td>269</td>
<td>98.9</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>What type of college to you attend?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four-year university</td>
<td>203</td>
<td>74.6</td>
</tr>
<tr>
<td>Community college</td>
<td>69</td>
<td>25.4</td>
</tr>
</tbody>
</table>
Table 6. Factor Loadings and Unique Variances for Confirmatory Factor Analysis of the Drinking-Specific CHBs Scale in Phase 2

<table>
<thead>
<tr>
<th>Item</th>
<th>$\lambda$ (S.E.)</th>
<th>$\Psi^2$ (S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 1</td>
<td>1.000 (.000)</td>
<td>0.866 (.114)</td>
</tr>
<tr>
<td>Item 2</td>
<td>1.106 (.051)</td>
<td>0.846 (.136)</td>
</tr>
<tr>
<td>Item 3</td>
<td>0.913 (.055)</td>
<td>1.155 (.161)</td>
</tr>
<tr>
<td><strong>Amount of Alcohol</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 4</td>
<td>1.000 (.000)</td>
<td>1.404 (.180)</td>
</tr>
<tr>
<td>Item 5</td>
<td>1.133 (.074)</td>
<td>0.851 (.122)</td>
</tr>
<tr>
<td>Item 6</td>
<td>1.006 (.083)</td>
<td>1.006 (.134)</td>
</tr>
<tr>
<td>Item 7</td>
<td>0.643 (.083)</td>
<td>1.936 (.156)</td>
</tr>
<tr>
<td><strong>Other Drugs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 8</td>
<td>1.000 (.000)</td>
<td>1.093 (.221)</td>
</tr>
<tr>
<td>Item 9</td>
<td>1.049 (.077)</td>
<td>0.799 (.136)</td>
</tr>
<tr>
<td>Item 10</td>
<td>0.974 (.109)</td>
<td>1.183 (.185)</td>
</tr>
<tr>
<td><strong>Rest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 11</td>
<td>1.000 (.000)</td>
<td>1.101 (.185)</td>
</tr>
<tr>
<td>Item 12</td>
<td>0.907 (.071)</td>
<td>1.216 (.163)</td>
</tr>
<tr>
<td>Item 13</td>
<td>1.011 (.066)</td>
<td>0.909 (.142)</td>
</tr>
</tbody>
</table>
Table 7. Model fit for the Drinking-Specific CHBs Scale in Phase 2

<table>
<thead>
<tr>
<th>Index</th>
<th>Value</th>
<th>Model Fit Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square ($\chi^2$)</td>
<td>91.806</td>
<td>Good Fit</td>
</tr>
<tr>
<td>Degrees of freedom (df)</td>
<td>59</td>
<td>---------</td>
</tr>
<tr>
<td>Root-mean-square error of approximation (RMSEA)</td>
<td>0.045</td>
<td>Excellent Fit</td>
</tr>
<tr>
<td>Standardized RMR</td>
<td>0.041</td>
<td>Excellent Fit</td>
</tr>
<tr>
<td>Tucker–Lewis index (TLI)</td>
<td>0.965</td>
<td>Excellent Fit</td>
</tr>
<tr>
<td>Comparative fit index (CFI)</td>
<td>0.973</td>
<td>Excellent Fit</td>
</tr>
</tbody>
</table>
Table 8. Inter-correlations of Drinking-Specific CHBs Factors in Phase 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Physical Activity</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Amount of Alcohol</td>
<td>.735**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Other Drugs</td>
<td>.676*</td>
<td>.658**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Rest</td>
<td>.625**</td>
<td>.625**</td>
<td>.515**</td>
<td>-</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
Table 9. Demographic Information for Participants in Phase 3

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>152</td>
<td>54.5</td>
</tr>
<tr>
<td>Female</td>
<td>127</td>
<td>45.5</td>
</tr>
</tbody>
</table>

**Ethnicity**
- Non-Hispanic White: 191 (68.7)
- Hispanic/Latino: 27 (9.7)
- Black/African American: 31 (11.2)
- Native American or American Indian: 4 (1.4)
- Asian American/Pacific Islander: 18 (6.5)
- Other: 7 (2.5)

**Do you smoke?**
- Yes: 86 (31.6)
- No: 186 (68.4)

**Place of birth**
- U.S.: 270 (96.8)
- Other: 7 (2.5)
- Mexico: 2 (0.7)

**What type of college do you attend?**
- Four-year university: 222 (79.6)
- Community college: 57 (20.4)

**What best describes the location where you reside?**
- Urban: 133 (47.7)
- Suburbs: 90 (32.3)
- Rural: 56 (20.1)

**AUDIT Categories**
- Abstainers: 39 (14.0)
- Low-risk drinkers: 139 (49.8)
- High-risk drinkers: 83 (29.7)
- Probable alcohol dependence: 18 (6.5)
### Table 10. Factor Loadings and Unique Variances for Confirmatory Factor Analysis of the Drinking-Specific CHBs Scale in Phase 3

<table>
<thead>
<tr>
<th>Item</th>
<th>$\lambda$ (S.E.)</th>
<th>$\Psi^2$ (S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 1</td>
<td>1.000 (.000)</td>
<td>1.236 (.225)</td>
</tr>
<tr>
<td>Item 2</td>
<td>0.986 (.077)</td>
<td>1.324 (.254)</td>
</tr>
<tr>
<td>Item 3</td>
<td>1.108 (.071)</td>
<td>0.581 (.125)</td>
</tr>
<tr>
<td><strong>Amount of Alcohol</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 4</td>
<td>1.000 (.000)</td>
<td>1.596 (.200)</td>
</tr>
<tr>
<td>Item 5</td>
<td>1.196 (.100)</td>
<td>0.846 (.181)</td>
</tr>
<tr>
<td>Item 6</td>
<td>1.231 (.097)</td>
<td>0.635 (.117)</td>
</tr>
<tr>
<td>Item 7</td>
<td>0.636 (.096)</td>
<td>2.231 (.199)</td>
</tr>
<tr>
<td><strong>Other Drugs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 8</td>
<td>1.000 (.000)</td>
<td>0.782 (.182)</td>
</tr>
<tr>
<td>Item 9</td>
<td>1.000 (.053)</td>
<td>0.639 (.151)</td>
</tr>
<tr>
<td>Item 10</td>
<td>0.827 (.053)</td>
<td>1.126 (.172)</td>
</tr>
<tr>
<td><strong>Rest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 11</td>
<td>1.000 (.000)</td>
<td>1.479 (.241)</td>
</tr>
<tr>
<td>Item 12</td>
<td>1.130 (.080)</td>
<td>0.831 (.205)</td>
</tr>
<tr>
<td>Item 13</td>
<td>1.163 (.091)</td>
<td>0.651 (.212)</td>
</tr>
</tbody>
</table>
Table 11. Model fit for the Drinking-Specific CHBs Scale in Phase 3

<table>
<thead>
<tr>
<th>Index</th>
<th>Value</th>
<th>Model Fit Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square (χ²)</td>
<td>76.972</td>
<td>Good Fit</td>
</tr>
<tr>
<td>Degrees of freedom (df)</td>
<td>59</td>
<td>--------</td>
</tr>
<tr>
<td>Root-mean-square error of approximation (RMSEA)</td>
<td>0.037</td>
<td>Excellent Fit</td>
</tr>
<tr>
<td>Standardized RMR</td>
<td>0.043</td>
<td>Excellent Fit</td>
</tr>
<tr>
<td>Tucker–Lewis index (TLI)</td>
<td>0.981</td>
<td>Excellent Fit</td>
</tr>
<tr>
<td>Comparative fit index (CFI)</td>
<td>0.985</td>
<td>Excellent Fit</td>
</tr>
</tbody>
</table>
Table 12. Inter-correlations of Drinking-Specific CHBs Factors in Phase 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Physical Activity</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Amount of Alcohol</td>
<td>.625**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Other Drugs</td>
<td>.585*</td>
<td>.650**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Rest</td>
<td>.399**</td>
<td>.528**</td>
<td>.430**</td>
<td>-</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
### Table 13. Means, Standard Deviations, and Intercorrelations for all of the Study Variables in Phase 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DSCHBs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>44.27</td>
<td>16.43</td>
</tr>
<tr>
<td>2. OCHBs</td>
<td>.701**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20.69</td>
<td>7.98</td>
</tr>
<tr>
<td>3. AOES(+)</td>
<td>-.088</td>
<td>-.071</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>77.18</td>
<td>14.16</td>
</tr>
<tr>
<td>4. AOES (-)</td>
<td>-.020</td>
<td>-.036</td>
<td>.198**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>49.37</td>
<td>10.76</td>
</tr>
<tr>
<td>5. S/LD</td>
<td>-.097</td>
<td>-.125</td>
<td>-.225*</td>
<td>-.126</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>27.51</td>
<td>7.86</td>
</tr>
<tr>
<td>6. MOD</td>
<td>-.206**</td>
<td>-.181**</td>
<td>-.197**</td>
<td>-.214**</td>
<td>.619**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20.62</td>
<td>5.82</td>
</tr>
<tr>
<td>7. SHR</td>
<td>-.371**</td>
<td>-.306**</td>
<td>.064</td>
<td>-.091</td>
<td>.518**</td>
<td>.578*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>38.25</td>
<td>7.19</td>
</tr>
<tr>
<td>8. DRSEQ-SP</td>
<td>-.381**</td>
<td>-.363**</td>
<td>-.097</td>
<td>.129</td>
<td>.136**</td>
<td>.244*</td>
<td>.205**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>21.52</td>
<td>6.74</td>
</tr>
<tr>
<td>9. DRSEQ-ER</td>
<td>-.467**</td>
<td>-.412**</td>
<td>.077</td>
<td>.039</td>
<td>.096</td>
<td>.215*</td>
<td>.311**</td>
<td>.675**</td>
<td>-</td>
<td>-</td>
<td>32.78</td>
<td>9.37</td>
</tr>
<tr>
<td>10. DRSEQ-OP</td>
<td>-.523**</td>
<td>-.444**</td>
<td>.286</td>
<td>.104</td>
<td>.060</td>
<td>.141*</td>
<td>.391**</td>
<td>.588**</td>
<td>.708*</td>
<td>-</td>
<td>36.71</td>
<td>7.36</td>
</tr>
</tbody>
</table>

*Note.* *p < .05, *** *p < .001. DSCHBs= Drinking-Specific Compensatory Health Beliefs Scale; OCHBs= Substance use subscale from original Compensatory Health Beliefs Scale; AOES (+)= Alcohol Outcome Expectancies scale-positive subscale; AOES (-)= Alcohol Outcome Expectancies scale-negative subscale; S/LD = Stopping / Limiting Drinking subscale of the Protective Behavioral Strategies Scale-20; MOD = Manner of Drinking subscale of the Protective Behavioral Strategies Scale-20; SHR = Serious Harm Reduction subscale of the Protective Behavioral Strategies Scale-20; DRSEQ-SP= Social Pressure Drinking Refusal Self-Efficacy subscale from the Drinking Refusal Self-Efficacy Questionnaire-Revised; DRSEQ-ER= Emotional Relief Drinking Refusal Self-Efficacy subscale from the Drinking Refusal Self-Efficacy Questionnaire-Revised; DRSEQ-OP= Opportunistic Drinking Refusal Self-Efficacy subscale from the Drinking Refusal Self-Efficacy Questionnaire-Revised
Table 14. One-Way Analysis of Variance of Drinking-Specific CHBs by AUDIT Groups

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>3</td>
<td>30.054</td>
<td>22.108</td>
<td>.000**</td>
</tr>
<tr>
<td>Within groups</td>
<td>275</td>
<td>373.838</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>279</td>
<td>464.002</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.** p < .001
Table 15. Means and Standard Deviations for AUDIT Groups

<table>
<thead>
<tr>
<th>AUDIT Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstainers</td>
<td>39</td>
<td>2.90</td>
<td>1.402</td>
</tr>
<tr>
<td>Low-Risk Drinkers</td>
<td>139</td>
<td>2.98</td>
<td>1.173</td>
</tr>
<tr>
<td>High-Risk Drinkers</td>
<td>83</td>
<td>4.11</td>
<td>1.084</td>
</tr>
<tr>
<td>Probable Alcohol Dependence</td>
<td>18</td>
<td>4.26</td>
<td>0.868</td>
</tr>
</tbody>
</table>

Note: AUDIT scores are the following: Abstainers = 0; Low-Risk Drinkers = 1-7; High-Risk Drinkers = 8-19, and Probable Alcohol Dependence = 20+
Curriculum Vita

Sandra Leticia Oviedo Ramirez was born in León, Guanajuato, México. At the age of seven, she and her family migrated to San Diego County, California. Sandra received an Associate’s degree in Social Behavioral Sciences from Palomar College located in San Marcos, California. In Spring 2013, Sandra completed her Bachelor’s degree in Psychology at California State University San Marcos. As an undergraduate, Sandra was a Minority Access to Research Careers (MARC) Scholar. In fall 2013, she entered the doctoral program in Psychology at the University of Texas at El Paso (UTEP). Throughout her academic career at UTEP, she has worked as a graduate research assistant. Currently, she is an evaluator at the office of Research Evaluation and Assessment Services (REAS) directed by Dr. Guadalupe Corral. Sandra’s research interests are the following: 1) Examining the relationship between health and culture, 2) understanding how people modify their health behaviors, specifically related to diet, exercise, and substance use, and 3) developing culturally-adapted interventions to help address the existing health disparities among underrepresented minorities. Sandra is a co-author on a chapter titled “Systems Contexts for Designing Culturally Adapted Prevention Interventions” published in the 2017 Oxford Handbook of Acculturation and Health. Upon the completion of her PhD, Sandra would like to pursue an evaluator position at a non-profit organization whose aim is to assist research programs that focus on health promotion in order to improve individual and public health, welfare, and safety.

Contact Information: Sandra Leticia Oviedo Ramirez
sloviedoramirez@miners.utep.edu

This thesis was typed by Sandra Leticia Oviedo Ramirez