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# DEVELOPING A MEASURE OF AMBIVALENCE ABOUT DRINKING LESS ALCOHOL: PSYCHOMETRIC PROPERTIES AND CONSTRUCT VALIDITY

Samara Lloyd Rice

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**DEVELOPING A MEASURE OF AMBIVALENCE ABOUT DRINKING LESS  
ALCOHOL: PSYCHOMETRIC PROPERTIES AND CONSTRUCT VALIDITY**

By

**SAMARA LLOYD RICE**

B.A., Psychology, University of New Mexico, 2006  
M.S., Psychology, University of New Mexico, 2010

DISSERTATION

Submitted in Partial Fulfillment of the  
Requirements for the Degree of

**Doctor of Philosophy  
Psychology**

The University of New Mexico  
Albuquerque, New Mexico

**December 2013**

**DEDICATION**

This work is dedicated to everyone struggling with alcohol and all those affected by alcohol misuse. May we all one day enjoy healthy lives free from harm due to alcohol.

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**ABSTRACT**

The resolution of ambivalence is an appealing explanation of how at-risk drinkers make changes in their alcohol consumption; however, limited research about this potential mechanism of change exists due to the lack of a specific measure of ambivalence about drinking less alcohol. An initial item pool measuring ambivalence was assessed in two different samples of at-risk drinkers, undergraduate college students participating in the study for research participation credit ( $N_1 = 129$ ) and participants recruited from online sources ( $N_2 = 128$ ) using an online web survey. Three different methods of measuring ambivalence were tested: a double-barreled items method, a difference score method calculated from the sum of items measuring both motivation to change as well as motivation to maintain the status quo, and an Emotion items method. Exploratory Factor Analyses (EFAs) revealed a single factor structure for all three scales, and internally-consistent scales were formed from a subset of well-performing items based on item-scale and factor analytic results. Convergent and discriminant validity correlations were also examined. This study introduces the Change, Ambivalence, Sustain, and Emotion Scales (CASES) for eventual use in investigating if the resolution

of ambivalence is a mechanism of change in at-risk drinkers. Limitations and directions for future research are also discussed.

*Keywords:* alcohol, ambivalence, motivation, measure, instrument development, motivational interviewing



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## Introduction

Excessive drinking and alcohol use disorders cause significant harm both to the individual and to society. Alcohol consumption is a preventable risk factor responsible for approximately 3.8% of deaths worldwide (Rehm, Mathers, Popova, Thavorncharoensap, Teerawattananon, & Patra, 2009). Alcohol use disorders (AUD) are relatively widespread in the United States. It is estimated that the 12-month prevalence rate for alcohol abuse from 2001-2002 was 4.65%, and alcohol dependence had a rate of 3.81% during this same period (Grant, Dawson, Stinson, Chou, Dufour, & Pickering, 2006). It is also estimated that among US adults aged 18-29 years, 7.0% meet criteria for a diagnosis of alcohol abuse, and another 9.2% meet criteria for a diagnosis of alcohol dependence. Although college students have higher rates of alcohol dependence compared to non-college students, both groups have similar rates of alcohol abuse (Dawson, Grant, Stinson, & Chou, 2004).

Rates of treatment seeking are usually low. One study found that only 25% of U.S. adults meeting criteria for alcohol dependence sought treatment (Dawson, Grant, Stinson, Chou, Huang, & Ruan, 2005). Given that even binge drinking is a risk factor for and has an adverse effect on many chronic health conditions such as cardiovascular disease, diabetes, and cancer, efforts to decrease excessive alcohol consumption outside of traditional treatment settings are needed.

Recently AUD treatment researchers have recognized the need for knowledge about how exactly people make changes in their alcohol use behavior, instead of just assessing which treatments work but knowing little about the process (Longabaugh & Magill, 2011). Increased knowledge of patient mechanisms of change also has the

potential to reduce at-risk drinking in a non-treatment seeking population. It is likely that there are common processes that those who change their drinking outside of a formal treatment context (self-change) use which would generalize to the usually more severely impaired individuals who present for treatment. In fact, investigating patient self-change has been advocated as one of several necessary considerations for understanding how treatments for AUD work more generally (Morgenstern & McKay, 2007).

The resolution of ambivalence about reducing drinking has been identified as a potential explanation for how individuals make changes in their drinking (Miller & Rollnick, 2002). The assertion that the resolution of ambivalence about reducing drinking results in changes in alcohol use behavior has face validity, and it is also an often-repeated explanation for the success of motivational interviewing as a treatment for AUD. However, even though this explanation for the efficacy of motivational interviewing is often suggested, little empirical evidence exists (Longabaugh, 2007). Scientific investigations into how ambivalence manifests in problem drinkers, how it can be resolved, and how it can be used to predict and improve treatment rates as well as prevent relapse, have the potential to further our understanding of behavior change, if only we had an instrument to measure ambivalence well.

The purpose of this study was to continue to develop a quantitative, self-report measure of ambivalence about reducing alcohol use according to methods advocated by psychometricians. Research conducted prior to the current study has surveyed experts about the construct of ambivalence and how to best measure it, and pilot data on previous versions of the instrument have been collected in two different samples (Glynn & Moyers, 2010; Hallgren, Ladd, & Greenfield, 2013). The current study administered the

most recently revised version of the instrument (version 4.0, see Appendix A) to a sample large enough to collect reliable estimates of its psychometric properties and provide evidence of its construct validity for use in alcohol research. The ultimate goal of the current study is to publish the instrument so that it can be used in research about how ambivalence is involved in the change process. Specifically, the current study provided data for several statistical analyses including: exploratory and confirmatory factor analyses, reliability and item analyses which may suggest how to shorten the measure, and analyses to demonstrate the construct validity of the instrument for research about the treatment of AUD.

The observation that problem drinkers have ambivalent attitudes towards alcohol is pervasive in the psychological literature (Breiner, Stritzke, & Lang, 1999; Costello, Rice, and Schoenfeld, 1974; Houben & Wiers, 2006; Miller & Rollnick, 2002). In fact, not only do problem drinkers usually have mixed feelings towards alcohol, research has shown that individuals who are not problem drinkers usually do not hold completely positive attitudes towards alcohol either (de Visser & Smith, 2007). This finding has also been replicated with children aged 8-12 (Cameron, Stritzke, & Durkin, 2003).

### **Methods of measuring ambivalence**

The simultaneous presence of both positive and negative expectancies, feelings, and/or attitudes towards alcohol has been measured according to several different methods, such as the semantic differential technique, the attitudinal component technique, and questionnaires that measure potential ambivalence, felt ambivalence, and the approach and avoidance of alcohol consumption.

**Semantic differential technique.** Once Kaplan (1972) proposed that the method of measuring attitudes be changed to allow for the endorsement of both negative and positive attitudes towards an object simultaneously, research regarding ambivalence towards a variety of objects and behaviors flourished. Before the modification suggested by Kaplan, researchers usually measured attitudes using the semantic differential technique. The semantic differential technique is still widely used, and assumes that the evaluative space for assessing an attitude is bipolar, that is, that it is possible to feel only one way along a continuum of bad to good about an object or behavior. For example, subjects may be asked to rate their attitude towards capital punishment on a continuum of -3 (extremely negative) to +3 (extremely positive), using the response categories: -3 (extremely negative), -2 (quite negative), -1 (slightly negative), 0 (neither negative nor positive, equally negative or positive), +1 (slightly positive), +2 (quite positive), and +3 (extremely positive).

This method posed two problems for studying ambivalence. First, participants may have indicated ambivalence by endorsing the zero category, but it was ambiguous; they may have endorsed zero because they were neutral or indifferent, or they may have endorsed zero because they were ambivalent (equally negative and positive). Second, regarding the other response categories, participants were forced to choose between feeling that capital punishment was either negative or positive, whereas they may have felt that capital punishment was both negative and positive. For example, suppose that a participant endorsed +1 (slightly positive). He or she may have found some aspects of capital punishment positive (perhaps as a deterrent for criminal behavior) but also negative because it involves ending a life, but his or her overall judgment was slightly



positive. These concerns led attitude researchers to question whether they were able to study the phenomenon of ambivalence directly.

**Attitudinal component technique.** The attitudinal component technique assesses ambivalence by asking the participant to consider only the positive or only the negative aspects of an object separately. It was developed as an amendment to the semantic differential technique to allow for the direct measurement of ambivalence and is also called the split semantic differential technique (Kaplan, 1972). Instead of utilizing one question to assess attitudes as with the semantic differential technique, the attitudinal component technique asks two different questions. First, the participant is asked, “Considering only the positive qualities of capital punishment and ignoring its negative ones, evaluate how positive its positive qualities are on a 4-point unipolar scale”. Participants are then asked to endorse either 0 (not at all positive), 1 (slightly positive), 2 (quite positive), or 3 (extremely positive). Next, the participant is asked, “Considering only the negative qualities of capital punishment and ignoring the positive ones, evaluate how negative its negative qualities are on a 4-point unipolar scale” (Kaplan, 1972).

The attitudinal component technique has been used to successfully assess ambivalence towards a multitude of political perspectives and health behaviors (Conner, Sparks, Povey, James, Shepherd, & Armitage, 2002; Priester & Petty, 2001). For example, regarding alcohol, Costello and colleagues (1974) demonstrated that chronic alcoholics held ambivalent views towards alcohol, by endorsing alcohol as both good and bad, pleasant and unpleasant.

**Potential or objective ambivalence.** Potential ambivalence and objective ambivalence refer to the same construct and are often measured with data collected with the attitudinal

component technique. Potential ambivalence refers to the personal reaction or general attitude towards a behavior or object, and is conceptually and empirically different from the emotional experience of ambivalence (Conner & Armitage, 2008). The attitudinal component technique assesses the positive/good/favorable component of an ambivalent attitude separately from the negative/bad/unfavorable component. A measure of potential ambivalence, called the Griffin calculation, is computed according to the following formula:

$$\text{Ambivalence} = (P + N)/2 - |P - N|,$$

where  $P$  denotes the positive component and  $N$  denotes the negative component (Thompson, Zanna, & Griffin, 1995).

This equation simultaneously captures two necessary conditions for ambivalence, that the positive and negative components are of relatively equal magnitude, and that they have some degree of intensity (Thompson et al., 1995). In order for ambivalence to occur, two opposing views must be simultaneously held in approximately equal amounts, and there must be some intensity or importance surrounding the topic or behavior. The above equation averages the sum of the positive and negative components, and then subtracts from it the absolute value of the difference of the components. Thus, when positive and negative attitudes are roughly the same, higher levels of ambivalence are evident when participants endorse the higher end of the response categories which as described above could range from 0 (not at all positive/negative), through 1 (slightly positive/negative) to 2 (quite positive/negative), or 3 (extremely positive/negative). The Griffin equation is the formula most often used for measuring potential ambivalence in the social psychology literature (Conner et al., 2002).

**Felt or subjective ambivalence.** While potential ambivalence may be viewed as relating more to a cognitive appraisal of an object or behavior, felt ambivalence refers to the emotional experience of ambivalence. It has been assessed according to a few different methods. One common approach is called the Subjective Ambivalence Scale (Priester & Petty, 1996). The Subjective Ambivalence Scale asks participants to rate the level of conflict, indecision, and mixed feelings they feel when thinking about an object or behavior. This method utilizes three separate questions, and responses are rated on a scale from 0 (feel no conflict or indecision, i.e. have completely one-sided reactions) to 10 (feel maximum conflict or indecision, i.e. have completely mixed reactions).

Felt ambivalence is also measured by questionnaires such as the Felt Ambivalence Towards Smoking Scale (Lipkus, Pollack, McBride, Schwartz-Bloom, Lyna, & Bloom, 2005; see Appendix E). This 7-item questionnaire asks participants how much they agree with the following statements on a scale from 1 (strongly disagree) to 6 (strongly agree). Typical items from the Felt Ambivalence Towards Smoking Scale are, “You have strong feelings both for and against smoking” and “You find yourself feeling torn between wanting and not wanting to smoke”. However, it does contain two double-barreled items: “At times you feel good that you smoke; other times you feel bad that you smoke” and “Sometimes you feel bothered that you smoke, and other times you do not seem bothered that you smoke”. This scale is cross-sectionally related to measures of desire to quit smoking and Stage of Change (Lipkus, Green, Feaganes, & Sedikides, 2001). Ambivalence assessed with this instrument at baseline has also been shown to positively predict desire to quit at four and eight months. Felt ambivalence at four months also predicted desire to quit at eight months (Lipkus et al., 2005). More self-

reported ambivalence predicted an increased subsequent desire to quit smoking. This instrument has also been used to successfully predict relapse at one month follow-up among cigarette smokers (Menninga, Dijkstra, & Gebhardt, 2011). The more felt ambivalence reported at baseline, the higher the likelihood that participants had smoked cigarettes one month later.

**Approach and Avoidance.** Ambivalence about reducing drinking has also been conceptualized as an approach and avoidance conflict (Conner & Armitage, 2008). A measure of the approach or avoidance of alcohol was initially developed by McEvoy, Stritzke, French, Lang, and Ketterman (2004) and called the Approach and Avoidance of Alcohol Questionnaire (AAAQ). They assessed the factor structure of this instrument with college students, and found a three-factor solution: an approach factor called *inclined/indulgent*, another approach factor called *obsessed/compelled*, and an avoidance factor called *resolved/regulated*.

Klein, Stasiewicz, Koutsky, Bradizza, and Coffey (2007) further tested the AAAQ on 138 alcohol-dependent participants. They found only two factors, one approach and one avoidance. The AAAQ scales accounted for a significant amount of variance in drinking measures such as number of drinking days and average drinks per drinking day. The *avoidance* scale was also significantly related to measures of change readiness and alcohol expectancies (Klein et al., 2007).

### **Ambivalence as a moderator of health behaviors**

High levels of felt ambivalence attenuate the relationship between attitudes and behavior (Priester, 2002). Priester (2002) found that among a sample of 193 undergraduates, those students who felt little evaluative tension (ambivalence) were more

likely to consume alcohol based on their attitudes: students with positive attitudes were more likely to drink alcohol, and students with negative attitudes towards alcohol were less likely to drink. However, behavior was more difficult to predict when students were more ambivalent; positive attitudes were not as likely to correspond with more drinking, and vice versa. An implication of this finding is that researchers should include measures of ambivalence when evaluating the efficacy of interventions designed to encourage increasing healthy behaviors (Priester, 2002).

Similarly, potential ambivalence has also been shown to moderate the relationship between intentions and behavior within the realms of blood donation (Conner, Godin, Sheeran, & Germain, 2012), and of eating a low-fat diet or more fruits and vegetables (Conner et al., 2002). Individuals with more ambivalent attitudes are also more likely to be susceptible to persuasive arguments (Armitage & Conner, 2000).

The moderating role of ambivalence may be due to belief homogeneity or heterogeneity. Ambivalent attitudes are heterogeneous; for example, ambivalence may arise in a problem drinker due to the positive and negative consequences associated with alcohol use. Armitage (2003) found that inconsistency among beliefs about drinking alcohol was less predictive of behavior than more homogenous belief sets. This finding was also replicated when belief homogeneity was experimentally manipulated (Armitage, 2003).

### **Ambivalence as a mediator of health behavior change**

Ambivalence about reducing drinking is theorized to be an important explanation for motivational interviewing efficacy (Miller & Rollnick, 2002). However, theoretically

it also may be a patient mechanism of change, common to all therapeutic interventions and also manifesting in individuals who change their drinking without treatment.

Oser, McKellar, Moos, and Moos (2010) found that ambivalence mediated the relationship between entering treatment and heavy alcohol use. Acknowledging the lack of an instrument that directly measures ambivalence about reducing drinking, they conceptualized a multidimensional model of ambivalence and measured ambivalence by using a principal components analysis. They theorized that highly ambivalent individuals would recognize that their drinking was a problem, be less confident that they could change their drinking on their own, and experience depression as a result. The principal components analysis revealed that these three variables loaded on one component at .7 or greater. Ambivalence was measured as a weighted average of these three variables: problem recognition, self-efficacy, and depression. With change in ambivalence scores from baseline to one year follow-up as a mediator, a reduction in ambivalence mediated the relationship between entering treatment and reduced drinking at the three-year follow-up. This may be the most comprehensive test of ambivalence about reducing drinking as a mediator of behavior change to date. While research investigating the reduction of ambivalence as a mediator of behavior change is scarce, the purpose of this project was to conduct relevant statistical analyses to aid in the development of a self-report, quantitative measure of ambivalence about reducing drinking for use in research investigating ambivalence as a mechanism of change.

### **Definition of ambivalence about reducing drinking**

One of the important steps in developing an instrument is to clearly explicate the entire domain of the construct to aid in item generation (DeVellis,

2003). The following definition of ambivalence was arrived at in a previous instrument development study by combining the ambivalence definitions of experts who were certified to train others in Motivational Interviewing (Rice, 2010):

Ambivalence about ending problem drinking is feeling two ways about changing drinking. It is a normal experience that manifests when one is considering a change, but also has compelling desires, reasons or feelings to not make a change. Ambivalence often feels like there are mixed or competing thoughts and feelings that pull one in different directions about the decision to change. Both the advantages and disadvantages of change seem equally weighted. This can result in an experience of inner conflict and leave one uncertain or indecisive about what to do (p. 54, Rice, 2010).

### **Previous instrument development studies**

Instrument development is an iterative process, and a series of studies has informed the construction of the current version of the ambivalence instrument according to methods advocated by experts (DeVellis, 2003; Nunnally & Bernstein, 1994). The instrument was first piloted in the Talking about Drinking study (Glynn & Moyers, 2010). The preliminary version of the instrument was comprised of 42 items and contained only the *Double-barreled* items, *Change*, and *Sustain* scales. It was administered to 47 undergraduate students who were concerned about their drinking. An exploratory factor analysis was conducted, but the results were interpreted with caution

given the small sample. A contribution of this initial pilot study was an important piece of convergent validity evidence: the ambivalence score correlated with actual change minus sustain talk statements uttered by participants during MI therapy sessions at  $r = .41, p < .01$  (Rice, Glynn, & Delaney, 2009). The pilot testing also revealed that a *Change* scale item was not correctly paired with an opposite *Sustain* scale item. Thus, two new items were developed to more correctly pair the items with their opposite, increasing the number of items in the measure to 44.

Next, a qualitative study was conducted to question experts about the construct of ambivalence and how to best measure it (Rice, Moyers, & Delaney, 2010). This is a recommended but often overlooked step in instrument development (Haynes, Richard, & Kubany, 1995). The participants were 70 respondents on the Motivational Interviewing Network of Trainers list serv, approximately 10% of its membership. They gave many suggestions that were used to improve the ambivalence instrument, most notably a revision of the definition of ambivalence which reflected aspects of ambivalence that they felt were missing, and the suggestion that items should also measure the emotional aspect of ambivalence, not just a balance of pros and cons. This study resulted in the addition of the *Emotion* scale of the ambivalence instrument (see item 59 of Appendix 1). Experts also suggested a few domains that affect ambivalence that were previously missing from the instrument, such as the importance of drinking less and the impact of drinking on social relationships. Items developed in response to this expert advice were included in the measure in an attempt to create as comprehensive an item pool as possible, resulting in 59 items total.



A third study piloted the *Emotion* scale of the ambivalence instrument with undergraduate students participating in a study about social networks and drinking behavior (Hallgren et al., 2013). An exploratory factor analysis was conducted on 35 felt ambivalence items, which revealed two factors that accounted for 55% of the variance. Surprisingly, the analysis showed that the two scales, *conflicted* and *uncomfortable*, were negatively correlated at  $-.65$  (Rice, Ladd, Greenfield, Hallgren, & Delaney, 2012). This result was not supported by theory, as one who feels conflicted about reducing their drinking should also feel uncomfortable.

Although the analysis was conducted on 196 students, descriptive analyses revealed that only 42 (21%) were concerned about their drinking. The resulting item means were at the low end of the scale, and the item variances were low, which are undesirable features of an instrument (DeVellis, 2003). Another reason for the high negative correlation between the two scales may have been related to how the items were written. Item 59 subsumes the 32 items that comprise the *Emotion* scale, and its stem is “When I think about drinking less I feel...”. Participants then rated their agreement with the statement that comes next on a Likert scale from 1-7. Items in the *uncomfortable* scale were all comprised of one word answers, such as anxious or scared, and they were also the first 10 items on the list. Alternatively, items in the *conflicted* scale contained longer phrases such as “like I want to change and not change my drinking at the same time” and “mixed feelings about the decision to quit”. An important contribution of this study was the discovery that items should be listed in random order so as to attempt to avoid potential method effects. This change was made which resulted in the fourth

iteration of the ambivalence instrument, the version which was administered in the current study.

## Method

### Inclusion and exclusion criteria

It was anticipated that four to seven hundred participants would participate in the study. The only inclusion criteria were that participants were concerned about their alcohol use, were eighteen years of age or older, and were willing to complete questionnaires about their attitudes and behavior concerning their alcohol use.

### Recruitment

A wide range of recruitment sources were utilized: the author's Facebook page (176 Facebook friends), Craig's list (Albuquerque, NM and Victoria, BC, Canada), Backpage.com (all sites in the US), four alcohol-related Yahoo groups (blinks8rs, 1711 members; Distilling, 479 members; EFTCoaa, 509 members; and SerenitySteps, 965 members), the author's e-mail contact list, and the University of New Mexico's psychology undergraduate research participation website. Participants were encouraged to forward the recruitment message to anyone who may be interested, employing a snow ball recruitment approach. Several links to the study were also shared on Facebook or e-mailed to others by the author's Facebook and e-mail contacts. Not expected, Backpage.com offered to advertise the study link for three months for free to increase their listings in their *Focus Groups* section. Undergraduate students from the University of New Mexico participated in the study in exchange for research participation credits. All participants were entered into a random drawing for two \$50 Amazon gift certificates and one \$100 gift certificate as an incentive to participate.

### Procedure

Participants clicked on the link in the online recruitment invitation or through the Department of Psychology research credit website, which took them directly to the study website. Opinio, survey software available through the University of New Mexico (UNM), was used. Although Opinio is secure and encrypted software, no identifying information was collected, except for the UNM net ID of the undergraduate students in order to give them research participation credit or the e-mails of those wishing to participate in the random drawing. Thus, a waiver of documentation of consent was requested and received from the Institutional Review Board (IRB) at UNM as this study was an assessment-only web-based survey. A formal consent process would have been inconvenient to and identifying of the participants.

The first page of the survey was the consent form (see Appendix O). Participants gave consent to participate in the study by clicking “Next”, which began the substantive portion of the survey by asking demographic questions. Once participants had answered the last question of the survey, UNM students participating in the study for research participation credits were prompted to enter their UNM e-mail address so that they could be assigned credit. Non-UNM participants were asked to e-mail [AlcoholAttitudes@gmail.com](mailto:AlcoholAttitudes@gmail.com) to give their e-mail addresses so that they could be entered into a random drawing for one \$100 or two \$50 Amazon gift cards as a thank you for their time and effort. This drawing was mentioned in recruitment materials as an incentive to participate in the study. The last page of the survey also listed websites for participants who wanted more information or help for their drinking (see Appendix P). The protocol for this study was approved by the IRB at UNM (#13-126).

### **Methods of measuring ambivalence in current study**

The ambivalence instrument that is the focus of the current research tested three different methods of measuring ambivalence: the double-barreled items method, the sum of change and sustain items method, and the emotion items method. The initial version was called the Change, Ambivalence, Sustain, and Emotion Scales-A (CASES-A) version 4.0 (see Appendix A).

**Double-barreled items method.** The first method utilized double-barreled items which directly measured the “simultaneous coexistence of opposing attitudes” aspect of ambivalence towards problem drinking. Although the use of double-barreled items is problematic and not recommended for instrument development in general (Rust & Golombok, 2009), they appeared perfect for measuring ambivalence. The following six double-barreled items were developed for initial testing:

1. Item #4: I know that I drink too much, but I just don't want to stop.
2. Item #21: Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad.
3. Item #35: I really want to change my drinking, I just don't know why I don't stop.
4. Item #37: I really want to quit drinking or drink less, but every time I try something happens that makes it impossible.
5. Item #41: Sometimes I think that I should cut down on my drinking, but other times I think that I don't need to.
6. Item #47: I always say that I want to change my drinking, but then I just do things as I've always done.

**Sum of Change and Sustain items method.** The second method of measuring ambivalence required the development of two separate scales of items. The first scale is called the *Change* scale, and contains items that measure the level of agreement with reasons, feelings, or situations that reflect the desire to change drinking. The *Sustain* scale contains items that are the exact opposite of the *Change* scale, both in content and direction. A specific example is the pair of two items: “I need to quit drinking because I’ve made a lot of mistakes when I’m drunk” and “I don’t usually do things that I regret when I’m drunk”. The first item belongs to the *Change* scale as it would be a reason to change drinking, and the second belongs to the *Sustain* scale as it would not be. Items in the *Sustain* scale are negatively weighted and summed with those in the *Change* scale, and scores near zero indicate the presence of ambivalence. Thus, each item in the *Change* or *Sustain* scales: a) corresponds to a particular area in a client’s life that may influence a client’s ambivalence or motivation to end problem drinking, b) is assigned a positive or negative value, and c) is paired with another item that is its opposite so that their sum reflects ambivalence surrounding the topic to which both items refer. This method also measured the simultaneous coexistence of opposing desires, but without using problematic double-barreled items.

Paired *Change* and *Sustain* items that were tested for inclusion were as follows:

1. Coping:

*Drink to feel better difference score*

1a) Item #19: I don’t use drinking as a way to feel better (+).

1b) Item #26: Whenever I feel bad, I know that drinking will make me feel better (-).

*Manage stress difference score*

2a) Item #11: I don't find myself drinking to relieve my stress (+).

2b) Item #15: I drink to deal with my stress (-).

*Solution to problems difference score*

3a) Item #34: Drinking rarely solves my problems (+).

3b) Item #1: No matter what happens, I know that having a drink will make it all right (-).

2. Desire

4a) Item #22: I don't really like drinking (+).

4b) Item #54: Drinking is one of my favorite things to do (-).

3. Emotions

*Happiness difference score*

5a) Item #9: I can see myself being happy without alcohol (+).

5b) Item #44: I don't know if I'd be happy if I quit drinking or drank less (-).

*Drink to deal with life difference score*

6a) Item #6: I feel confident I could manage my life without drinking (+).

6b) Item #49: I don't feel that I have the strength to deal with my life right now if I quit drinking or drank less (-).

*Change scary difference score*

7a) Item #45: Quitting or cutting down doesn't scare me (+).

7b) Item #30: Not having the option of drinking alcohol scares me (-).

*Change imaginable difference score*

8a) Item #31: I can imagine a new life without alcohol (+).

8b) Item #2: I can't imagine my life without drinking (-).

*Caring about alcohol problems difference score*

9a) Item #18: It bothers me that I drink when I think I shouldn't (+).

9b) Item #39: I don't care if my drinking is hurting myself or others (-).

#### 4. Goal orientation

##### *Important to drink less difference score*

10a) Item #25: It's important to me that I drink less (+).

10b) Item #5: Drinking less is not that important to me (-).

##### *Ideal life difference score*

11a) Item #53: I'll never have the kind of life that I want if I continue to drink so much (+).

11b) Item #56: Drinking doesn't keep me from accomplishing what I want in life (-).

##### *Getting ahead difference score*

12a) Item #50: The main thing that is holding me back in life is continuing to drink so much (+).

12b) Item #52: Drinking isn't keeping me from getting ahead (-).

#### 5. Health problems

13a) Item #28: I need to cut down or quit drinking because it is hurting my health (+).

13b) Item #21: My health is not a reason for me to quit or cut down (-).

#### 6. Legal Problems

14a) Item #24: I have legal problems because of my drinking (+).

14b) Item #16: Drinking hasn't gotten me into any trouble with the law (-).

#### 7. Leisure

##### *Relaxation difference score*

15a) Item #33: Alcohol doesn't calm me down that much (+).



15b) Item #23: Drinking alcohol is one of my favorite ways to relax (-).

*Fun difference score*

16a) Item #40: My life would still be fun if I didn't drink or drank less (+).

16b) Item #3: Life wouldn't be as much fun if I didn't drink or drank less (-).

8. Social relationships

*Friends difference score*

17a) Item #36: I could still hang out with my friends if I quit drinking or drank less (+).

17b) Item #29: I wouldn't be able to socialize with most of my friends if I didn't drink or drank less (-).

*Family difference score*

18a) Item #14: My family is upset about my drinking (+).

18b) Item #57: My drinking has not caused me any problems with my family (-).

*Alcohol social lubricant difference score*

19a) Item #58: I don't use alcohol as a way to feel more comfortable around people (+).

19b) Item #7: I'd be more shy and awkward around people if I didn't drink or drank less (-).

*Relationships in general difference score*

20a) Item #27: My relationships with others would be better if I didn't drink so much (+).

20b) Item #42: Alcohol doesn't hurt my relationships with others (-).

*Problems with others difference score*

21a) Item #8: My drinking causes problems for me with other people (+).

21b) Item #48: Alcohol helps me get along better with others (-).

9. Personal responsibility/disappointment

22a) Item #38: I've disappointed others or myself because of my drinking (+).

22b) Item #10: My drinking has not brought disappointment to myself or others (-).

### 10. Problem recognition

#### *Having drinking problem difference score*

23a) Item #17: My drinking is a problem (+).

23b) Item #55: I don't really have a problem with alcohol (-).

#### *Drunken mistakes difference score*

24a) Item #46: I need to quit drinking or drink less because I've made a lot of mistakes when I'm drunk (+).

24b) Item #32: I don't usually do things that I regret when I'm drunk (-).

### 11. Self-concept

25a) Item #12: I want to change my drinking because it doesn't fit with who I really am (+).

25b) Item #51: My drinking doesn't keep me from being the person I want to be (-).

### 12. Self-efficacy for change

26a) Item #13: I could quit drinking or drink less if I really wanted to (+).

26b) Item #43: I'm not confident that I could quit drinking if I wanted to (-).

**Emotion items method.** This method measured ambivalence as the sum of the endorsement of 32 different feelings that may capture the emotional experience of ambivalence, with a particular emphasis on the conflicting and uncomfortable aspects of ambivalence about making an important change (see item 59, Appendix A). The stem of the item asked, "When I think about drinking less I feel..." Participants rated their agreement on a scale from 1 (absolutely disagree) to 7 (absolutely agree) with items such

as “two ways about my drinking”, “like I want to change and not change my drinking at the same time”, and “torn”.

### **Instrument scoring**

The version of the instrument (version 4.0) used in this study yielded five different scores for each individual, each measuring different aspects of ambivalence about reducing drinking: the *Double-Barreled Ambivalence* score, the *Sustain* score, the *Change* score, the *Ambivalence* score, and the *Emotion* score.

Ambivalence score calculated from double-barreled items. The double-barreled ambivalence score in version 4.0 was computed as the sum of all six potential double-barreled items. These items were developed to directly reflect the coexistence of opposing feelings about alcohol that are common in someone wanting to make a change in his/her drinking. They followed the pattern of: “I want to make a change in my drinking because of *x*, but I want to continue drinking because of *y*”. The sum of responses to these items yielded a total score that ranged from 6 to 42, with higher scores representing higher levels of ambivalence.

*Sustain* score. The second score in version 4.0 was the sum of up to 26 items that reflected the desire to maintain current drinking patterns. This was the *Sustain* score, and was comprised of items which reflected reasons why the participant did not see a problem with their current drinking behaviors, powerful feelings or situations that may have influenced a participant to drink, or other reasons why the client may have wanted to continue to drink. Responses to these items were assigned a negative score and summed. The *Sustain* score could range from -26 to -182, with lower (i.e., more extremely negative) scores indicating higher levels of wanting to maintain the status quo. A

participant who endorsed *Sustain* items more strongly was less ambivalent and more decided about not wanting to make a change. She or he either felt comfortable with the impact that alcohol was currently having on her or his life or did not see reasons to make a change.

**Change score.** The *Change* score measured how much the participant wanted to change his or her drinking, and the magnitude of the perceived negative impact of continuing to drink. It was calculated from up to 26 items in version 4.0, which were assigned a positive value and summed. This score could potentially range from 26 to 182, with higher scores indicating less ambivalence and higher levels of wanting to make a change.

**Ambivalence score.** Once the *Sustain* and *Change* scores from version 4.0 were calculated, they were summed to compute the *Ambivalence* score. This score could range from negative 182 to positive 182 if calculated from all 26 difference scores. Scores of zero or close to zero indicated high levels of ambivalence. Conversely, a score closer to negative 182 indicated that the participant was not very ambivalent but rather felt decided that she would prefer to not make a change in her drinking at that time or did not perceive her drinking to be a problem. A score closer to positive 182 indicated that the client was not ambivalent, but rather felt motivated to make a change or was able to maintain the changes she had already made in developing a healthy relationship with alcohol.

**Emotion score.** In version 4.0 this score was the sum computed from a combination of responses to 32 items which corresponded to the stem (item #59): “When I think about drinking less I feel...” Examples of the *Emotion* items were “two ways about my drinking” or “afraid of changing”. Items were scored on a Likert scale from 1 (absolutely

disagree) to 7 (absolutely agree). Items in the *Emotion* scale were designed to capture felt or subjective ambivalence.

## Measures

### Measures of the ambivalence construct

#### The Change, Ambivalence, Sustain, and Emotion Scales-Alcohol (CASES-A) version

**4.0.** As described above, this was the most recently revised version of the ambivalence about reducing drinking measure before being administered in the current study (see Appendix A). Version 4.0 was comprised of 90 items before elimination of poorly performing items based on statistical analyses from the current study. There were four *a priori* scales in the CASES: the *double-barreled items* scale, the *Change* scale, the *Sustain* scale, and the *Emotion* scale. All items were endorsed on a scale from 1 (strongly disagree) to 7 (strongly agree). Examples of items in this 6-item scale were “I know that I drink too much, but I just don’t want to stop” and “Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad”.

There were 26 items in each of the *Change* and *Sustain* scales. Each item was paired with its opposite. Items in the *Sustain* scale were given a negative weight and summed with items in the *Change* scale to compute the ambivalence score. Scores of zero or close to zero indicated the presence of ambivalence; participants were endorsing reasons and feelings to both change and not change their drinking with generally equal valence. For example, the item “I want to change my drinking because it doesn’t fit with who I really am” was part of the *Change* scale, and the item “My drinking doesn’t keep me from being the person I want to be” was part of the *Sustain* scale. Both items refer to

an individual's self-concept and drinking. The first was a reason to change one's drinking, whereas the second was a reason to maintain the status quo.

The fourth *a priori* scale was the *Emotion* scale. The stem of the items in this scale was: "When I think about drinking less, I feel..." There were 32 descriptors of emotion that followed, such as "two ways about my drinking", "pulled in different directions" and "conflicted".

**Approach and Avoidance of Alcohol Questionnaire** (AAAQ; McEvoy et al., 2004).

The 20 item version of this instrument was used in the current study (Klein et al., 2007).

The AAAQ was designed to measure alcohol craving as a multidimensional construct encompassing both approach and avoidance attitudes and behaviors towards alcohol (see Appendix B). Typical approach items included: "I was thinking of ways to get alcohol" and "I would have liked to have a drink or two". Example avoidance items were: "I was thinking about the benefits of being sober" and "I deliberately occupied myself so I would not drink alcohol". McEvoy and colleagues found a three-factor solution when testing the instrument on two large Australian and American samples of college students. However, Klein and colleagues determined that a two-factor solution was best with an American clinical sample of alcohol-dependent participants. The 20-item version was used to aid in the comparison of the college student and internet samples. It measured approach and avoidance attitudes towards alcohol with an *Approach* factor (Cronbach's  $\alpha = .90$ ) and an *Avoidance* factor (Cronbach's  $\alpha = .88$ ). In the current study Cronbach's alpha for the *Approach* scale was .84 in the student sample and .87 in the internet sample, and .89 and .88 for the *Avoidance* scale, respectively.

**Attitudinal (Objective) ambivalence.** The measurement of attitudinal ambivalence was adapted from two different methods utilized by prominent ambivalence researchers in the field of social psychology (see Appendix C). The first method was used by Priester and Petty (2001), and was comprised of two items that query participants about their overall reaction to the idea of drinking less alcohol. Participants responded on a scale from -4 (negative, unfavorable) to +4 (positive, favorable). Cronbach's alpha for these two items was .94 (Priester & Petty, 2001), and .92 for the student sample and .83 for the internet sample in the current study.

The second method was first advocated by Kaplan (1972) and has since been used in multiple studies by different authors (Armitage & Conner, 2000; Priester & Petty, 2001). The first item asked, "Considering only the positive things about drinking less alcohol, and ignoring any negative things about drinking less, I have..." Participants then rated their response on a scale from 0 (no positive thoughts or feelings) to 10 (maximum positive thoughts or feelings). The second question asked, "Considering only the negative things about drinking less alcohol, and ignoring any positive things about drinking less, I have..." Participants again rated their response on a scale from 0 (no negative thoughts or feelings) to 10 (maximum negative thoughts or feelings). Armitage and Conner (2000) found that reliability estimates for this measure of ambivalent attitudes ranged from .83-.88.

**Felt (Subjective) Ambivalence.** A measure of subjective ambivalence about drinking less alcohol was adapted from the one reported in Priester, Petty, and Park (2007). Five separate items inquired about the degree of conflict, indecisiveness, tension, ambivalence, and mixed feelings participants have toward the prospect of drinking less, measured on

an 11-point Likert scale (high scores indicated agreement, see Appendix D). Priester and Petty (2001) reported that the internal consistency of the first three items was .87, and an exploratory factor analysis found it to be a unidimensional scale. Cronbach's alpha was .83 for all five items (Priester et al., 2007). In the current study it was .84 in the student sample and .87 in the internet sample.

**Felt ambivalence scale (adapted for alcohol use for current study).** The Felt Ambivalence scale as originally written assessed the emotional experience of ambivalence with regards to tobacco cessation (Lipkus et al., 2005). Typical items from the Felt Ambivalence scale were “You find yourself feeling torn between wanting and not wanting to smoke” and “At times you feel good that you smoke, other times you feel bad that you smoke”. It was a 7-item, single-factor measure with a Cronbach's alpha of .79. A version adapted for alcohol use was administered to estimate its convergent validity with the Emotion scale of the CASES (see Appendix E). Internal consistency was .92 in both the student and internet samples.

**Readiness to change.** *The Stages of Change Readiness and Treatment Eagerness Scale* (SOCRATES: Miller & Tonigan, 1996) was a widely-used 19-item self-report instrument that measured readiness to change with three scales: *Ambivalence* (four items), *Problem Recognition* (seven items), and *Taking Steps* (eight items; see Appendix F). The *ambivalence* scale highlighted the uncertainty aspect of ambivalence common to the beginning of the change process. Items for this scale were originally derived to measure the contemplation stage in the *Stages of Change* model, in individuals who were initially presenting for treatment (Miller & Tonigan, 1996). Heavy drinkers in this stage were considering if their drinking was becoming a problem, but were not explicitly stating that



they had a problem nor were they necessarily committed to doing something about it.

Typical items of the *ambivalence* scale were, “There are times when I wonder if I drink too much” and “Sometimes I wonder if my drinking is hurting other people”. Cronbach’s alpha for this scale when it was originally developed was .60, which admittedly was somewhat lower than ideal (Miller & Tonigan, 1996). However, in the current sample it was .87 for both the student and internet samples.

Typical items in the *problem recognition* scale of the SOCRATES included: “I know that I have a drinking problem” and “If I don’t change my drinking soon, my problems are going to get worse.” Cronbach’s alpha for the problem recognition scale was .85. *Taking steps* was assessed by items such as “I am actively doing things now to cut down or stop drinking”, and “I have already changed my drinking, and I am looking for ways to keep from slipping back into my old pattern”. Internal consistency for this scale was .83 in the original development sample (Miller & Tonigan, 1996). In the current study it was .92 for the student sample and .93 for the internet sample.

**Readiness to change.** A second change readiness instrument was also administered to identify participants who were in the *precontemplation*, *contemplation*, or *action* stages of change (Rollnick, Heather, Gold, & Hall, 1992). The Readiness to Change (RTC) scale utilized four items which corresponded to one of the three stages of change mentioned previously, resulting in 12 items total. An example item in the *precontemplation* scale was “There is no need for me to think about changing my drinking”. The *contemplation* scale contained items such as “I enjoy my drinking, but sometimes I drink too much”, and an example of an *action* scale item was “I am actually changing my drinking habits right now”. Cronbach’s alpha for each of these scales was .73, .80, and .85, respectively. Test-retest

reliabilities were .82, .86, and .78 for the *precontemplation*, *contemplation*, and *action* scales (shown in Appendix G). Internal consistency estimates for the current study were .68, .86, and .90 for the student sample and .73, .79, and .83 for the internet sample, respectively.

### **Measures of alcohol-related behavior**

**Alcohol Use Disorders Identification Test (AUDIT;** Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). The AUDIT was a 10-item measure that has been shown to successfully screen for hazardous and harmful drinking (see Appendix H). Its items question about drinking consumption and behavior, as well as adverse reactions to and consequences of drinking. The instrument yielded a maximum score of 40, and scores of 8 or above denoted a strong likelihood of problematic drinking. A cut-off score of 8 successfully classified 92% of problem drinkers and 94% of those with nonhazardous drinking behavior in the development sample of the AUDIT. It has been demonstrated recently that an AUDIT score of 7 for males and 5 for females more correctly classifies at-risk drinkers in a college sample (DeMartini & Carey, 2012).

**Short-form Alcohol Dependence Data Questionnaire (SADD;** Raistrick, Dunbar, & Davidson, 1983). The SADD measured present-state alcohol dependence with items such as “Do you drink as much as you want irrespective of what you are doing the next day?” and, “The morning after a drinking session do you wake up with a definite shakiness of your hands?”. Split-half reliability for this 15-item measure was .87 in the original development sample (see Appendix I). Cronbach’s alpha for the entire scale was .88 for the student sample and .91 for the internet sample in the current study. Items were rated on a 0-3 Likert scale with 0 indicating never, 1 (sometimes), 2 (often), and 3 (nearly always). The authors recommended that total scores from 1-9 denoted low dependence,

10-19 (medium dependence) and scores above 20 indicated high dependence. The total possible score was 45.

**Alcohol and Drug Consequences Questionnaire (ADCQ;** Cunningham, Sobell, Gavin, Sobell, & Breslin, 1997). The alcohol and drug use consequences questionnaire measured the pros and cons of changing alcohol and/or drug use behavior (see Appendix J). Typical items in the *Costs of Change* scale were “I will have difficulty relaxing” and “I will change a lifestyle I enjoy”. Cronbach’s alpha for this 14-item scale was .92 in the development sample. In the current study it was .93 for the student sample and .91 for the internet sample. The *Benefits of Change* scale was comprised of 15 items such as “I will feel better physically” and “I will save more money”. Internal consistency for this scale was .90 in the development sample, .96 in the student sample, and .94 in the internet sample.

**Attitudes about drinking less alcohol.** These items were adapted from Armitage and Conner (2000). Participants answered three items on a scale from -3 to +3. The stem of each question was, “Reducing my drinking in the future is...”, and participants responded on a continuum of unpleasant to pleasant, unenjoyable to enjoyable, and unsatisfactory to satisfactory (see Appendix I). Reliability estimates for these three items were .84 for participants with low ambivalence and .88 in highly ambivalent participants (Armitage & Conner, 2000). Reliability estimates in the current study were .91 in the student sample and .90 in the internet sample.

#### **Other instruments used for assessing for construct validity**

**Apathy Evaluation Scale.** (AES; Lane-Brown & Tate, 2009; Marin, Biedrzycki, Firinciogullari, 1991). The AES is a unidimensional instrument that measured apathy

over the past four weeks with 18 items (see Appendix K). Cronbach's alpha and test-retest reliability for this measure was .94, and internal consistency was .92 for the student sample and .93 for the internet sample in the current study. The AES was developed to measure apathy that resulted from traumatic brain injury, dementia or similar organic causes, and was originally developed to be rated by an informant of the patient. Since the AES was the best apathy measure found by the author for the current study's purpose, item wording was changed slightly from the third to the first person so that it could be completed by self-report. For example, the original AES item said, "S/he is interested in things", and the version adapted for the purposes of this study was "I am interested in things". Similarly, "S/he is interested in having new experiences" was changed to "I am interested in having new experiences".

**Resilience.** The Brief Resiliency Scale (BRS; see Appendix L) was composed of 6 items that measured the ability to bounce back from stressful events. Example items included "It does not take me long to recover from a stressful event" and "I usually come through difficult times with little trouble". Reliability estimates ranged from .80 to .91 in the original development samples (Smith, Dalen, Wiggins, Tooley, Christopher, & Bernard, 2008). In the current study internal consistency was .82 in the student sample and .86 in the internet sample.

**Positive and Negative Affect Scale (PANAS; see Appendix M).** The PANAS was comprised of 10 items that measured positive emotions such as "excited" and 10 items that measured negative emotions, such as "afraid" (Watson, Clark, & Tellegen, 1988). Participants were asked to rate to what extent they had felt various emotions on the day of assessment on a scale from 1 (not at all) to 5 (extremely). Internal consistency was .89

for the *Positive* scale, and .85 for the *Negative* scale in the development sample. In the current study, Cronbach's alpha for the *Positive* scale was .90 in the student sample and .91 in the internet sample, and .93 for the *Negative* scale in both samples.

**Demographic Questionnaire.** An instrument assessing participant demographic characteristics, intentions towards alcohol use, and alcohol use disorder treatment histories was designed for the purposes of this study (see Appendix N).

### **Analysis Plan**

Statistical analyses were conducted to answer the following questions: 1. Were there differences between the UNM student and internet participants? 2. What were the factor structures of the *a priori* scales of the CASES (double-barreled items, *Change* and *Sustain* difference scores, and the *Emotion* scale)? 3. Which items should be eliminated from the measure and what were the resulting reliability estimates of the scales? 4. What were the estimates of convergent and discriminant validity for the measure? Methods utilized in addressing each of these questions are detailed next.

**1. Were there differences between the UNM student and internet participants?** Chi-square and independent-group *t* tests were conducted to test for statistically significant differences between the two samples on important demographic, drinking, and motivational characteristics. These analyses characterized differences between the two samples and informed decisions about whether to separate or combine samples for the exploratory factor analyses.

**2. What were the factor structures of the *a priori* scales of the CASES?** An iterative series of exploratory factor analyses (EFAs) were conducted separately on: 1) the *Doubled-barreled* items, 2) the ambivalence difference scores from the *Change* and

*Sustain* scales, and 3) the *Emotion* items, to reveal if these three *a priori* scales were uni-dimensional. Items in these scales were also combined with items from other scales assessing related constructs in joint EFAs to assist with concerns about discriminant validity.

**3. Which items should be eliminated from the measure and what were the resulting internal consistency estimates of the factors?** Items were considered for elimination from the double-barreled, sum of *Change* and *Sustain* difference scores, or the *Emotion* scales in separate analyses. The elimination of items was an iterative process, with the final goal of developing the CASES so that it would be as short an instrument as possible, while still maintaining a high level of reliability and validity for its intended purpose. Items or difference scores were eliminated using a sequential process, which varied slightly due to the particular concerns of the individual scales, but which began with eliminating items from the CASES based on the EFA results. Items with low factor loadings (particularly those with loadings less than .45, the chosen cut-off value which represented 20% of shared variance with other items of the same factor), or items which did not load on the primary factor of CASES items during EFAs with items from other assessments, were eliminated first.

Item-scale analyses for the subset of potential items determined by the EFAs were conducted next. Item distributions were examined to see if their means were in the centers of the distribution and that they had adequate variance. Inter-item correlations were inspected, and items were considered for removal if they exhibited too low of a correlation with other items in that scale, or too high of a correlation. Items with high correlations with particular variables were candidates for removal if they had redundant

item wording, as often they could be eliminated without sacrificing content validity or internal consistency.

Item-scale analyses also included considerations of the corrected item-total correlations, squared multiple correlations, and estimated alpha coefficients based on the addition and removal of a single item, conducted in SPSS. However, these analyses guide instrument development through a “leave one out” method. A problem with this approach is that results are less informative if calculated when poorer items are included in the total scale, and that this method also does not show if a smaller subset of items would have produced a larger alpha coefficient (Hayes, 2005). Additionally, the calculation of the correlation between the original scale and the new scale comprised of a subset of ideal items would aid in the decision of which items to eliminate.

Thus, the SPSS macro ALPHAMAX, developed by A. F. Hayes (2005), was utilized to further guide the consideration of which items to remove. ALPHAMAX calculates all possible combinations of items and produces a data file containing a row for each scale of every possible combination of items comprised of two or more items. This data set also contains how many and which items were included in the subscale, the correlation between the subscale and the original scale, and Cronbach’s alpha for the subscale. ALPHAMAX also provides summary statistics which report the maximum correlation and internal consistency estimate depending on the number of items.

**4. What were the estimates of convergent and discriminant validity for the measure? Convergent validity.** Convergent validity was determined by correlating various scores from the CASES with instruments which were purported to measure similar constructs. It was hypothesized that the *Change* scale of the CASES would

positively correlate with: the *Avoidance* scale of the AAAQ, the *Benefits of Change* scale of the ADCQ, and possibly the *Problem Recognition* and/or *Taking Steps* scale of the SOCRATES. It was also hypothesized that the *Change* scale would negatively correlate with both measures of *Felt Ambivalence*.

It was predicted that the *Sustain* scale of the CASES would correlate with the *Approach* scale of the AAAQ and the *Costs of Change* scale of the ADCQ. The overall ambivalence score (calculated by summing the *Sustain* negative score with the *Change* positive score) would correlate positively with both measures of Attitudinal Ambivalence. The absolute value of the overall ambivalence score (the difference from zero, a possible indication of ambivalence) would correlate negatively with the *Felt Ambivalence* scores, the *Ambivalence* scale of the SOCRATES, and the total Apathy score. Lastly, it was predicted that the *Emotion* scale of the CASES would positively correlate with the measures of *Felt Ambivalence* and the *Negative* scale of the PANAS. In addition, the pattern of correlations among all four scales of the CASES were also examined.

**Discriminant validity.** It was hypothesized that the Apathy Evaluation Scale (AES) would not correlate with the absolute value of the *ambivalence* score or with the *double-barreled ambivalence* score. This result would then demonstrate that the construct the CASES is purported to measure, ambivalence about reducing drinking, was not related to apathy (or indifference), constructs that are similar to but not identical with ambivalence. A second test of discriminant validity would be if there was a zero correlation between the *ambivalence* score or the *double-barreled ambivalence* score and the Brief Resiliency Scale, as the item content of these measures did not appear to overlap. It was also



predicted that the absolute value of the ambivalence score would not correlate with either the *Negative* or *Positive* scales of the PANAS. This result would demonstrate that the CASES was not merely a measure of negative or positive affect.

### **Power analysis**

The consideration of how many participants were sufficient for instrument development depended on a variety of factors, and the representativeness of the sample to the intended population was just as important as the statistical consideration of how many participants were necessary to empirically establish stable parameter estimates. It was imperative that the sample was comprised of at-risk drinkers, and ideal if they were also concerned about their drinking and thinking of making a change. The sample size for the current study also depended on the homogeneity of the student and non-student samples, as well as on the speed and cost of their recruitment. Given the heterogeneity of the at-risk drinking population, replication of results from the current study will also depend greatly on how representative current participants are with this population in general.

With regards to statistical concerns, there are various recommendations about adequate sample sizes in the literature. Nunnally and Bernstein (1994) suggest that tests be administered to a development sample of no less than 300 subjects in order for participant variance to be eliminated as a major concern. Clark and Watson (1995) mirror this recommendation, and also state that 300 is often an adequate sample size for replicable correlation matrices as well. Although some test developers suggest that instruments can be reliably developed with fewer subjects, it is difficult to give a set number that will be sufficient across all tests and samples (Devellis, 2003). A liberal estimate was provided by Shultz and Whitney (2005): development samples should

contain between 5-10 participants per item. According to this guideline, several exploratory factor analyses (EFAs) were adequately powered. EFAs were conducted on either 129 or 128 participants, often with groups of between six to twenty-six items. An exception was the EFAs conducted with the 32 *Emotion* items.

However, a Monte Carlo study conducted by Guadagnoli and Velicer (1988) found that the comparability between the sample and population components was determined by the saturation of the component, that is, how many variables loaded on it and how high their factor loadings were. Despite widespread recommendations, this simulation study found that the ratio of items to participants was not important. Items with factor loadings of .8 or greater had a high likelihood of comparability, regardless of sample size. This study also found that a sample size of 150 was sufficient for factor loadings of .6 or greater. However, components with four or more items loading .6 or greater had good comparability regardless of sample size.

Thus, study conclusions were tempered by concerns about the replicability of parameter estimates due to a less than ideal sample size, as well as due to the generalizability of the current sample with its intended population. However, results from the Guadagnoli and Velicer (1988) simulation study indicated that study sample size was adequate to guide tentative conclusions relevant to this stage in instrument development. In particular, when interpreting factors, greater attention was paid to items or difference scores loading greater than .8 or when necessary, .7; and factors defined by two or less items were interpreted with caution. Instrument development is an iterative process, and regardless of sample size, conclusions from the current study will need confirmation in a future study.

## Results

### Initial data screening

**Cleaning of original data set.** There were a total of 702 participant records in the original data set downloaded from the Opinio software. These 702 potential participants gave consent to participate in this research study by reading the informed consent webpage and clicking the *Next* button to begin answering survey questions. Of these, 72 participants (10.26%) merely viewed the survey questions but answered none of the questions. These non-responses were deleted from the data set, leaving 630 participants (89.74%) who answered at least one question in the survey and thus were retained for analyses.

**Determination of answers given by ‘bots’.** Twenty-one participant records (3.33%) were suspected of coming from *bots*, or malicious computer programs designed to falsely answer online surveys posing as human participants. This study was designed to be unattractive to potential bots because of the following two features: 1) the incentive for participation was a random drawing of three prizes from an unspecified but presumably large participant pool, and 2) participants were asked to e-mail the researcher at a separate e-mail address to be entered into the drawing. However, this study was advertised on Craig’s List and Yahoo Groups, both potential sources for the recruitment of bots.

Potential false answers from bots were originally detected because suspect e-mail addresses were given at an inappropriate place in the survey. The last question of the survey asked participants to enter their UNM e-mail address to receive credit for their research participation. There were very few non-UNM e-mail addresses entered for this

question; however, 21 were initially suspected as coming from bots because they were very strange and not likely to be derived from someone's name or English phrases, or because duplicate e-mail addresses were given on the same day. Opinion recorded when the survey was initiated and completed for each participant, and these suspect participants often took only four minutes to complete the whole survey.

Upon closer inspection of the data given by these records, many contained illogical or seemingly false answers. For example, participants were asked to type in their annual household income, and most participants gave a number in the thousands or zero (many were students). The bot records often typed nonsensical amounts such as 2, 3, 4, or 5. The average annual income for the suspected bot sample ( $n = 21$ ) was \$4.33 compared to \$53,093 for the rest of the sample ( $n = 609$ ). Similarly, suspected bot responses endorsed attending previous treatment for an alcohol use disorder in higher proportions (95.25%) compared to the rest of the sample (7.88%), and a chi-square test indicated that this proportion was significantly different between the two groups  $\chi^2(2) = 160.89, p < .001$ . Thus, these participant records were removed from the data set to avoid potentially biasing results.

**Determination of student sample.** The remaining 609 participants were examined to categorize the sample into student and non-student groups. This determination was important given that the cutoff score for at-risk drinking on the AUDIT is different for college students compared to non-college students (DeMartini and Carey, 2012). Two hundred and fifty-nine survey participants (42.53%) did not receive research participation credit and did not report that they were an undergraduate student, and two hundred and sixty-six participants (43.68%) completed the survey in exchange for research

participation credit at UNM. The eighty-four remaining participants (13.%) were recruited from online sources and did not participate for extra credit, but also reported that they were undergraduate college students. Given that there was a higher percentage of participants reporting that they had a bachelor or master's degrees in this group (32.1%) compared to the UNM student group (12.0%), and that the drinking profiles of the non-UNM student group (AUDIT = 11.59) appeared more similar to the non-student group (AUDIT = 13.23) compared to the UNM student group (AUDIT = 7.24), additional analyses were conducted to determine if the non-UNM students recruited from online would be best categorized in the student or non-student group.

Differences in age, drinking, drinking attitudes and behavior, and readiness to change among UNM students, non-UNM students, and non-student participant groups with no missing data are shown in Table 1. Eight one-way ANOVAs were first conducted, and significant differences between groups were evaluated at  $\alpha = 0.00625$ , employing a Bonferroni correction to control for multiple comparisons. Next, *t*-tests between the UNM and non-UNM student groups and between the non-UNM student or non-student groups were conducted to test for significant group differences after the omnibus ANOVA test was determined to be significant.

Analyses revealed more systematic differences between the UNM and non-UNM student groups compared to differences between the non-student and non-UNM student groups. The omnibus ANOVA tests were significant for all variables except for *Alcohol Avoidance* attitudes and behaviors as measured by the AAAQ, after applying the Bonferroni correction. Except for the non-UNM student group being significantly younger than the non-student group, independent *t*-tests revealed that the drinking

profiles of both groups were not different from each other, beyond what would be expected due to sampling error. On the other hand, the non-UNM student group had a significantly higher likelihood of at-risk drinking as indicated by the AUDIT, alcohol dependence (SADD), *Alcohol Approach* attitudes and behaviors, *ambivalence*, and *problem recognition* compared to the UNM student group. Given these systematic differences, non-UNM students were categorized into the group recruited from online sources, as opposed to the UNM student group recruited from UNM in exchange for research participation credit, in all subsequent analyses.

**Comparison of survey completers versus non-completers.** There was a considerable amount of missing data due to the study design and recruitment sources. Although 609 participants answered at least one question of the survey, 122 participants (20%) only answered the demographic questions in the first section of the survey and ended their participation before giving any information about their drinking attitudes or behavior. Furthermore, only 430 (70.6%) completed all or most of the survey. A comparison of the participants who only answered demographic questions with those who began answering questions about drinking attitudes and behavior was conducted to assess for systematic differences between these two types of participants to aid in the interpretation of the generalizability of results.

Table 2 shows the demographic characteristics of these two groups. Most significant differences were explained by the fact that undergraduate students needed to finish the survey to receive research participation credit. Thus, participants who completed the survey were more likely to report hearing about the study through the student research participation website, being an undergraduate student, and not having a

college degree. They also were significantly younger and less married. There were no significant differences between the two groups in gender, race, Hispanic ethnicity, and annual income, suggesting that the subgroup of participants involved in subsequent analyses were not systematically different in these demographic characteristics.

There were a few significant differences between the groups in characteristics related to drinking, although most questions assessing motivation did not vary between completers and non-completers. Respondents who answered the substantive portion of the survey were less likely to have had a drink within the last hour or last 24 hours, and more likely to have had their last drink over a month ago. They also felt more confident in their ability to change their drinking on their own if they wanted to. Besides the non-completion group having more 12-step experience, all other initial questions assessing motivation, such as being concerned about their drinking or their intentions regarding their amount of alcohol consumption, were not significantly different between the groups.

**Determination of at-risk drinking status.** Participants were categorized into hazardous and non-hazardous drinkers using predetermined AUDIT cut-off scores. If participants were in the non-student group, scores of eight or higher were used to categorize participants as having a strong likelihood of hazardous drinking (Saunders et al., 1993). If participants were from the UNM student group, a score of five or higher was used for females or 7 or higher was used for males, as recommended by DeMartini and Carey (2012). However, 86.8% of the UNM college students had a total AUDIT score of eight or higher. Of the 609 participants, 257 participants (42%) were classified as at-risk drinkers, and 190 (31%) were not; but total AUDIT scores were missing for 162 participants (27%) due to missing data. One hundred and twenty-two of these

participants with missing data (75%) did not provide any ambivalence data, leaving only 40 participants with missing AUDIT data who had answered at least one ambivalence item (25%) being dropped from subsequent analyses. Subsequent analyses were also not conducted on participants who were not identified by the AUDIT as being at risk for hazardous drinking. It is necessary that the sample used to develop an instrument be similar to those who will eventually be administered the instrument, and retaining participants who are not drinking at risky levels could potentially bias the results (DeVellis, 2003). Thus, the remaining analyses were conducted separately for two different groups of participants: at-risk drinkers who were UNM college students ( $N_1 = 129$ ) and at-risk drinkers who were recruited from online sources ( $N_2 = 128$ ). In subsequent analyses, 17 (13%) of participants were missing CASES data in the student group and 22 (17%) were missing CASES data in the internet group. List-wise deletion was utilized when conducting statistical analyses.

### **1. Were there differences between the UNM student and internet participants?**

**Comparison of student and nonstudent samples.** Table 3 shows comparisons between the student and internet groups. Results generally confirmed that the student and internet groups were indeed from different populations, in that the pattern of significant differences between the groups showed that the internet group was more severe in alcohol consumption and consequences, more ready to change, and also more intensely ambivalent about changing. The groups showed differences in demographic characteristics in predictable and understandable ways, such as participants in the UNM student group being younger, less frequently married, and having less education and household income. The UNM group was also comprised of more Hispanic and female



participants, consistent with the demographic characteristics of students enrolled in undergraduate psychology classes at UNM.

Predictable differences on other measures were consistent with the internet group having more severe alcohol use and higher readiness for change. The internet group had a higher AUDIT score and a higher alcohol dependence score, although both groups had an average score in the 'medium dependence' range as determined by the SADD. Both groups were similar with regards to avoidance behaviors towards alcohol, but the internet group had more approach behaviors. As measured by the SOCRATES, the internet group was significantly higher in *ambivalence*, *problem recognition*, and *taking steps*. Consistent with the SOCRATES, the RCQ also showed that the internet group endorsed items in the *Contemplation* Stage of Change (considering changing) more highly, and endorsed *Precontemplation* Stage of Change items (certain that they don't want to change) less highly, than the student group. The internet group also had a higher *Action* score, corroborating that they engaged in more help-seeking behaviors (more treatment and Alcoholics Anonymous attendance), and that they were more likely to report that they wanted to drink less alcohol than they currently were, compared to the student group. The internet group also endorsed being more ambivalent and having more costs of changing, and was comprised of more individuals who reported considering changing their alcohol with formal treatment or on their own. They were also more likely to have had a drink within the last hour or last 24 hours compared to the student group. Of note, both groups saw approximately the same amount of *Benefits of Change* and reported similar levels of negative affect, but the student group reported more positive affect compared to the internet group. In general, these results confirm that the student and

internet groups have different alcohol consumption and motivation profiles, and that the factor structure of the CASES should be examined separately for each group.

## 2. What were the factor structures of the *a priori* scales of the CASES?

Three subsets of exploratory factor analyses (EFAs) were conducted on three distinct *a priori* scales of the ambivalence measure: the Double-Barreled items, the *Change* and *Sustain* difference scores, and the *Emotion* items. EFAs were conducted using maximum likelihood estimation. Only factor loadings greater than .45 were interpreted, as a factor loading of .45 indicated that that item shares 20% of the variance with other items on that factor (Tabachnick & Fidell, 2007).

**Double-barreled items.** Several iterative EFAs were conducted to evaluate whether the double-barreled items were unidimensional, and what factors emerged when the double-barreled items were subjected to EFAs with combinations of items from the *Felt Ambivalence* scale (Lipkus et al., 2005) or six of the negative affect items of the PANAS (Watson et al., 1988). These analyses were conducted separately for the student and internet groups.

*Evaluation of assumptions.* Assumptions were also evaluated separately for the student and internet groups. Sample size was adequate for this analysis when considering a ratio of five or ten participants to one item (Shultz & Whitney, 2005). The distributions of items varied between the student and internet groups. Significance tests for skew and kurtosis revealed that items 4 (I know that I drink too much, but I just don't want to stop.) and 35 (I really want to change my drinking, I just don't know why I don't stop.) were positively skewed in the student group, whereas these items were not significantly skewed in the internet sample; however, item 35 was significantly kurtotic. Additionally,

the mode for items 4, 35, 37 (I really want to quit drinking or drink less, but every time I try something happens that makes it impossible.), and 47 (I always say that I want to change my drinking, but then I just do things as I've always done.) was one (absolutely disagree) in the student sample. The mode for items 35 and 37 was also one for the internet group, but the mode for items 21 (Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad.), 41 (Sometimes I think that I should cut down on my drinking, but other times I think that I don't need to.), and 47 was seven (absolutely agree), revealing a different pattern of responses between the two groups. Since common variable transformations often do not improve normality when the mode is at one end of the scale (Atkins, Baldwin, Zheng, Gallop, & Neighbors, 2012), and because results of the current study await verification with subsequent samples, variables were left in their unadulterated form.

Scatterplots were inspected for some of the pairs of items, and items displayed acceptable levels of linearity in both groups. Similarly, no  $z$ -scores for the double-barreled items exceeded 3.29, indicating no univariate outliers in either group. Multivariate outliers were assessed using Mahalanobis distance. A cutoff based on a critical chi-square with six degrees of freedom required a Mahalanobis distance of 22.46 ( $p < .001$ ) to detect the presence of a multivariate outlier; none were found in the student or internet samples.

Multicollinearity was assessed with two methods. First, there were no bivariate correlations between pairs of items which exceeded .9, and second, the Squared Multiple Correlations (SMCs) were not greater than .65 in the student group and .42 in the internet group. Since no SMCs were 1 in either group, singularity was also not present

(Tabachnick & Fidell, 2007). In the student sample, the correlation matrix also indicated a strong likelihood of factorability since all correlations were significant, and all but one were over .3. However, the pattern of correlations was different in the internet sample, two correlations were non-significant, and a third also did not exceed .3.

*Iterative series of EFAs to determine dimensionality.* An iterative series of EFAs determined that oblique rotation was preferable to orthogonal, as correlations among factors (when present) were usually above .32. The goal of these analyses was twofold: first, it was necessary to assess the dimensionality of the double-barreled scale to inform subsequent analyses, and second, it was desirable to examine the simple structure of the scale with joint EFAs conducted with items from other similar scales to inform the construct validity of the doubled-barreled scale. Promax rotation was chosen to assist in this goal as this oblique rotation technique clarifies which items load on which factors, while allowing for a correlation among factors.

Clark and Watson (1995) suggested that items that measure constructs similar to the construct the new instrument is intended to measure, as well as items that measure neuroticism or negative affect, be included in initial exploratory factor analyses. This allows the test developer to increase the likelihood of discriminant validity by eliminating items that also load on factors comprised mostly of items from other measures. Thus, a series of joint EFAs were also conducted with items from the negative affect scale of the PANAS and Lipkus et al.'s (2005) *Felt Ambivalence* measure. Double-barreled items were similar in content with the *Felt Ambivalence* scale, and two items from that scale were also double-barreled. Reported here are the results of various EFAs conducted on: 1) only the six double-barreled items, 2) the six double-barreled items with six items

from the PANAS negative affect scale (afraid, guilty, upset, distressed, ashamed, and scared) 3) the six double-barreled items with the seven items of Lipkus et. al's (2005) *Felt Ambivalence* scale adapted for alcohol use for the current study. Joint EFAs conducted on all items combined were not conducted as Clark and Watson (1995) recommend that joint EFAs conducted for construct validity purposes should compare similar numbers of items from each instrument.

In the student group, an EFA conducted with only the double-barreled items showed that only one factor with an eigenvalue over one emerged, accounting for 50.56% of the variance. Item 21 had the lowest factor loading (.53), and items 35, 37, 47 had loadings above .79 (see Table 4). Two factors emerged for the internet sample, but the second factor accounted for only 6.76% of the variance compared to 39.78% for the first factor. Items 21, 35, 37, and 47 loaded on the first factor, and items 4 and 41 loaded on the second (see Table 4). These factors were highly correlated ( $r = .64$ ), suggesting little differentiation between them. Scree plots clearly indicated only one factor for each study group (see Figures 1 and 2). When a one-factor solution was specified for the internet group, items #4 and #41 did not load on the factor (see Table 4).

Next, EFAs with the PANAS negative affect items were conducted. Results were similar for both the student and internet groups (see Table 5). Both scree plots clearly indicated two factors, and the pattern matrix showed that all of the PANAS items loaded on the first factor, and the double-barreled items loaded on the second. In the student group, the first factor accounted for 44.69% of the variance, the second accounted for 14.60%, and the two factors were correlated ( $r = .49$ ). In the internet group, the first

factor accounted for 38.82% of the variance, the second for 14.63%, and they were also correlated ( $r = .41$ ).

Lastly, joint EFAs were conducted with the six double-barreled items and the seven items from the *Felt Ambivalence* towards drinking alcohol scale. A slightly different pattern of results emerged between the student and internet groups. Although two factors with eigenvalues over one emerged for the student group, the scree plot suggested only one factor, in that the slope of the line between the second and third factors was much less steep compared to the line between the first and second factors (Tabachnick & Fidell, 2007). These factors accounted for 49.08% and 8.39% of the variance in the data, respectively, and were correlated  $r = .65$ . The pattern matrix (see Table 6) indicated that the *Felt Ambivalence* items loaded on the first factor, and the double-barreled items loaded on the second. Double-barreled items #21 (Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad.) and #41 (Sometimes I think that I should cut down on my drinking, but other times I think that I don't need to.) did not load on either factor in the student sample.

Three factors with eigenvalues over one emerged for the internet group, accounting for 25.63%, 27.95%, and 5.08% of the variance in the data, respectively. However, the results of this EFA should be interpreted with caution. Normally the second factor should account for less variance than the first. Although a factor solution converged, one or more communality estimates had values over one during the iteration process. Communalities are the sum of squared loadings for that particular item across all factors, indicating the amount of variance accounted for by that individual item (Tabachnick & Fidell, 2007). It should be impossible for an item to account for greater

than 100% of the variance, implying that the results for this EFA were untrustworthy. Also, even though both of the first two factors accounted for over a quarter of the variance each, the scree plot suggested a single factor. The slope of the line between the second and third factor was much more similar to the line between the third and fourth eigenvalues, compared to the line between the first and second factors. Additionally, the factor correlation matrix showed that the correlation between the first and second factors was .71, and between the first and third factors was .53, indicating redundancy. Only the *Felt Ambivalence* item #1 loaded on the third factor, “You have strong feelings both for and against drinking alcohol”.

Given these contradictory results and that an assumption of EFA was violated, additional EFAs were conducted to clarify the factor structure with these items in the internet group. Various types of rotational techniques were specified: direct oblimin, equamax, quartimax, and even the orthogonal rotational technique, varimax. The pattern matrix of each showed variations of loadings across the three factors. Further, a different extraction technique was required to clarify the factor structure given that maximum likelihood extraction produced commonality estimates greater than one.

Thus, the results of EFAs using unweighted least squares extraction or principal factors extraction, each with promax rotation, were compared. No communality estimates were greater than one with either of these extraction techniques. Three factors with eigenvalues over one emerged for both, accounting for 47.88%, 5.41%, and 3.99% of the variance, respectively. These factors were correlated at .46 or above, and the pattern matrices showed similar patterns of factor loadings, although they varied slightly in magnitude. The third factor was defined by only two items: the first item on the third

factor (double-barreled item #21; Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad) jointly loaded on the second factor as well, leaving only one other item to define the third factor. Double-barreled item #4 (I know that I drink too much, but I just don't want to stop) did not load on any factor in either solution.

A principal components analysis (PCA) was also conducted to investigate if it corroborated the EFA results. Three components with eigenvalues over one emerged, accounting for 50.83%, 8.85%, and 7.79% of the variance, respectively. The PCA pattern matrix revealed that items generally loaded in a similar manner as the EFAs, except that double-barreled item #4 was the only item to load on the third component, and double-barreled item #21 only loaded on the second component.

Given the similarity of results among the EFAs and the PCA, and that the third factor was not robustly defined, an EFA with a specified two-factor solution was conducted next, using unweighted least squares extraction and promax rotation. These results were much more interpretable. The first factor accounted for 47.60% of the variance, and the second for 5.22%. They were correlated .72, corroborating the scree plot, which showed only one factor. The pattern matrix indicated (see Table 6) that double-barreled item #41 (Sometimes I think that I should cut down on my drinking, but other times I think that I don't need to), loaded on the first factor of *Felt Ambivalence* items, and double-barreled item #4 (I know that I drink too much, but I just don't want to stop) did not load on any factor. Double-barreled item #21 (Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad) only loaded on the second factor at .47. These results suggest that double-barreled items #4, #41, and



possibly #21 may be good candidates for elimination from the final version of the ambivalence measure for both groups, depending on results from the item analyses.

*Final EFA results.* EFA results conducted with only the double-barreled items revealed a single factor structure for both the student and internet groups (see Table 4); however, items #4 and #41 did not load on the factor for the internet group. These items will receive special attention when evaluating the item analysis results and deciding which items should remain in the final version of the instrument. The joint EFAs revealed that the double-barreled items were more differentiated from the negative PANAS items than the *Felt Ambivalence* items. Although factors were correlated when the double-barreled items were analyzed with the negative PANAS items, the scree plots clearly indicated two factors. However, when the double-barreled items were combined with the *Felt Ambivalence* items, the scree plots clearly indicated only one factor. This suggested that there will likely be significant correlations among all of these measures (reported in the section addressing question four), but that the double-barreled scale will be more highly correlated with the *Felt Ambivalence* scale compared to the PANAS. However, results await further analysis related to question three, which addressed which double-barreled items would be eliminated from the scale, before computing its correlation with other assessments. The probable lack of discriminant validity was not surprising given that the double-barreled and *Felt Ambivalence* items were both developed to measure ambivalence towards either drinking less alcohol or quitting smoking, and thus have similar item content. Depending on results from the item analyses, especially if six double-barreled items are retained for both groups these scales

may be psychometrically similar, although they will likely be correlated to some extent regardless.

EFA results were generally the same between the student and internet groups, except for the joint EFA with the *Felt Ambivalence* items. Here, the pattern matrix indicated that the *Felt Ambivalence* and double-barreled items loaded on separate factors for the student group, except that double-barreled items #21 and #41 did not load on any factor. In the internet group, item #21 also did not load on any factor, indicating that this item may not be measuring the same latent construct as the rest, its item wording may be poor or easily misunderstood, or that it does not adequately measure ambivalence in these samples. Double-barreled item #4 also did not load on any factors. Thus, careful attention will be paid to items #4, #21, and #41 when deciding which items will be retained in version 5.0 of the measure. It also may be possible to improve the discriminant validity of the double-barreled scale with non-college students by eliminating item #41 as it loaded on the same factor as the *Felt Ambivalence* items.

***Change and Sustain difference scores.*** EFAs were first conducted with all 26 difference scores. Next, difference scores with factor loadings on the first factor greater than .6 (9 in the student group and 8 in the internet group) were chosen for further analysis, given that loadings of this magnitude likely represent the population factor structure with small sample sizes (Guadagnoli & Velicer, 1988). Next, this subset of difference scores were combined with either the 10 negative affect items from the PANAS, the 7 Felt Ambivalence items (Lipkus et al., 2005), or the 6 double-barreled items to assess their unidimensionality when combined with items measuring similar constructs.

*Evaluation of assumptions.* Assumptions were evaluated separately for the student and internet groups. Sample size was adequate for all EFAs, whether they were conducted with only the 26 *Change* and *Sustain* difference scores or a combination of high-loading difference scores with items from other related scales. The difference scores were fairly normally distributed in both samples; significance tests of skew and kurtosis revealed that only difference score #14 was significantly positively skewed in the student group, due to 45% of scores being at the extreme negative end of the distribution. This difference score focused on motivation to drink less due to legal problems, understandably not highly endorsed, especially in the student group.

Although that was the only significantly skewed or kurtotic variable for either group, inspection of the modes of difference scores revealed that several difference scores had the majority of difference scores at either extreme of the scales. The content of these difference scores are reported on pages 20-23. In the student group, difference scores 5, 6, 7, 8, 17, and 26 had a mode of 6, indicating that as a group, student participants perceived these topics to be more of a reason to change than not to change. Conversely, difference scores 11, 12, 14, 18, 20, and 23 had a mode of -6, indicating that student participants on average reported that these topics were more of a reason to keep drinking as they normally do. Interestingly, difference scores 2, 3, 9, 10, 15, 19, 21, 22, 24, and 25 had modes of zero, indicating that the majority of students perceived these topics to be the most associated with ambivalence about change. In the group of participants recruited from the internet, there were far more modes at zero, the centers of the difference score distributions (difference scores 1, 5, 7, 8, 9, 10, 13, 16, 18, 20, 21, 22, 23, 24, 25, and 26), suggesting more ambivalence in the internet group. Difference

scores 3 and 6 had modes of positive six, and difference scores 11, 12, and 14 had modes of negative six.

Inspection of a subset of scatterplots of pairs of difference scores showed that bivariate relationships between difference scores were approximately linear. No univariate outliers were found in either group, using a  $z$ -score in excess of positive or negative 3.29 ( $p < .001$ ) as a criterion. Similarly, no multivariate outliers were found, using a criterion of a Mahalanobis distance in excess of 54.05 (degrees of freedom = 26,  $p < .001$ ).

Multicollinearity was not a problem for either group. No bivariate correlations were greater than .9, and inspection of the SMCs revealed that none were above .777 in the student group and .835 in the internet group. Singularity was also thus not a problem. More problematic; however, was the factorability of the correlation matrix, especially in the student group. In the student group, bivariate correlations were often below .3, and several were not significantly different from zero. In particular, difference score #13 (*health problems*) was uncorrelated with the rest. There were more significant bivariate correlations in the internet group, but many still did not exceed .3. Difference score #13 (*health problems*) was significantly correlated with three others (#10, *important to drink less*; #11, *ideal life*; and #12, *getting ahead*) in the .22 to .24 range.

*Iterative series of EFAs to determine dimensionality.* If there were more than one latent factor, factors were hypothesized to be correlated, but various rotational techniques were used to aid in the interpretation of factors. Promax rotation was tried first, then Direct Oblimin, and lastly Varimax to assess the most appropriate rotational technique. The first subset of EFAs was conducted with only the 26 difference scores.

Six factors with eigenvalues over one emerged in the student group, accounting for 2.62 - 29.93% of the variance, but the scree plot suggested one strong with possibly one or two weak factors (see Figure 3). Promax rotation failed to converge with 25 iterations, but the factor matrix showed that the latter factors were defined by only a few difference score loadings. Thus, a three-factor solution was specified next on the basis of the scree plot. Only one difference score loaded above .70 on the second factor, and the highest factor loading was .47 on the third factor. The first and third factors were correlated ( $r = -.46$ ) and the second and third were correlated ( $r = -.28$ ). Given that the pattern of factor loadings was unclear, Direct Oblimin rotation (delta set at zero) was specified next. Factor correlations were reduced ( $< .32$ ), thus varimax rotation was tried. The third factor was poorly defined with all three rotational strategies, and a two-factor solution was specified next. The patterns of factor loadings for the Promax, Direct Oblimin, and Varimax rotational techniques were compared, and results were generally the same across all three. Table 7 shows the two-factor solution using Varimax rotation. The second factor was only defined by three difference scores above .6 (#7, change scary; #8, change imaginable; and #16, fun). Although results suggested some evidence of a second factor, the smaller sample size limited its interpretability. Future studies may find evidence of two factors when evaluating the CASES with a larger sample size or with participants with more severe drinking, but for the purposes of the current study a one-factor solution was specified next (see Table 8). A subset of difference scores that loaded on the primary factor above .6 were retained for subsequent analyses: #10 (important to drink less), #11 (ideal life), #12 (getting ahead), #18 (family), #20 (relationships in

general), #22 (disappointment/personal responsibility), #23 (having drinking problem), #24, (drunken mistakes) and #25 (self-concept).

Seven factors with eigenvalues over one emerged for the internet group. The scree plot clearly suggested two factors (see Figure 4), and factors three through seven accounted for between 2.38% - 5.48% of the variance. The pattern of factor loadings was difficult to interpret; several factors were defined by only a few difference scores, thus a three-factor solution was specified next. Similar to the student group, the second and third factors were difficult to interpret and defined by only a few difference scores, prompting the use of Direct Oblimin (delta set at zero) rotation to assess if a different rotational technique would result in more interpretable factor loadings. Results using Varimax rotation were also inspected, and factor loadings were similar across the various rotational techniques. Factor loadings for the two-factor solution are shown in Table 7, and loadings on a single factor are shown in Table 8. There were only two difference scores that loaded on the second factor above .6, #1 (drink to feel better) and #17 (friends). These were different difference scores compared to the difference scores that emerged on the second factor for the student group.

Next, joint EFAs with the nine top-performing difference scores and the ten negative affect items of the PANAS were conducted. Three factors with eigenvalues over one emerged in the student group, but the scree plot suggested only two factors. Additionally, the third factor accounted for only 3.59% of the variance and was defined by only two difference scores. Thus, a two-factor solution was specified next. The two factors accounted for 41.55% and 14.80% of the variance, and were correlated ( $r = .48$ ) with Promax rotation. The pattern matrix revealed that all of the negative PANAS items

loaded on the first factor, and all of the difference scores were on the second. Similar results were found with the internet group. Although three factors with eigenvalues over one also emerged, converging evidence again indicated only two. Thus, a two-factor solution was specified. The two factors accounted for 41.24% and 18.51% of the variance, respectively, and were correlated ( $r = .38$ ). All of the PANAS items loaded on the first factor, and all of the difference scores loaded on the second.

A joint EFA was conducted next with the subset of highly-loading difference scores and items from the *Felt Ambivalence* scale. Two factors with eigenvalues over one emerged in the student group, accounting for 43.45% and 15.27% of the variance, respectively. The scree plot suggested two factors. The two factors were highly correlated using either Promax or Direct Oblimin rotation, but the pattern matrix of each indicated that all of the difference scores emerged on the first factor, and all of the *Felt Ambivalence* items were on the second. The same pattern of results was found for the internet group except that the first factor accounted for 47.02% of variance and the second, 16.04%.

A final subset of joint EFAs were conducted next with the best-performing difference scores and the six double-barreled items. Although three factors with eigenvalues over one emerged in the student group, they were highly intercorrelated (all  $> .67$ ) and the scree plot clearly indicated only one factor. When a two-factor solution was specified, all of the difference scores loaded on the first factor and the double-barreled items were on the second, but factors were highly correlated using either Promax ( $r = .74$ ) or Direct Oblimin ( $r = -.70$ ) rotation. A single-factor solution showed an

overlap of the difference scores with the double-barreled items, particularly items #35, #37, and #45 in the student group.

Results were similar with the internet group. Three factors with eigenvalues over one emerged, but findings suggested that there was actually only one latent factor. A two-factor solution revealed that all of the difference scores loaded on the first factor and the double-barreled items loaded on the second, except for difference score #24 (drunken mistakes), which didn't load on either factor. The first factor accounted for 45.39% of the variance, the second for 8.66%, and they were correlated ( $r = .61$ ). The scree plot suggested only one factor, which was specified next. In the internet group, all difference scores loaded higher than the double-barreled items except for double-barreled item #35, which was relatively undifferentiated from the difference scores.

*Final EFA results.* Findings from the iterative series of EFAs conducted with only the difference scores showed that a similar group of difference scores loaded highly for both groups, although the pattern of loadings varied slightly between the groups. Given that the stability of difference score loadings was questionable for factor loadings under .5 with this small of a sample (Floyd & Widaman, 1995), only loadings of .6 or greater were considered. In the student group, there were three difference score loadings which met this criterion for the second factor (#7, change scary; #8, change imaginable; and #16, fun), and in the internet group, only two (#1, drink to feel better; and #17, friends).

There was mixed evidence for the presence of a second factor, especially in the context of EFAs conducted with only 129 (student group) or 128 (internet group) participants. On the one hand, the second factor was unreliable in these data given that it was defined by only a few difference scores that loaded above .6, and also accounted for



less percentages of variance compared to the first factor in both groups (Tabachnick & Fidell, 2007). Simulation studies have also shown that factor loading patterns are unstable with less than 150 participants, and when less than four items load on a factor and/or factor loadings are lower than .6 (Guadagnoli & Velicer, 1988). On the other hand, the scree plots suggested two factors, especially in the internet group (see Figures 3 and 4). Additionally, Clark and Watson (1995) suggest that if items from the first factor have an average correlation with items in the second factor above .3, a one-factor solution is more justified. That was not the case with these data; the average inter-correlation between difference scores above .6 on the first and second factors was .20 in the student group and .22 in the internet group. In sum, there was evidence both for and against a two-factor solution in these data, and future research conducted with additional participants will be analyzed for the stable presence of a second factor. It was decided for the purposes of the current study that it was preferable to select items for this scale which produced a factor structure that had the highest likelihood of replication. If more compelling evidence is found in a future study, a second subscale could then be added to the *Change* and *Sustain* difference scores scale.

Thus, only difference scores which loaded highly on the first factor were retained for further analysis. This resulted in nine difference scores in the student group and eight difference scores in the internet group. They were difference scores: #11 (ideal life), #12 (getting ahead), #18 (family), #20 (relationships in general), #22 (disappointment/personal responsibility), #23 (having drinking problem), #24, (drunken mistakes) and #25 (self-concept). Only difference score #10 (important to drink less) exhibited differential loadings between the two groups, and was included in analyses for

the student group but not the internet group. When only these difference scores were subjected to an EFA by themselves, a single factor with an eigenvalue over one emerged, the scree plot corroborated a single-factor solution, and the single factor accounted for 53.71% and 60.49% of variance in the student and internet groups, respectively. The joint EFAs showed that difference scores reflected a similar but different latent factor than the negative affect items of the PANAS or the *Felt Ambivalence* scale, but that they were relatively undifferentiated from the double-barreled items.

**Emotion scale items.** Thirty-two emotion scale items (see Appendix A, question 59) were candidates for inclusion in the *Emotion* scale of the final version of the ambivalence measure (version 5.0). Many EFAs were conducted in an iterative manner, focusing on four primary concerns: whether orthogonal or oblique rotation should be used, what the appropriate number of factors should be, how factors emerged when *Emotion* items were combined with items from other instruments measuring similar constructs, and finally, which items should be retained in the final scale on the basis of the factor analytic results.

*Evaluation of assumptions.* Assumptions were evaluated separately for the student and internet groups. Even with a criterion of five participants per item, these analyses were underpowered, whether EFAs were conducted on only the *Emotion* scale items or combined with items from other assessment instruments. Next, the distributions of items were inspected for normality. In the student sample, significance tests for skew and kurtosis revealed that 17 of the 32 items were skewed, and items 59.11 and 59.32 were also kurtotic. Items were much less skewed in the internet sample; only items 59.11 (“like giving up hope I will ever change”), 59.19 (“a lot of suffering about what to do”), and 59.32 (“like giving up”) were skewed but not kurtotic. However, four additional

items were significantly kurtotic. Except for item 59.1, “two ways about my drinking”, all items had a mode of one (absolutely disagree) for the student sample. For the internet sample, 21 items also had a mode of one, and four items had a mode of 7 (absolutely agree): item 59.1 “two ways about my drinking”, item 59.8 “like I want to change and not change my drinking at the same time”, item 59.28 “like there are good and bad things about drinking less”, and item 59.29 “mixed feelings about the decision to quit”. Because of the presence of modes at the extremes of the scale, transformation would not have significantly improved normality, and items were left untransformed.

Although the degree of linearity varied among pairs of items, the inspection of various scatterplots revealed that item pairs generally displayed linearity in both groups. No univariate outliers were detected in either group, as determined by a  $z$ -score greater than 3.29 ( $p < .001$ ). The presence of multivariate outliers was assessed with Mahalanobis distance. A critical chi-square of 59.70 (degrees of freedom = 30,  $p < .001$ ) was used to identify twelve student participants and nine internet participants as multivariate outliers. Although utilizing Mahalanobis distance to detect multivariate outliers is a sound practice, it is not robust with nonnormal variable distributions, such as was the case with numerous items in the student group and some in the internet group, and also does not detect outliers with perfect precision. Tabachnick and Fidell (2007) warn that it should be used with caution. Thus, given that these analyses were also already underpowered, the decision was made to not delete participants from the following analyses, although conclusions were tempered by this limitation.

Inspection of the correlation matrix revealed no bivariate correlations among items that were over .9 for either group. There were also no SMCs over .9, indicating

that multicollinearity and singularity were not present. The correlation matrices for both samples indicated a strong likelihood of factorability given that only a few bivariate correlations were under .3.

*Iterative series of EFAs to determine dimensionality.* EFAs to establish whether oblique or orthogonal rotation should be used in subsequent EFAs were conducted on all participants as a group to increase the precision of estimates, given the small ratio of items to participants for this analysis. Oblique rotation was determined to be the best method of rotation based on the following concerns. First, if more than one factor was present, they were hypothesized to be correlated. Second, initial EFAs with two to six predetermined factors were conducted, which compared Varimax rotation (orthogonal) with Direct Oblimin rotation with Delta set at zero (oblique). The pattern of items loading on each factor was more easily interpreted with Direct Oblimin versus Varimax rotation. Third, a correlation of .32 was used as a cutoff score to determine empirically if oblique rotation should be used. Results from the initial EFAs showed that factors were indeed correlated: with four factors, there were three pairs of factors that were correlated above .32; with three factors, one factor pair was; and in the two factor solution the factors were correlated at .49.

The first subset of EFAs was conducted on only the 32 *Emotion* items, separately for the student and internet groups. Using Promax rotation (oblique) to aid in the determination of simple structure, three factors emerged with eigenvalues over one in the student group. However, convergent results indicated that there was only one factor. First, the second and third factors only accounted for 3.92% and 1.76% of the variance respectively, compared to 61.68% of the variance for the first factor. Additionally, the

first and second factors were correlated at .80, and the first and third were correlated at .70, indicating redundancy among the factors. Third, the scree plot clearly suggested only one factor (see Figure 5). Results of the one-factor EFA are shown in Table 9.

A similar pattern of results was found for the internet group. Although four factors emerged with eigenvalues over one, the last three factors accounted for little variance compared to the first, the scree plot indicated only one factor (see Figure 6), and the first factor correlated with the second, third, and fourth at .70, .62, and .36, respectively. Thus, a forced solution of only one factor was specified to ascertain which items had the highest factor loadings. Results are shown in Table 9. Ironically, the one *Emotion* item that mentioned ambivalence explicitly, #59.3 (ambivalent about changing) did not load on the factor for either group.

However, as recommended by Clark and Watson (1995), items from related instruments were also combined with the *Emotion* items to investigate if the *Emotion* scale would discriminate between related constructs. Many EFAs were conducted with various combinations of items from other assessments to determine if a pattern of loadings emerged. This was a helpful step in determining which items should be retained in the final instrument. *Emotion* items were first combined with the ten negative PANAS items, then with only the seven items from the *Felt Ambivalence* scale, and next separately with the six double-barreled items. Lastly, items from all of the instruments were combined.

First, *Emotion* items were combined with the ten items measuring negative affect from the PANAS. Five factors with eigenvalues over one emerged in the student group, although they were highly inter-correlated and the scree plot suggested only one or

possibly two factors. Next, a two-factor solution was examined. All of the *Emotion* items loaded on the first factor, and all of the negative affect items loaded on the other. However, the two factors were correlated ( $r = .68$ ). Next, a forced one-factor solution showed that the first 18 highest-loading items ( $> .8$ ) were all from the *Emotion* scale.

Five factors with eigenvalues over one emerged for the internet group, although the scree plot more clearly suggested a two-factor solution when *Emotion* items were combined with the negative PANAS items, compared to only one factor for the student group. *Emotion* items loaded on the first two factors, and the PANAS items on the third; the fourth and fifth factors were defined by only a few items and accounted for a negligible amount of variance. Given that the scree plot indicated two factors, a two-factor solution was specified next. Inspection of the pattern matrix for this solution showed that the *Emotion* items generally loaded on one factor and the PANAS items on the other, and they were correlated ( $r = .63$ ). However, the pattern matrix also revealed that five emotion items loaded on both factors, items 59.4, 59.9, 59.11, 59.19, and 59.31.

Next, EFAs with *Emotion* items and items from the *Felt Ambivalence* scale were conducted. Although five factors with eigenvalues over one emerged in the student sample, the scree plot indicated only two actual factors, and a two-factor solution was examined next. The two factors were correlated ( $r = .63$ ), and the *Emotion* items generally loaded on the first factor and the *Felt Ambivalence* items loaded on the second. Items 59.1, 59.15, and 59.18 loaded on both.

In the internet group, five factors with eigenvalues over one also emerged when *Emotion* items were combined with *Felt Ambivalence* items, but the scree plot indicated one strong factor with one or two possible other weak factors; these factors were highly

inter-correlated and accounted for little variance, except for the first factor. A three-factor solution showed the *Emotion* items loading on the first two factors and the *Felt Ambivalence* items loading on the third, with a few items loading on more than one factor. A two-factor solution revealed a messy pattern of results. The two factors were correlated ( $r = .74$ ), six items from the *Emotion* scale loaded on both factors, and several *Felt Ambivalence* items loaded highly on the first factor, which contained mostly *Emotion* items. The one-factor solution accounted for 54.39% of the variance, and the factors loadings above .8 were all from the *Emotion* scale.

EFA with the double-barreled items were examined next. In the student group, five factors with eigenvalues over one emerged, but the scree plot clearly indicated only one factor. No clear pattern of results emerged in the two-factor solution. The factors were correlated at .8, and both *Emotion* and double-barreled items loaded on both factors. Thus, a one-factor solution was specified to look for a clearer pattern of results. There were 18 items with factor loadings above .8, all from the *Emotion* scale. This EFA also revealed that the *Emotion* items most similar to the double-barreled items for the student group were items: 59.3 “ambivalent about changing”, 59.16 “like I will always be a drinker”, 59.1 “two ways about my drinking”, 59.28 “like there are good and bad things about drinking less”, and 59.31 “annoyed”.

In the internet group, four factors with eigenvalues over one emerged, but the scree plot indicated only two. These factors were correlated and the double-barreled items were again mixed with the *Emotion* items with no clear pattern of factor loadings. A two-factor solution was tried next. The two factors were correlated at .76, indicating redundancy and an actual one-factor solution. The pattern matrix showed no clear pattern

of results, similar to the student group. Next, a one-factor solution was specified. An almost identical subset of *Emotion* items, with low factor loadings similar in magnitude to most of the double-barreled items, was found for the internet group.

Lastly, EFAs with the *Emotion*, PANAS, *Felt Ambivalence*, and double-barreled items combined were conducted. Although this subset of EFAs were underpowered, this investigation was undertaken to aid in the determination of which *Emotion* items were good candidates for retention in the final measure. Seven factors emerged in the student group, but the scree plot indicated only one factor, with possibly two other weak factors. In the 7-factor solution, the first and second factors were highly correlated ( $r = .77$ ), and comprised of a mixture of *Emotion* and double-barreled items. The first and third factors were also correlated ( $r = .58$ ), and the third factor contained mostly negative PANAS items. The fourth factor was comprised of *Felt Ambivalence* items. Given the scree plot results, a three-factor solution was specified next to investigate the factor loadings of the second and third lesser factors. With this run, the first factor contained a mixture of *Emotion* and Double-barreled items, the *Felt Ambivalence* items loaded on the second, and the PANAS items comprised the third. The factors were all highly inter-correlated; the first factor was correlated with both the second and third factor at .62.

This solution was also examined with Oblimin rotation (delta set at zero) to inspect the inter-correlation among factors with this rotational technique. The factors were still highly correlated, though slightly reduced. The first factor correlated with the second ( $r = -.57$ ) and with the third ( $r = .53$ ). The items loaded on the same factors as with the Promax rotation, except the PANAS items loaded on the second and the *Felt Ambivalence* items loaded on the third.



The two-factor solution is reported in Table 10 and interpreted in the next section called *Final EFA results*. Given the high correlations among factors when more than one factor was specified, and that the scree plot suggested only one strong factor, a one-factor solution was examined next. Eighteen items loaded on the factor at .8 or higher; they were all from the *Emotion* scale. A very similar subset of *Emotion* items had approximately equal factor loadings with not only some of the double-barreled items, but also items from the PANAS and *Felt Ambivalence* scale.

In the internet group, eight factors with eigenvalues over one emerged, but the scree plot clearly suggested only two factors. The first factor accounted for 45.95% of the variance, and the second for 9.06%. The others accounted for 3.61% or less. However, the rotation failed to converge with 25 iterations. The pattern matrix of the two-factor solution (see Table 10) did not display a coherent pattern, except that there were eight *Emotion* items with factor loadings were above .8 on the first factor, and that the PANAS items loaded on the second factor. However, *Emotion*, double-barreled, and *Felt Ambivalence* items loaded on both factors, and the factors were correlated ( $r = .62$ ). Next, a one-factor solution was examined. There were twelve items that loaded above .8, and they were all from the *Emotion* scale. Interestingly, the ten highest-loading items for the internet group were also part of the eighteen highest-loading items for the student group. This common group of items also generally loaded highly on the one-factor EFAs conducted with only the *Emotion* items, and comprised a candidate group of items for retention in version 5.0 of the ambivalence measure.

*Final EFA results*. Convergent evidence indicated that the *Emotion* scale was essentially unidimensional for both groups, although highly related to items from other

similar assessments, especially the double-barreled items. First, scree plots usually clearly suggested only one factor, especially when EFAs were conducted with only the *Emotion* items (see Figures 5 and 6). The only exceptions to a one-factor solution were the two joint EFAs conducted with: 1) the *Emotion* and double-barreled items and 2) items from all the instruments combined. These analyses indicated that a one-factor solution was more appropriate with the student group, but a two-factor solution was for the internet group, and were probably driven by more of a differentiation between the *Emotion* and negative affect PANAS items in the internet group. Thus, all of these measures represent a single latent construct for the college student sample, but not for the internet sample. Second, when more than one factor was specified, the latter factors usually only accounted for a trivial amount of variance. Third, factors were highly correlated, often above .6.

However, results were not as clear with regard to which *Emotion* items should be retained for the final version of the measure, and findings suggest that *Emotion* items may differ between versions of the CASES for college and non-college individuals (see Table 10). On the one hand, results from the EFAs conducted with only the *Emotion* items showed that the factor loadings of individual items were relatively the same for both groups (see Table 9). These initial findings suggested that version 5.0 of the *Emotion* scale may have similar items for both student and non-student groups. On the other hand, joint EFAs conducted with items from the negative affect scale of the PANAS, the *Felt Ambivalence* scale, and the double-barreled items demonstrated that the *Emotion* items were related to these other assessments in different ways, when comparing the student and internet groups.

Table 10 shows that all but one *Emotion* item loaded on the first factor for the student group, and all but six did for the internet group. However, factor loadings for the same *Emotion* item were often different between the groups. Also, in the student sample, findings indicated that the *Emotion* items were measuring a latent construct similar to the negative affect items of the PANAS and few of the double-barreled items; items from the *Felt Ambivalence* scale reflected a different latent construct. In the internet sample, the *Emotion* and *Felt Ambivalence* items measured the same latent construct, but the negative affect PANAS items were a different latent construct. They contributed unique variance to the factor solution, beyond its shared variance with these other measures.

Furthermore, double-barreled items #21 and #35 did not load on either factor for the internet sample, in addition to item #4, which did not load for either group. As mentioned previously, *Emotion* item 59.3 and double-barreled item #4 did not load on any factor for either group, but the groups also had different non-loading items. *Emotion* item 59.15 and PANAS items 3 and 12 did not load for the student group, and double-barreled items #21 and #35 did not load for the internet group.

*Emotion* item 59.1 (two ways about my drinking) was cautiously considered for removal from the pool of candidate items for the measure for college students because it loaded on the factor measuring *Felt Ambivalence* items. However, the primary factor in the student group also had highly-loading negative affect items, thus differentiation from the primary factor was preferable from a construct validity perspective. Also, subsequent analyses answering question three found 59.1 to be less correlated to the negative affect items.

*Emotion* item 59.3 (ambivalent about changing) should also be removed as it does not load on any factor, whether a one- or two-factor solution is specified. Item 59.15 (like I should cut down but I don't want to) was cautiously be considered for removal; although it did not load on a two-factor solution, it loaded highly on a one-factor solution. Also, subsequent analyses found it to be less correlated with negative affect items.

Factor analytic results were more definitive for the internet group. *Emotion* items 59.4 (scared), 59.9 (despair over not being able to change), 59.11 (like giving up hope I will ever change), 59.19 (a lot of suffering about what to do), 59.31 (annoyed), and 59.32 (like giving up), should be removed from the candidate pool of items as they are measuring the same construct as the negative affect scale of the PANAS. Additionally, item 59.3 (ambivalent about changing), was also removed as it did not load on any factor, and appeared to measure something other than the latent construct of the emotional experience of ambivalence.

### **3. Which items should be eliminated from the measure and what were the resulting internal consistency estimates of the factors?**

This question was answered separately for the double-barreled item scale, the *Change* and *Sustain* difference scores scale, and the *Emotion* item scale, and considered separately for both the student and internet groups. In general, items were first evaluated based on the results of the EFA analyses. Items which did not load on the primary factor and/or items which loaded similarly with items from different scales were candidates for elimination. However, candidate items were also chosen based on their item content, means, variances, and individual inter-item correlations, as well as the impact of their inclusion or elimination on Cronbach's alpha and the average inter-item correlation.

Decisions were based on an analysis of all of these considerations simultaneously.

Finally, once an appropriate initial scale was selected, items were further considered for elimination based on results from using the ALPHA MAX macro. This software enabled comparisons of internal consistency estimates and correlations between the new subscale and the original scale based on smaller combinations of individual items or difference scores.

**Double-barreled item scale.** Findings from the EFAs revealed that double-barreled items #4, #21, and #41 were good candidates for elimination from the instrument. All double-barreled items loaded on a single factor in the student group, but items #4 and #41 did not load in the internet group. Although related, all double-barreled items were relatively differentiated from the negative affect PANAS items, and more similar to the *Felt Ambivalence* items. However, given that there were only six items in this scale, all six items were initially considered for inclusion. In the student group, item means were in the center of the scale for #21 and #41, but were between 2.60 and 3.18 for the other double-barreled items. Cronbach's alpha was .85, and inter-item correlations ranged from .27 to .71. ALPHAMAX was used to find the lowest number of items which had a Cronbach's alpha of .8 or greater but still a high correlation with the double-barreled scale that included all six items. The best combination of items meeting these criteria was including double-barreled items #35, #37, and #47 in the final version of the scale. This combination also corroborated EFA results. Cronbach's alpha for these three items was .87 (two points higher than with six items), and a scale of these items correlated with the six-item scale ( $r = .93$ ).

In the internet group, means for all items were closer to the middle of the scale, and inter-items correlations ranged from .12 to .61. SMCs were low for items #4, #21, and #41, and ranged from .16 to .24; however SMCs for items #35, #37, and #47 ranged from .45 to .49. Items #4, #21, and #41 were also good candidates for removal based on the EFA results. Cronbach's alpha was .77 for the six-item scale. In the scale including only items #35, #37, and #47 Cronbach's alpha was .81 (four point improvement), and the correlation between the scale with these three items and the six-item scale was ( $r = .92$ ). Results from these analyses suggest that a three-item scale may be preferable to the six-item scale, especially with regard to construct validity. However, both scales will be retained for analysis when question four is addressed, which examines convergent and discriminant validity correlations.

***Change and Sustain difference scores scale.*** The results from the exploratory factor analyses indicated that difference scores #10, #11, #12, #18, #20, #22, #23, #24, and #25 were strong candidates for inclusion in the scale for the student group, and the same group of items, excluding difference score #10, were good candidates for the internet group.

Cronbach's alpha was .91 in the student group, but only three differences scores had means in the center of the scale (zero); the rest ranged from -1.65 to -2.99. Inter-item correlations were generally in the recommended range for a unidimensional scale (Clark & Watson, 1995), and spanned from .34 to .67. The average inter-item correlation was .53.

Although EFA results reduced the instrument from 26 differences scores (52 items) to 9 difference scores (18 items), the SPSS macro ALPHAMAX was used to

explore if it were reasonable to reduce the scale further. ALPHAMAX revealed that there were many combinations of difference scores that would result in a scale with an internal consistency estimate of .8 or greater, and a correlation of .9 or greater with the nine-item scale. Thus, item content was examined for redundancy, to aid in the decision of which items to eliminate. Difference score 10 (important to drink less), was a tempting candidate for elimination because it loaded on the primary factor for the student group only. Its elimination may have allowed version 5.0 of the scale to be the same for both groups. However, it also may measure important information about ambivalence in this population, as many college students drink at problematic levels but are not concerned about it, and this conceivably could influence their motivation and ambivalence. Difference scores 11 (ideal life) and 12 (getting ahead) had similar item content; either one could be eliminated from the measure while still measuring ambivalence due to the influence of drinking on accomplishing life goals. Difference scores 18 (family) and 20 (relationships in general) had related item content, in that asking about how alcohol influences an individual's family is subsumed by asking about how alcohol influences an individual's relationships in general. Difference scores #22 (disappointed others or myself) and #24 (drunken mistakes) also had similar content. Thus, difference score #18 could be eliminated, and either #11 or #12 and #22 or #24 could also be eliminated without losing much item content diversity.

ALPHAMAX results indicated that a scale as small as two difference scores (#20 and #23) had a coefficient alpha of .81 and correlation with the total nine-item scale score of .90 in the student group. However, most combinations required at least four or five

difference scores to show acceptable internal consistency and a high correlation with the nine-item scale.

However, even if scales were psychometrically similar, the question remained of whether or not they would be sensitive enough to measure ambivalence as a mechanism of change. The decision of which items to retain should be made on rational as well as empirical grounds. The EFA results showed that the highest-loading difference scores were #11, #20, and #23. These items had diverse content ( $\alpha = .85$ ,  $r = .94$ ), and formed the core group of difference scores for the new scale. Other combinations of difference scores were examined, although the addition of one or two more items to the scale only resulted in negligible improvement. If the scale were to be reduced further, combinations of four to six items would be ideal to ensure that the full domain of the construct is represented, such as combinations of difference scores #10, 11, 20, 22, 23, or 25. The Flesch-Kincaid grade level reading formula estimated that the reading level of these difference scores ranged from third to eighth grade. The subscales produced from combinations of these items have internal consistency estimates ranging between .86 - .89 and correlations with the nine-item total score between .95 - .98.

Reducing the scale further was also complicated by the fact that the redundancy of the individual items making up a difference score would be more apparent in a 10-item scale compared to the original 52-items questionnaire. Items in version 5.0 of the CASES would appear in a random order and *Change* and *Sustain* items would be mixed in with items from other scales. However, the redundancy of items such as “My drinking is a problem” and “I don’t really have a problem with alcohol” may still be noticed, and it is unknown how it may affect the measurement properties of the CASES.



Primary factor loadings were generally higher in the internet group, and EFAs indicated that all eight difference scores (#11, #12, #18, #20, #22, #23, #24, and #25) loaded on the primary factor .7 or above. Cronbach's alpha was .92. Item means were all close to the center of the distribution, and SMCs were .61 or greater, except for difference score #22, which was .54. This difference score could probably be eliminated from the measure, especially if #24 is retained, as they were correlated ( $r = .62$ ) and #24 had the higher SMC of .61. Individual inter-item correlations ranged from .42 to .77, and the average inter-item correlation was .60.

Although test developers often suggest that it is preferable to retain items with higher inter-item correlations rather than lower ones (DeVellis, 2003), Clark and Watson (1995) advise that they should not exceed .5, lest they diminish construct validity. They suggest that inter-item correlations which cluster around their mean and are in the .15 - .50 range are preferable, in that they are not so highly correlated that they contain redundant information and/or do not adequately represent the full domain of the construct. Thus, large inter-correlations were examined to help guide the elimination of redundancy and improve the construct validity of a smaller scale. Difference score #11 was correlated with #12 ( $r = .77$ ) and #23 ( $r = .76$ ). Difference score #18 was correlated with #20 ( $r = .71$ ), and #25 was correlated with #11 and #12 ( $r = .68$ ) and ( $r = .72$ ), respectively. These high correlations mimicked results from the content analysis, and corroborated that either #11 or #12 could be eliminated from the measure as long as one was retained, and #18 could be eliminated as long as #20 was retained.

Results from ALPHAMAX indicated that scales with as low as three difference scores would meet criteria of ( $\alpha \geq .8$  and  $r \geq .9$ ). However, the best number appeared to

be four; scales of five or greater difference scores resulted in only slightly better psychometric properties. Many difference score combinations appeared adequate from a psychometric perspective, thus four difference scores were chosen for non-overlapping content. A scale comprised of difference scores #11, #20, #23, and #25 had an internal consistency estimate of .89 and correlation with the scale with eight difference scores of .96. In the student group, Cronbach's alpha was .86 and the correlation was .96. This subset of items, as well as the scale comprised of eight difference scores, were tentatively considered for retention in version 5.0, awaiting further information when convergent and discriminant validity correlations were examined in question four. It was decided to not include difference score #10 in the scale for the student group to enable comparisons between the student and internet groups. However, future research will reconsider the inclusion of #10 if it remains a viable candidate.

**Emotion item scale.** It was difficult to interpret which subset of *Emotion* items would be best to include in version 5.0 of the CASES from the EFA results in the student group. Except for 59.3 (ambivalent about changing), all items loaded on the primary factor. Further, the results of the joint EFA indicated that the negative affect items from the PANAS loaded on the same factor as the *Emotion* items for the student group, thus only selecting the highest-loading items may have decreased the discriminant validity for this scale. Thus, a correlation matrix of negative PANAS items and all 32 *Emotion* items was inspected to select *Emotion* items which had the lowest correlations with the negative PANAS items.

All negative PANAS items were significantly correlated with the *Emotion* items in the student group. However, *Emotion* items 59.1, 59.3, 59.7, 59.8, 59.15, and 59.28

were correlated the least with the negative affect items (i.e. they were generally correlated less than .4). These items were combined with the ten best-performing items selected for the internet group (described below, items 59.1, 59.8, 59.14, 59.15, 59.21, 59.22, 59.24, 59.27, 59.28, and 59.29), resulting in twelve items total, as four items that were least correlated with PANAS items were also part of the best-performing group of *Emotion* items in the internet group.

Means for items 59.1 and 59.28 were at the center of the distribution, but means for the other items were generally towards the low end of the scale. Variances were only slightly smaller than in the internet sample. Inter-item correlations ranged from .30 to .89, and the average inter-item correlation was .60. Cronbach's alpha was .95 for the 12-item scale. Item 59.3 (ambivalent about changing) was removed from the subset because its SMC was below .4, its corrected item-total correlation was .5, and it did not load on the primary factor.

Summary statistics using ALPHAMAX showed that the best five-item *Emotion* scale for the student group correlated with the original eleven items ( $r = .98$ ) and its internal consistency was ( $\alpha = .93$ ). This was composed of different items than what was found for the five best-performing items in the internet group. The correlation of this scale with the eleven-item scale was ( $r = .96$ ) in the student group, and ( $\alpha = .88$ ).

Psychometric differences among different combinations of five-item scales varied only slightly and were always within acceptable levels; correlations between the five- and eleven-item scales ranged from .96 - .98, and internal consistency from .84 to .93.

Because of the homogeneity of items in general and that the group of ten-well performing items in the internet group had already been evaluated as having relatively non-redundant

content and high readability, consideration was given to the option of having the same five or ten *Emotion* items for both groups. This decision was strengthened by the finding that four of the five best-performing items in the internet group were also the least correlated with negative PANAS items in the student group, and represented the best choice with regards to validity concerns. Thus, the same five- and ten-item *Emotion* scales were used in subsequent analyses for both groups.

The process was more straight-forward for the internet group, as negative PANAS items loaded on the second factor, and eight *Emotion* items loaded on the other primary factor .8 or greater. Loadings these high have been shown in simulation studies to be highly reliable with the current sample size (Guadagnoli & Velicer, 1988). The *Emotion* items showed poor discriminant validity with the *Felt Ambivalence* items, but since both sets of items were designed to measure the same construct, it was to be expected. An additional six items loaded on the primary factor greater than .7, and these items formed the initial smaller group of items which were subjected to item-scale and ALPHAMAX analyses: #59.1, #59.5, #59.8, #59.14, #59.15, #59.17, #59.18, #59.21, #59.22, #59.23, #59.24, #59.27, #59.28, and #59.29.

All fourteen items showed means in the centers of the distributions, similar variances, and corrected item-total correlations above .63. The inter-item correlations were generally above .5, but uniform. Summary results from the ALPHAMAX macro found that a scale of seven or eight items would yield an internal consistency estimate greater than .92 and a correlation with the 14-item Emotion scale of .99. However, results also showed that scales as small as three items could yield a Cronbach's alpha of

.87 and a correlation with the 14-item scale of .95. Thus, item content was evaluated to eliminate further redundancy.

Although all items were similarly themed, the one-word items were eliminated as many were also included in longer phrases. For example, item 59.17 (unsure) was eliminated because it was redundant with item 59.22 (unsure about what to do about my drinking). Items 59.5, 59.17, 59.18, and 59.23 were removed, leaving ten items for further consideration. Both five-item scales, either with items 59.1, 59.8, 59.14, 59.27, and 59.29, or the other five items, 59.15, 59.21, 59.22, 59.24, and 59.28, had internal consistency estimates of .89 and a correlation of .98 with the ten-item scale. Thus, these results suggested that it was not important which items were included in the final scale from an empirical perspective.

However, the CASES is ultimately meant to be utilized in research with alcohol-dependent, treatment-seeking participants. A criticism of the CASES has been that the items need to be worded more simply and preferably be no higher than a fifth-grade reading level. The internet sample was highly educated, and it is possible that *Emotion* items may measure felt ambivalence differently when used with a treatment-seeking population. Thus, *Emotion* items were selected for simplistic language. Items with the highest readability scores were: 59.1 (two ways about my drinking), 59.8 (like I want to change and not change my drinking at the same time), 59.15 (like I should cut down but I don't want to), 59.27 (like I waiver back and forth about what to do), and 59.28 (like there are good and bad things about drinking less). These items were rated as having a third grade reading level using the Flesch-Kincaid grade level readability formula, whereas four of the other five items were rated as sixth-grade reading level or above.

The scale composed of these items had an internal consistency estimate of .88 and a correlation with the 10-item scale of .96. Both the ten- and five-item scales were examined in subsequent analyses.

#### **4. What were the estimates of convergent and discriminant validity for the measure?**

All estimates were calculated separately for the student and internet groups. The correlation matrices of the CASES scales are shown in Tables 11 and 12 for the student and internet groups, respectively. The two last columns in these tables report an additional conceptualization of ambivalence—the Griffin equation calculated from the CASES data. The *Sustain* scales were multiplied by negative one to produce a positive sum before applying the Griffin equation. The scores produced by the Griffin calculation correlated between .34 and .70 with all other CASES scales in the student sample, and in particular, the Griffin scores demonstrated significant positive correlations, as desired, with the double-barreled item scale ( $.54 < r < .58$ ), with the Emotion scale ( $.42 < r < .45$ ), and with the Ambivalence scale ( $.59 < r < .66$ ). However, a markedly different pattern of correlations emerged in the internet sample. The Griffin scores were significantly related to the *Double-barreled* ( $.19 < r < .26$ ) and *Emotion* ( $.31 < r < .34$ ) scales, but were generally not related to the *Change*, *Sustain*, or the *Sum of Change and Sustain difference scores* (Ambivalence scale). Importantly, the correlations with the Ambivalence scale were essentially 0 ( $-.01 < r < .06$ ). On the other hand, significant negative correlations were found between the Griffin scores and the absolute value of the Ambivalence scale, a measure with lower scores indicating more ambivalence, in *both* groups ( $-.86 < r < -.96$ ).

**Convergent validity.** It was hypothesized that the *Change* scale of the CASES would positively correlate with the *Avoidance* scale of the AAAQ, the *Benefits of Change* scale of the ADCQ, and possibly the *Problem Recognition* and/or *Taking Steps* scale of the SOCRATES. It was also hypothesized that the *Change* scale would negatively correlate with the two measures of *Felt Ambivalence* (i.e. Lipkus et al., 2005; Priester et al, 2007). Hypothesized associations were correct in the student group for: the *Avoidance* scale ( $r = .619, p < .001$ , 4-item scale;  $r = .632, p < .001$ , 8-item scale), the *Benefits of Change* scale ( $r = .482, p < .001$ , 4-item scale;  $r = .480, p < .001$ , 8-item scale), the *Problem Recognition* scale ( $r = .752, p < .001$ , 4-item scale;  $r = .789, p < .001$ , 8-item scale), and the *Taking Steps* scale ( $r = .640, p < .001$ , 4-item scale;  $r = .649, p < .001$ , 8-item scale). However, the *Change* scale did not correlate as predicted with both measures of *Felt Ambivalence*. The *Change* scale was correlated with the Lipkus et al. instrument ( $r = .487, p < .001$ , 4-item scale;  $r = .507, p < .001$ , 8-item scale), but positively correlated, not negatively. It was also positively correlated with the Priester et al. instrument ( $r = .278, p < .05$ , 4-item scale;  $r = .257, p < .05$ , 8-item scale).

In the internet group, hypothesized correlations were correct for: the *Avoidance* scale ( $r = .510, p < .001$ , 4-item scale;  $r = .467, p < .001$ , 8-item scale), the *Benefits of Change* scale ( $r = .582, p < .001$ , 4-item scale;  $r = .610, p < .001$ , 8-item scale), the *Problem Recognition* scale ( $r = .849, p < .001$ , 4-item scale;  $r = .880, p < .001$ , 8-item scale), and the *Taking Steps* scale ( $r = .532, p < .001$ , 4-item scale;  $r = .494, p < .001$ , 8-item scale). The correlation with *Felt Ambivalence* was also positive, not negative: the Lipkus et al. scale was ( $r = .524, p < .001$ , 4-item scale;  $r = .497, p < .001$ , 8-item scale),

and the Priester et al. scale was ( $r = .431, p < .001$ , 4-item scale;  $r = .418, p < .001$ , 8-item scale).

Convergent validity for the *Sustain* scale of the CASES was hypothesized to be established if it correlated positively with the *Approach* scale of the AAAQ and the *Costs of Change* scale of the ADCQ. Differential results were found between the groups. In the student group, it correlated with the *Approach* scale ( $r = .248, p < .01$ , 4-item scale;  $r = .224, p < .05$ , 8-item scale), and similarly with the internet group ( $r = .272, p < .01$ , 4-item scale;  $r = .288, p < .01$ , 8-item scale). But the *Sustain* scale correlated with the *Costs of Change* scale ( $r = .397, p < .001$ , 4-item scale;  $r = .383, p < .001$ , 8-item scale) in the student group but not in the internet group ( $r = .048, p = .623$ , 4-item scale;  $r = .101, p = .305$ , 8-item scale).

The overall ambivalence score (calculated by subtracting the *Sustain* score from the *Change* score) was predicted to correlate positively with both measures of Attitudinal Ambivalence; the first was adapted from Priester et al. (2001), and the second utilized the attitudinal component technique and the Griffin formula. Mixed support was found for this prediction. In the student group, the Ambivalence score calculated from the 4-difference score scale correlated with the Priester measure, but the 8-difference score measure did not ( $r = .185, p < .05$ , 4-difference score scale;  $r = .156, p = .087$ , 8-difference score scale). Neither difference score scale correlated with the other measure of Attitudinal Ambivalence calculated using the Griffin equation ( $r = .063, p = .517$ , 4-difference score scale;  $r = .067, p = .501$ , 8-difference score scale). In the internet group, the Ambivalence score correlated with the Priester et al. measure ( $r = .303, p < .001$ , 4-difference score scale;  $r = .277, p < .01$ , 8-difference score scale). The Ambivalence



score calculated from the 4-difference score scale also correlated with the attitudinal component technique measure ( $r = .190, p < .05$ ), but the 8-difference score version did not ( $r = .177, p = .073$ ).

It was hypothesized that the absolute value of the overall Ambivalence score (the difference from zero, a possible indication of ambivalence with lower numbers representing more ambivalence) would correlate negatively with the two measures of *Felt Ambivalence*, the *Ambivalence* scale of the SOCRATES, and the total Apathy score. This prediction was supported for all measures except for the *Felt Ambivalence* measure adapted from Priester et al. (2007) in the student group. Correlations of the absolute value of the Ambivalence score with *Felt Ambivalence* were ( $r = -.255, p < .01$ , 4-difference score scale;  $r = -.289, p < .01$ , 8-difference score scale) for the Lipkus instrument and ( $r = -.055, p = .644$ , 4-difference score scale;  $r = -.004, p = .976$ , 8-difference score scale) for the Priester measure. The absolute Ambivalence score also correlated negatively with the *Ambivalence* scale of the SOCRATES ( $r = -.440, p < .001$ , 4-difference score scale;  $r = -.428, p < .001$ , 8-difference score scale) and the Apathy scale ( $r = -.364, p < .001$ , 4-difference score scale;  $r = -.399, p < .001$ , 8-difference score scale).

The pattern of correlations was very different in the internet group; the absolute Ambivalence score was only correlated with the *Ambivalence* scale of the SOCRATES, and less so compared to the student group ( $r = -.238, p < .01$ , 4-difference score scale;  $r = -.218, p < .05$ , 8-difference score scale). The absolute value of the Ambivalence score was unrelated to the Lipkus or Priester *Felt Ambivalence* measures ( $r = -.159, p = .099$ , 4-difference score scale;  $r = -.155, p = .113$ , 8-difference score scale) and ( $r = .002, p =$

.982, 4-difference score scale;  $r = -.003$ ,  $p = .977$ , 8-difference score scale), respectively. It was also unrelated to Apathy ( $r = -.109$ ,  $p = .246$ , 4-difference score scale;  $r = -.113$ ,  $p = .230$ , 8-difference score scale).

Convergent validity predictions for the *Emotion* scale of the CASES were that it would positively correlate with both measures of *Felt Ambivalence* and the *Negative* scale of the PANAS. Hypotheses were similarly supported for both groups, expect that the *Emotion* scale was more weakly correlated with the negative affect scale of the PANAS in the internet group: ( $r = .581$ ,  $p < .001$ , 4-item scale;  $r = .609$ ,  $p < .001$ , 8-item scale) for the student group and ( $r = .294$ ,  $p < .01$ , 4-item scale;  $r = .394$ ,  $p < .001$ , 8-item scale) for the internet group. The *Emotion* scale also showed convergent validity with the Lipkus *Felt Ambivalence* scale ( $r = .641$ ,  $p < .001$ , 4-item scale;  $r = .634$ ,  $p < .001$ , 8-item scale) and the Priester measure ( $r = .532$ ,  $p < .001$ , 4-item scale;  $r = .573$ ,  $p < .001$ , 8-item scale) in the student group, and similarly for the internet group ( $r = .753$ ,  $p < .001$ , 4-item scale;  $r = .771$ ,  $p < .001$ , 8-item scale) and ( $r = .582$ ,  $p < .001$ , 4-item scale;  $r = .696$ ,  $p < .001$ , 8-item scale), respectively.

**Discriminant validity.** It was hypothesized that the double-barreled item scale would not correlate with the Apathy or Brief Resiliency scales; however, these scales were significantly related in both groups. The double-barreled score demonstrated a negative correlation with resilience. The more ambivalent participants were, the lower their resiliency score: ( $r = -.315$ ,  $p < .001$ , 3-item scale;  $r = -.349$ ,  $p < .001$ , 6-item scale) for the student group and ( $r = -.402$ ,  $p < .001$ , 3-item scale;  $r = -.362$ ,  $p < .001$ , 6-item scale) for the internet group. Also, the more ambivalent participants were, the more apathetic they were as well, in both the student and internet groups, respectively ( $r = .234$ ,  $p < .05$ ,

3-item scale;  $r = .193, p < .05$ , 6-item scale) and ( $r = .314, p < .001$ , 3-item scale;  $r = .197, p < .05$ , 6-item scale).

It was also predicted that there would be a zero correlation between the Ambivalence score and the Brief Resiliency scale, but this was also not supported in either group. Instead, negative relationships were found ( $r = -.358, p < .001$ , 4-difference score scale;  $r = -.386, p < .001$ , 8-difference score scale) for the student group and ( $r = -.309, p < .001$ , 4-difference score scale;  $r = -.324, p < .001$ , 8-difference score scale) for the internet group.

Lastly, it was hypothesized that the absolute value of the ambivalence score would not correlate with the Apathy measure or the *Negative* or *Positive* affect scales of the PANAS. Support for these predictions was generally found in the internet group but not the student group. In the student group, the absolute Ambivalence score negatively correlated with Apathy ( $r = -.364, p < .001$ , 4-difference score scale;  $r = -.399, p < .001$ , 8-difference score scale) and negative affect ( $r = -.340, p < .001$ , 4-difference score scale;  $r = -.356, p < .001$ , 8-difference score scale) but did not correlate with positive affect ( $r = .050, p = .584$ , 4-difference score scale;  $r = .048, p = .600$ , 8-difference score scale).

In the internet group, there were no significant correlations except that the absolute Ambivalence score computed from the 8-difference score version weakly correlated with negative affect ( $r = -.195, p < .05$ ). All other correlations were non-significant.

## Discussion

The focus of the present research was to continue the development of a measure of ambivalence about drinking less, which might be used to investigate whether the resolution of ambivalence is a mechanism of change in future research. The new instrument, the Change, Ambivalence, Sustain, and Emotion scales (CASES), conceptualizes readiness to change as a continuum, with wanting to maintain current drinking levels at one end, wanting to change alcohol consumption on the other, and the simultaneous presence of these two competing perspectives as ambivalence. The resolution of ambivalence is an appealing explanation of how people change, but has so far received limited investigation due to a lack of a specific measure of ambivalence, especially as it is conceptualized in the context of Motivational Interviewing. This study investigated the psychometric properties of the CASES in two different samples of at-risk drinking individuals, 129 undergraduate college students and 128 individuals recruited from online sources.

Data were first screened to assess if participants recruited from online who also indicated that they were undergraduate students should be considered part of the student or internet samples. Although they reported being undergraduate students, they were systematically different from the UNM undergraduate students, and more similar to the nonstudent group. The non-UNM student group was significantly older than the UNM students and significantly younger than the nonstudent group, but their readiness to change, alcohol use, and negative consequences were not statistically different from the nonstudent group, except for alcohol avoidance behaviors. They constituted too small of a sample ( $n = 84$ ) to allow for meaningful exploratory factor analysis results if they

were categorized into their own group. Thus, it was decided for the purposes of this study to include them in the internet group.

Next, data were analyzed for differences between participants who completed most of the survey and those who only completed the initial demographic section, to assess the generalizability of findings. Many of the differences found can be explained by the fact that undergraduate student participants were required to complete the whole survey to receive research participation credit. Thus, participants who began the substantive portion of the survey were more likely to report being an undergraduate student and that their last drink was over a month ago or more. They were also significantly younger, less likely to be married, less likely to have a college degree, and less likely to have gone to an AA meeting. Participants who only answered demographic questions were more likely to report that their last drink was within the last hour or the last 24 hours, and to have heard about the study from Craig's List, Facebook, or Backpage.com. Given that participants had to begin the survey to see its questions, it is not surprising that participants recruited from these online sources were more likely to discontinue the survey early. For example, they may have simply been curious about the study or decided that they did not feel like answering many questions.

Survey completers and non-completers were not significantly different in gender, race, income, or Hispanic or Latino/a ethnicity. They were also approximately equally concerned about their alcohol use, equally unlikely to be considering treatment, equally likely to be considering self-change, and indicated similar levels of both wanting and not wanting to change their drinking on their own (ambivalence). However, the non-completion group had less confidence in their ability to change their drinking on their

own. Although this difference was significant, on average it was less than half of a point difference between the groups.

Given that the group of participants who only completed demographic information did not complete the AUDIT, information about the at-risk drinking status of this group was unavailable. Reported rates of AA attendance for both the non-completion and completion groups were generally low (16% and 13%, respectively); however, the non-completion group reported more AA attendance, suggesting problematic alcohol use. Considered together, these results suggest that participants who were not included in subsequent analyses due to early non-completion of the survey were fairly similar to participants who were included in subsequent analyses, as most differences between the two groups can be explained by a greater proportion of survey completers also being undergraduate students.

Lastly, differences between the student and internet groups were examined. The internet group consumed more alcohol and generally indicated more readiness to change compared to the student group. For example, nearly two thirds of the internet group was concerned about their drinking compared to only a quarter of the student group. Likewise, over five times more participants in the internet group were considering treatment compared to the student group. These and other significant differences between the two samples suggested that the factor structure of the CASES may also be different for these two groups. Analyses utilized to inform instrument development were therefore conducted separately for both samples. Although the number of factors revealed during the EFAs was often similar, which items loaded on particular factors and the magnitude of their loadings often differed between the groups. Similarly, results of

the item analyses and convergent and discriminant validity correlations also diverged between the two groups for some items and assessments.

The CASES measured ambivalence using three different methods, the double-barreled items method, the sum of *Change* and *Sustain* difference scores method, and the *Emotion* items method. This study found support for all three methods. Exploratory factor analyses were first conducted, and then a subgroup of well-performing items were formed based on the factor analytic results, considering both factor analyses of only the potential items comprising the particular scale as well as of those items combined with items measuring other relevant constructs to enhance the construct validity of the final measure. Next, item and item-scale analyses were conducted to assess which combination of items would form the ideal scale. Two different versions of each scale were created, one shorter one and a second containing twice as many items as the first. The correlations of both versions with other assessments were inspected to ascertain the associations of the CASES scales with other relevant constructs.

### **Double-barreled items**

The use of double-barreled items in psychological assessments is unclear and imprecise, and their use is not recommended for instrument development (DeVellis, 2003; Shultz & Whitney, 2005). However, they were included in the initial item pool because they reflected the simultaneous presence of opposing motivations for change, and therefore may measure this elusive characteristic of ambivalence appropriately. An advantage of this method was its simplicity; double-barreled items could be summed directly, without requiring the combination of scales measuring opposing motivations, as was the case with the *Change* and *Sustain* difference scores method. A disadvantage was

its lack of clarity. For example, if participants answered “absolutely disagree” to double-barreled item # 35, “I really want to change my drinking, I just don’t know why I don’t stop”, were they disagreeing with “I really want to change my drinking”, “I just don’t know why I don’t stop” or both?

The double-barreled items initially emerged on one factor for the student group and two for the internet group, suggesting systematic differences in the measurement of ambivalence using this method between these two groups. However, this difference was not easily discerned, except that the internet group endorsed these items to a significantly higher degree than the student group. Double-barreled items #4 and #41 did not load on the second factor in the internet group. Their average intercorrelation with items #35, #37, and #45 (which loaded on the first factor) was .29, just below the cut point of .30. Clark and Watson (1995) suggested that if the average intercorrelation between items from the first and second factors is above .3, the division into two separate factors is unwarranted. Item #21 was uncorrelated with items #4 or #41, and had the lowest loading on the first factor (.52). Thus, while a 6-item scale may be warranted for the student group based on EFA results conducted with only the double-barreled items, it was not appropriate for the internet group.

However, #21 and #41 did not load on any factor when EFAs were conducted with the *Felt Ambivalence* items from the Lipkus et al. (2005) instrument in the student group, suggesting that these items do not measure the same latent construct as the other double-barreled items. In the internet group, #4 and #21 did not load on any factor in the joint EFA, and #41 loaded on the first factor of *Felt Ambivalence* items. Thus, the 3-item double-barreled scale, comprised of items #35 (I really want to change my drinking, I just



don't know why I don't stop), #37 (I really want to quit drinking or drink less, but every time I try something happens that makes it impossible), and #47 (I always say that I want to change my drinking, but then I just do things as I've always done) was the most appropriate version of this scale, based on concerns about construct validity and that the EFA results showed that these items consistently loaded on the same latent factor.

The 3-item scale had an internal consistency estimate of .87 and correlated with the 6-item scale .93 in the student group. Internal consistency was .81 and it correlated .92 in the internet group. Small decreases in alpha are expected when scales are administered in different samples (Hayes, 2005), thus internal consistency for this scale may fall below .8 in future research when administered to nonstudent samples.

Given the lack of clarity associated with the use of double-barreled items, Item Response Theory (IRT) should be utilized in future research once more data are collected. IRT provides more precise information about item functioning for each individual item through the use of item characteristic curves (Clark & Watson, 1995). It can measure ambivalence independent of the specific participant completing the assessment, by establishing the level of ambivalence needed to endorse that item highly at the item level. This could be useful given the heterogeneity of the at-risk drinking population, and that the degree to which sample-specific variability may have influenced the formation of CASES scales in the current study is currently unknown, except from what can be inferred by a description of sample characteristics. Classical Test Theory sums similar items to calculate the level of the trait estimated, but IRT can be used to give additional information, such as an item's ability to discriminate and its tendency to identify 'false positives' (DeVellis, 2003). An estimation of an item's discrimination, or

how unambiguously it measures ambivalence with different levels of this trait, would be useful. Item discrimination would likely differ between the student and internet samples, given that students on average endorsed less ambivalence compared to the internet sample. Knowing an item's ability to detect false positives would also be useful when evaluating ambivalence as a mechanism of change. Misclassifying participants as ambivalent when they actually were not may influence the validity of findings in future research.

Additionally, if the double-barreled item method remains a viable option in subsequent research, additional items should be written and administered to development samples. A candidate item pool of only six items was not sufficient. After EFA results showed three of them to be faulty, there were only three items left to form the scale. The addition of one more appropriate item would most likely increase the internal consistency estimate when administered to new samples. This scale was highly correlated with the other scales from the CASES, demonstrating convergent validity. However, their use may be unnecessary to adequately measure ambivalence if the *Change* and *Sustain* difference score method and the *Emotion* method are both utilized.

### ***Change and Sustain* difference scores**

Several of the 26 difference scores did not load on either factor for both groups. There was mixed evidence for the presence of a second factor, although the difference scores that may comprise the second factor were different in each group. Future research is needed to clarify the factor structure of this scale if a second factor is included. However, robust results from the current research found a subset of eight or nine difference scores that were strong candidates for the first factor, and which will be

included in the fifth version of the CASES. Of note, this subgroup of difference scores was the same for both groups with one exception, increasing confidence that they performed well in both the student and internet groups.

The exception was difference score #10 (important to drink less). At face value, even if college students were drinking at risky levels, whether or not it was important to them to drink less would understandably impact their ambivalence and readiness to change. Although this difference score reflects potentially important information about ambivalence, its factor loading for the single factor solution was .624 in the student group and .530 in the internet group. Given the potential instability of factor loadings with sample sizes below 150 participants (Guadagnoli & Velicer, 1988), it will be retained for further research, but was not chosen for the *Change* and *Sustain* difference scores scale at this time based on the results of the current study.

The eight difference scores which were part of the candidate group were: #11 (ideal life), #12 (getting ahead), #18(family), #20 (relationships in general), #22 (disappointment/personal responsibility), #23 (having drinking problem), #24 (drunken mistakes), and #25 (self-concept). A mixed-method examination of the difference scores comprising this scale was conducted, and the inter-item correlation matrix was inspected for overly-high correlations with specific other difference scores, to evaluate for potential redundancy in item content. This analysis reduced the potential subgroup of well-performing difference scores even further, as ALPHAMAX results also revealed that smaller combinations of four difference scores would produce an ideal internal consistency estimate ( $\geq .89$ ) as well as a very high correlation with the scale based on the eight-difference scores ( $r = .96$ ).

Thus, two scales were formed, one larger group of eight difference scores formed based on the EFA results, and a smaller one based on results from the content, readability, internal consistency, and correlation analyses with the eight-difference score scale. Synthesizing results from these sources of corroborating evidence, a four-difference score scale was chosen comprised of difference scores #11 (ideal life), #20 (relationships in general), #23 (having drinking problem), and #25 (self-concept). They reflected ambivalence and readiness to change concerning alcohol consumption and its negative impact on participants' lives: the degree of mismatch between their ideal life based on who they feel they really are and how they are currently living, as well as the impact of drinking on their relationships and the awareness of their own problems with their drinking. The impact of drinking on an individual's interactions with others is salient and specific, but it was interesting that all of the difference scores in this scale reflected drinking consequences that were also general. Revealing how they measure ambivalence in diverse samples represents an interesting line of future research.

The content of the eight-difference score scale also included difference scores #12 (getting ahead), #18 (family), #22 (disappointment/personal responsibility), and #24 (drunken mistakes). A rational analysis of item content showed that they represented diverse but similarly-themed content compared to the four-difference score scale. Empirical results also showed that participant responses to these items were similarly ranked when compared to the four-difference score scale ( $r = .96$ ).

Joint EFAs revealed that the eight difference scores were relatively differentiated from the negative affect items of the PANAS and the *Felt Ambivalence* measure, but not

the double-barreled items. This was not surprising given that the double-barreled items were also written to measure ambivalence.

Many of the difference scores querying about emotional content such as #1 (drink to feel better) or #2 (manage stress) had moderate negative loadings in the student group or no loadings on the primary factor in the internet group. Disregarding these items may have had a negative impact on construct validity if the difference scores scale were the only method of measuring ambivalence utilized. However, including the *Emotion* scale in the CASES should ensure that the full domain of ambivalence is measured. This is similar to methods of measuring ambivalence in the social psychological literature, such as incorporating the measurement of both objective (attitudinal) or subjective (felt) ambivalence. In this conceptualization, the difference score scale would be a measure of attitudinal or objective ambivalence, and the *Emotion* scale would measure subjective or felt ambivalence.

### ***Emotion items***

EFA's conducted with only the *Emotion* items showed that this scale was unidimensional in both groups. There were several candidate items which loaded highly on the primary factor. Joint EFA's conducted with items from only one other related assessment were also conducted. Items with low or no primary factor loadings, items that loaded on both factors, or items that loaded highly on the same factor as items from related assessments, were eliminated from the candidate item pool, reducing this subgroup further. The pattern of factor loadings varied, but in general the *Emotion* items were relatively differentiated from negative PANAS and *Felt Ambivalence* items but not the double-barreled items.

Although underpowered, joint EFAs with all related constructs combined were also conducted to eliminate poorly loading items, or items which were more similar to related constructs than the candidate pool of *Emotion* items. Results were more straightforward to interpret in the internet group than the student group. In the internet group, several difference scores loaded .8 or above on the primary factor, which was also relatively differentiated from the PANAS negative affect items and *Felt Ambivalence* items. Several *Emotion* items loaded on the same factor as the PANAS items in the student group, thus items were also chosen for retention due to their lower correlations (.4 or below) with these items. The group of ten highest-loading *Emotion* items in the internet group was also part of the group of eighteen highest-loading items in the student group, and four items with correlations .4 or below were also a part of this 10-item subgroup. Thus, a 10-item *Emotion* scale was developed containing items 59.1, 59.8, 59.14, 59.15, 59.21, 59.22, 59.24, 59.27, 59.28, and 59.29. However, results from using ALPHAMAX showed that the *Emotion* scale could be reduced further while still maintaining a high level of internal consistency and a high correlation with the 10-item scale. Given the homogeneity of items empirically, items were chosen for their readability, creating a 5-item scale that was at a third grade reading level. These items were: 59.1 (two ways about my drinking), 59.8 (like I want to change and not change my drinking at the same time), 59.15 (like I should cut down but I don't want to), 59.27 (like I waiver back and forth about what to do), and 59.28 (like there are good and bad things about drinking less).

Discriminant validity estimates showed that the 5- and 10-item *Emotion* scales were correlated with the negative affect PANAS scale .58 and .61 in the student group,

respectively, but only .29 and .39 in the internet group, respectively. This finding corroborated the joint EFA results, which found that the majority of PANAS items loaded on the same factor as the *Emotion* items in the student group but not the internet group. Furthermore, this scale was uncorrelated with the positive affect PANAS scale in the student group, but correlated -.31 and -.32 in the internet group. These findings suggest that felt or subjective ambivalence is different in college students who engage in risky drinking compared to nonstudents who are at-risk drinkers. Not only are the relationships between felt ambivalence and negative or positive affect different, but also the current study suggests that nonstudents feel more emotional intensity when considering drinking less alcohol, given their higher average score on both the 5- and 10-item *Emotion* scales. Further research is needed to explore this difference.

The *Emotion* and *Felt Ambivalence* items were developed to measure the same construct. Convergent validity estimates found that the 5- and 10-item *Emotion* scales correlated with the Lipkus et al. (2005) instrument .64 and .63, respectively, in the student group and .75 and .77, respectively, in the internet group. They were also correlated with the Priester et al. (2007) *Felt Ambivalence* instrument .53 and .57, respectively, in the student group and .58 and .70, respectively, in the internet group. Adequate evidence for convergent validity was found.

The finding that the *Emotion* items were uni-dimensional contradicted previous research, which found two factors that were negatively correlated (Rice et al., 2012). Two differences between the previous and current studies which may explain differential results were that in the previous study college student participants were not necessarily drinking at-risk, and also that Direct Oblimin rotation was utilized. When 2-factor EFAs

using Direct Oblimin rotation were specified in the current study, factors were relatively unrelated in the student sample ( $r = .03$ ), but highly negatively correlated in the internet sample ( $r = -.71$ ). However, when Promax rotation was used, the two factors were positively correlated in both the student ( $r = .81$ ) and internet ( $r = .76$ ) groups. This finding highlights how vastly different factor correlations can be with different rotational techniques and participants who differ in only one key aspect. If the results of the current study are to be replicated with EFA, they should be conducted with the same rotational technique and with participants who are drinking at-risk.

### **Limitations and future directions**

This study explored the development and psychometric properties of a new measure of ambivalence about reducing drinking in two different groups of at-risk drinkers, undergraduate students and participants recruited from online sources. Although some of the EFAs were conducted with an adequate number of participants, several were not and await replication in future research. However, a Monte Carlo study conducted by Guadagnoli and Velicer (1988) showed that the number and magnitude of factor loadings was more important than the ratio of participants to items. Concerns about power influenced the interpretation of factor analytic results; items were only selected for subsequent analysis if they loaded on the primary factor greater than .6, and factors defined by less than four items or difference scores were not interpreted. Items selected using these criteria should be more likely to replicate in a future study.

Sample-specific variance also may have influenced study findings due to the small number of participants. The sample of UNM undergraduates had a mean age of twenty-two and was very ethnically diverse, and a failure to replicate results in a future



study may be because of participant heterogeneity. However, data collection for this study is ongoing. Although recruitment of the internet sample has stalled, approximately two hundred more at-risk drinking undergraduate students are expected to participate in this study. Analyses will be repeated with more data, resulting in a version of the CASES for at-risk drinking college students developed with more stable parameter estimates.

The recruitment sources of the internet group also influenced study findings. On the one hand, participants in this group were diverse, and results from participants recruited through Craig's List and backpage.com would be expected to generalize to a population of at-risk drinkers who are likely to complete an online survey advertised on these websites. Participants recruited through Facebook, however, were either part of the researcher's social network or part of her Facebook friends' social networks. How this recruitment source affected the generalizability of results was unknown. However, it was suspected that relatively few of the participants recruited from this source were classified as at-risk drinkers, and therefore would not be present in the primary analyses. Perhaps a better recruitment source for future research would be the Amazon Mechanical Turk website, where participants complete online surveys for a nominal fee.

Instrument development is an iterative process, and requires that findings be replicated with numerous samples. Additionally, the measurement of ambivalence is complicated. As an example, the *Emotion* item "ambivalent about changing" did not load on either factor for both groups, despite in some ways being the item with the greatest face validity. Further, the population of problem drinkers is heterogeneous, and future research will be required to assess if the factor structure of the CASES is different with different types of at-risk drinkers or when ambivalence is assessed longitudinally. When

larger samples are available, future research should use item response theory to guide item selection and structural equation modeling to assess measurement invariance (Tabachnick & Fidell, 2007). Future research will also administer the version 4.0 of the CASES to develop a fifth version for use with alcohol-dependent, treatment-seeking participants to investigate if the resolution of ambivalence is a mechanism of change.

This study provided empirical support for the Change, Ambivalence, Sustain, and Emotion scales (CASES) for alcohol use disorder research. It is a readiness to change measure that specifically measures ambivalence about drinking less. The sum of positive items in the *Change* scale measures reasons or feelings which relate to wanting to change alcohol consumption, and the sum of negative items in the *Sustain* scale measures reasons or feelings that reflect a desire to maintain current drinking patterns. The summation of these two scores provides a measure of change readiness, with more extremely negative scores indicating motivation to maintain the status quo, more extremely positive scores indicating motivation to change, and scores of zero or near zero indicating the simultaneous presence of these opposing motivations, ambivalence. The Ambivalence score can be further refined by taking its absolute value; lower scores indicate more ambivalence. The sum of Change and Sustain difference scores measures attitudinal or objective ambivalence, and the *Emotion* scale measures felt or subjective ambivalence. A scale comprised of double-barreled items was also retained for analysis in subsequent research.

Although it is likely that there are multiple mechanisms that explain how at-risk drinkers make changes in their drinking, the resolution of ambivalence is an appealing

explanation. The development of a better measure of ambivalence is an essential step towards continuing this line of research.

## Figures

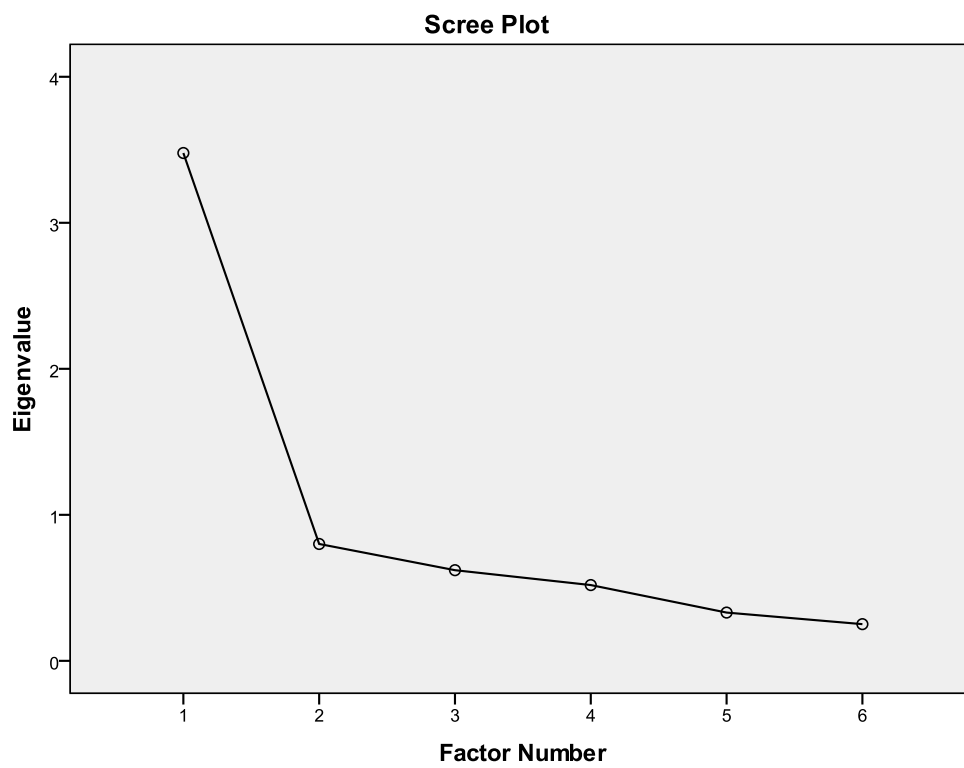


Figure 1. Scree plot of Double-barreled items for the student sample.

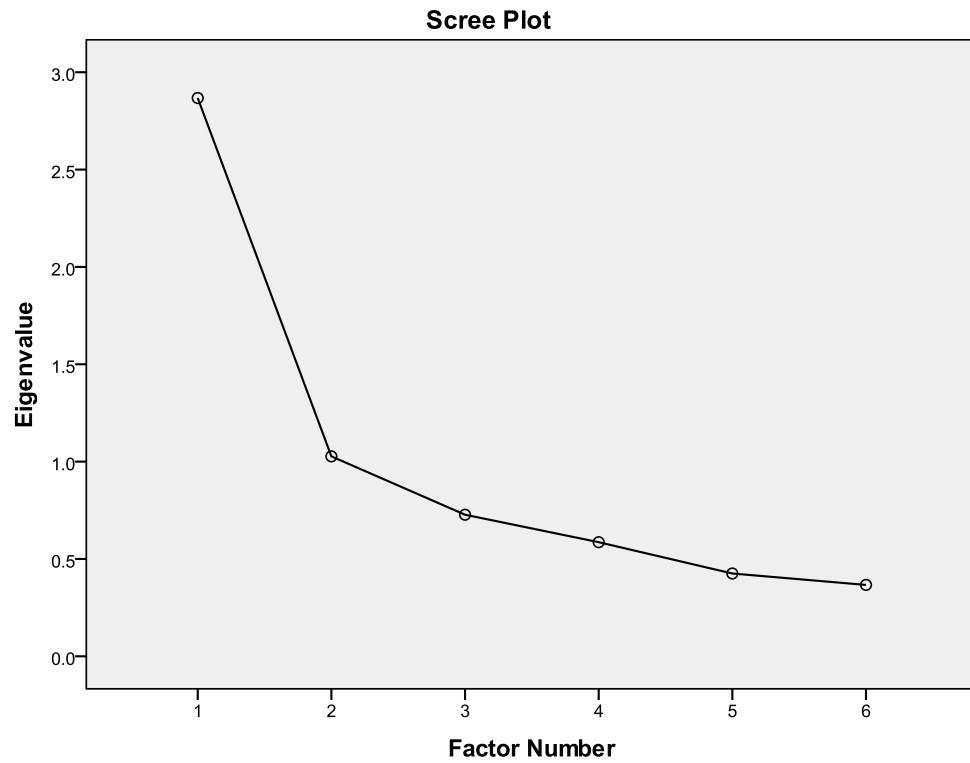


Figure 2. Scree plot of Double-barreled items for the internet sample

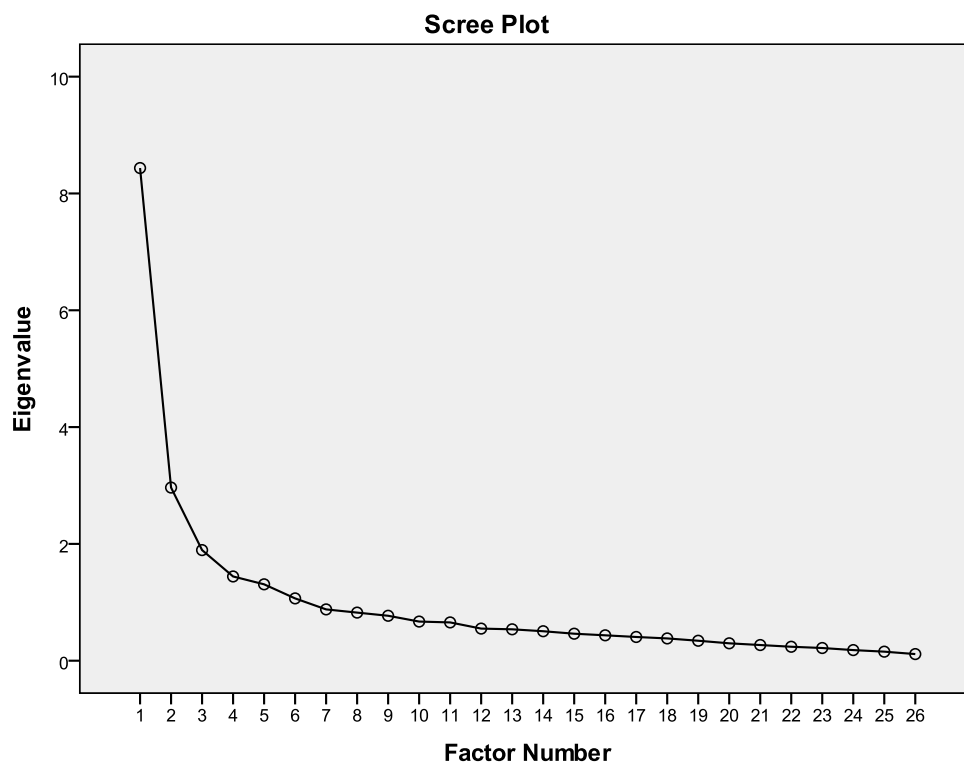


Figure 3. Scree plot of *Change* and *Sustain* difference scores in the student group

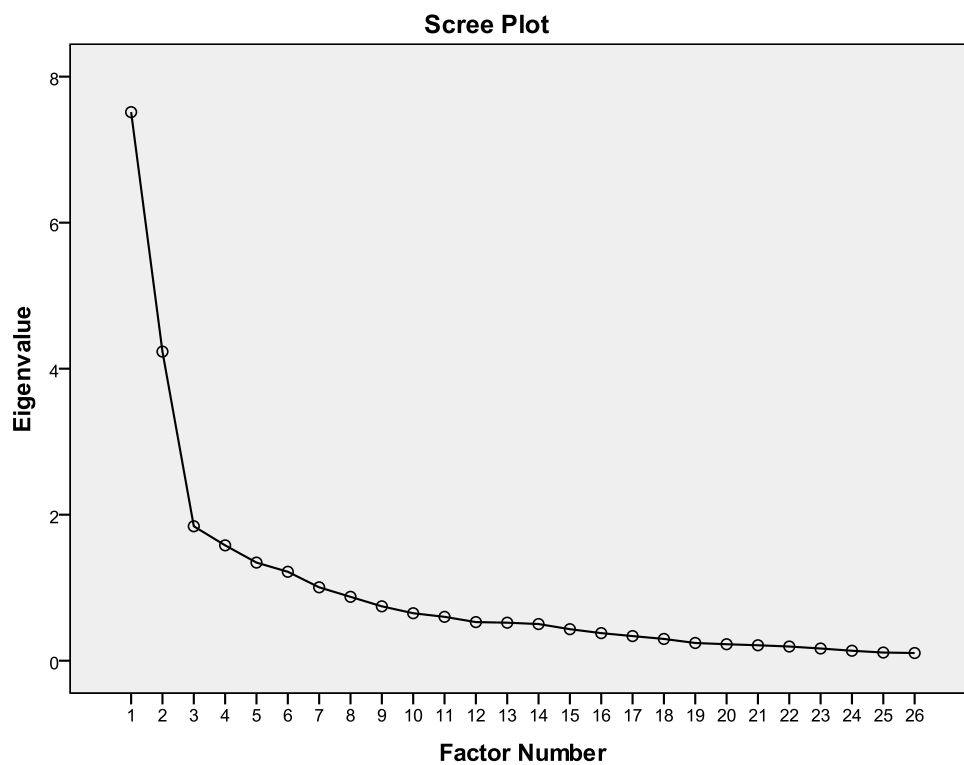


Figure 4. Scree plot of *Change* and *Sustain* difference scores in the internet group

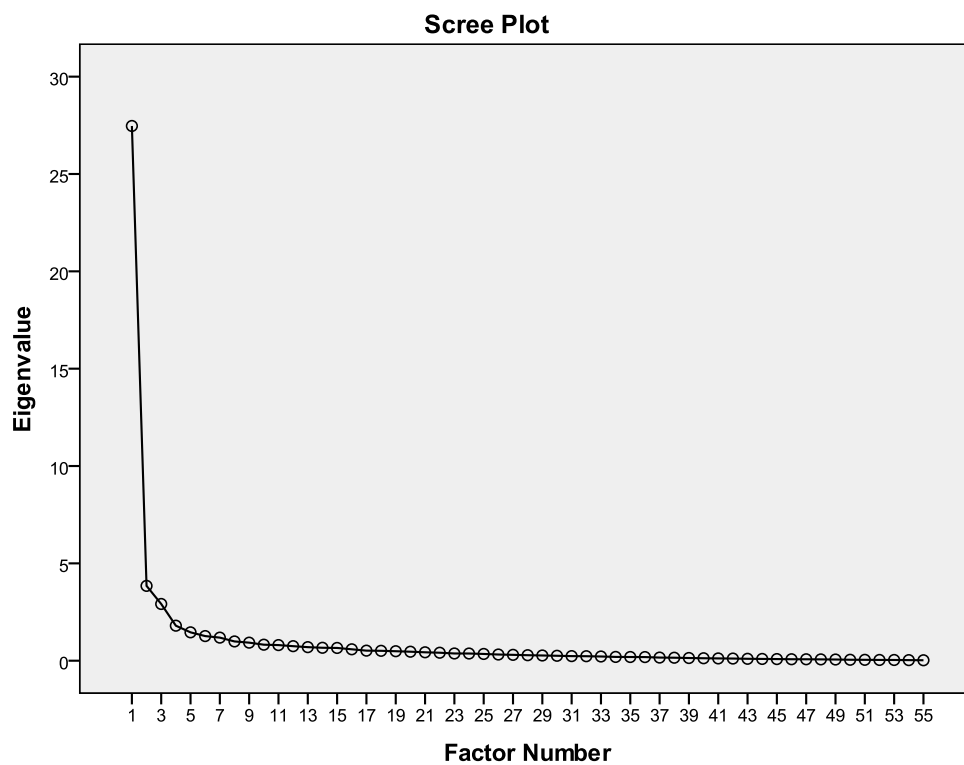


Figure 5. Scree plot of *Emotion* scale items for student sample



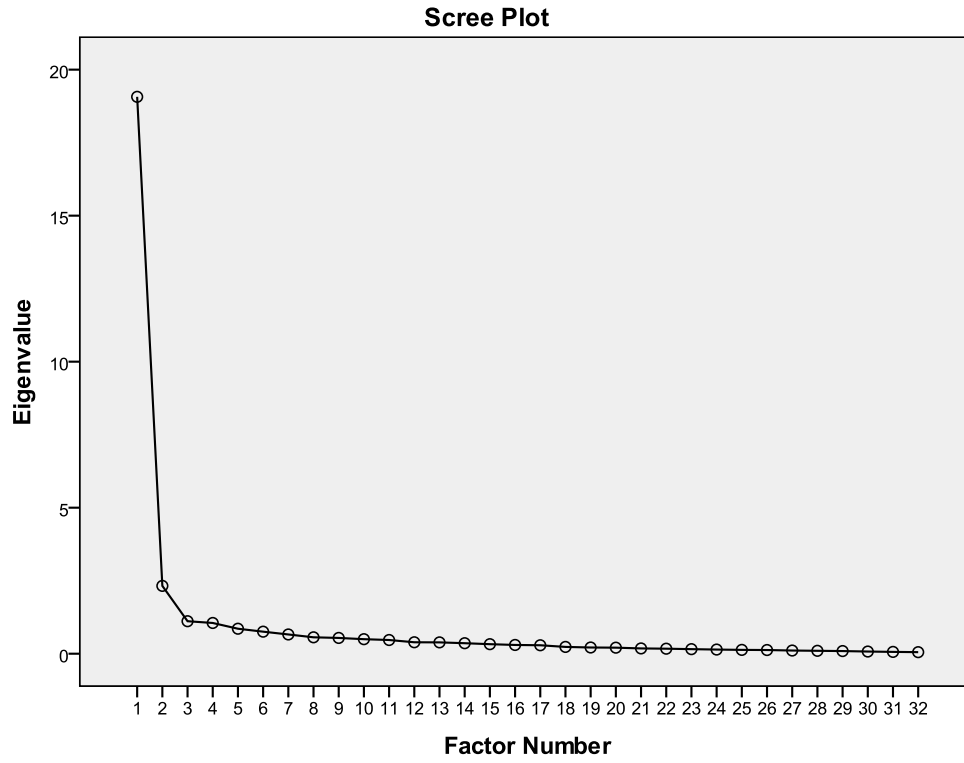


Figure 6. Scree plot of *Emotion* scale items for internet sample

Table 1. Differences among UNM student ( $n = 266$ ), non-UNM student ( $n = 84$ ), and non-student ( $n = 259$ ) groups

Variable	Mean	SD	$F(df)$	$p$
Age				
UNM student	22.06	5.82	146.09(2,606)	< .0001
Non-UNM student	25.64 <sup>a,b</sup>	9.11		
Non-student	36.18	12.47		
AUDIT score				
UNM student	7.24	5.49	32.01(2, 429)	< .0001
Non-UNM student	11.59 <sup>a</sup>	8.66		
Non-student	13.23	9.32		
SADD score				
UNM student	6.77	7.97	12.00(2, 419)	< .0001
Non-UNM student	11.29 <sup>a</sup>	9.79		
Non-student	11.15	10.71		
AAAQ-Approach Scale				
UNM student	24.58	19.63	24.55(2, 439)	< .0001
Non-UNM student	33.53 <sup>a</sup>	20.56		
Non-student	39.33	22.23		
AAAQ-Avoidance Scale				
UNM student	23.41	18.06	4.50(2, 443)	.0116
Non-UNM student	26.61 <sup>b</sup>	19.40		
Non-student	18.85	16.81		
SOCRATES-Ambivalence				
UNM student	7.23	4.27	19.20(2, 451)	< .0001
Non-UNM student	9.37 <sup>a</sup>	5.77		
Non-student	10.18	5.31		
SOCRATES-Problem Recog				
UNM student	11.62	6.45	18.19(2, 451)	< .0001
Non-UNM student	14.98 <sup>a</sup>	8.31		
Non-student	16.12	8.79		
SOCRATES-Taking Steps				
UNM student	16.86	9.29	5.23(2, 447)	.0057
Non-UNM student	18.64	9.54		
Non-student	19.95	9.56		

<sup>a</sup>Significantly different from the UNM student group

<sup>b</sup>Significantly different from the non-student group

Table 2. Comparison of participants who only answered demographic questions ( $n = 122$ ) with those who began ambivalence portion of survey ( $n = 487$ ).

Variable	Demographic questions only (n=122)	Began next section (n=487)	Test statistic (df)	p
Gender				
Female	69 (56.56%)	291 (59.75%)	$\chi^2=0.41$ (1)	.521
Age	31.93 (10.72)	27.72 (11.77)	$t = -3.59$ (607)	< .001
Race				
White, non-Hispanic	83 (68.03%)	317 (65.09%)	$\chi^2 = 5.06$ (2)	.080
Black/African American	14 (11.48%)	33 (6.78%)		
Other	25 (20.49%)	137 (28.13%)		
Hispanic or Latino/a	30 (24.59%)	163 (33.47%)	$\chi^2=4.48$ (1)	.107
Undergraduate student	35 (28.69%)	314 (64.48%)	$\chi^2=51.25$ (1)	< .001
Marital status				
Married/cohabitating	53 (43.44%)	121 (24.85%)	$\chi^2=16.53$ (1)	< .001
Education				
College degree	58 (47.54%)	152 (31.21%)	$\chi^2=11.52$ (1)	< .001
Annual household income	\$44,727 (\$53,670)	\$55,189 (\$2,666,822)	$t = 0.43$ (607)	.667
Median	\$30,000	\$23,000		
Recruitment source				
Craig's List	22 (18.03%)	33 (6.78%)	$\chi^2=75.75$ (4)	< .001
Facebook	31 (25.41%)	57 (11.70%)		
Student research (UNM)	14 (11.48%)	262 (54.41%)		
Word of mouth	16 (13.11%)	50 (10.27%)		
Other	39 (31.97%)	85 (17.45%)		
Concerned about drinking	42 (34.43%)	138 (28.34%)	$\chi^2=1.82$ (1)	.402
Alcohol use intentions				
Drink less alcohol	48 (39.34%)	170 (34.91%)	$\chi^2 = 0.85$ (2)	.654
Quit completely	17 (13.93%)	75 (15.40%)		
Drink like I am now	57 (46.72%)	242 (49.69%)		
Feel like both want and	51 (41.80%)	177 (36.34%)	$\chi^2=1.39$ (1)	.499

not want to change drinking at the same time ( <i>ambivalence</i> )				
Previous alcohol use treatment	6 (4.92%)	42 (8.62%)	$\chi^2=4.01$ (1)	.135
Number of experiences	13.00 (23.26)	3.67 (5.41)	$t=-0.98$ (5.08)	.372
Previous 12-step experience	20 (16.39%)	63 (12.94%)	$\chi^2=12.56$ (1)	.002
Have sponsor	3 (2.46%)	9 (1.85%)	$\chi^2=0.01$ (1)	.937*
Considering treatment	12 (9.84%)	34 (6.98%)	$\chi^2=1.15$ (1)	.562
Considering self-change	59 (48.36%)	237 (48.67%)	$\chi^2=0.13$ (1)	.939
Confident could change drinking on own <sup>a</sup>	5.69 (1.63)	6.05 (1.37)	$t=2.25$ (164.72)	<.05
Last drink				
Within last hour	22 (18.03%)	35 (7.19%)	$\chi^2=30.03$ (4)	< .001
Within last 24 hours	48 (39.34%)	137 (28.13%)		
Within last week	33 (27.05%)	143 (29.36%)		
Over a week ago	11 (9.02%)	67 (13.76%)		
Over a month ago	8 (6.56%)	105 (21.56%)		

\* one cell had an expected count less than five

<sup>a</sup> Answered on a scale from 1 (not at all confident) to 7 (very confident)

Table 3. Comparison of at-risk drinking UNM student and internet groups.

Variable	UNM students (N <sub>1</sub> =129)	Internet-recruited (N <sub>2</sub> =128)	Test statistic (df)	<i>p</i>
<b>Demographic information</b>				
Gender				
Female	80 (62.02%)	61 (47.66%)	$\chi^2 = 5.35(1)$	< .05
Age	21.91 (5.19)	32.35 (11.86)	$t = 9.14$ (173.55)	< .001
Race				
White, non-Hispanic	75 (58.14%)	94 (73.44%)	$\chi^2 = 26.43$ (2)	< .05
Black/African American	4 (3.10%)	17 (13.28%)		
Other	50 (38.76%)	17 (13.28%)		
Hispanic or Latino/a	63 (48.84%)	30 (23.44%)	$\chi^2 = 17.95(1)$	< .001
Marital status				
Married/cohabitating	20 (15.50%)	37 (28.91%)	$\chi^2 = 6.69(1)$	< .05
Education				
College degree	13 (10.08%)	69 (53.91%)	$\chi^2 = 56.81(1)$	< .001
Annual household income	\$28,614 (\$39,940)	\$112,194 (506,104)	$t = 1.86$ (128.57)	.065
Median	\$15,000	\$40,000		
Recruitment source				
Craig's List	1 (0.78%)	21 (16.41%)	$\chi^2 =$ 169.76(4)	< .001
Facebook	2 (1.55%)	23 (17.97%)		
Student research (UNM)	116 (89.92%)	12 (9.38%)		
Word of mouth	7 (5.43%)	22 (17.19%)		
Other	3 (2.33%)	50 (39.06%)		
<b>Drinking attitudes/behaviors</b>				
Concerned about drinking	31 (24.03%)	82 (64.06%)	$\chi^2 = 47.47(1)$	< .001
Alcohol use intentions				
Drink less alcohol	46 (35.66%)	85 (66.41%)	$\chi^2 = 27.65(2)$	< .001
Quit completely	16 (12.40%)	15 (11.72%)		
Drink like I am now	67 (51.94%)	28 (21.88%)		

Feel like both want and not want to change drinking at the same time (ambivalence)	54 (41.86%)	83 (64.84%)	$\chi^2 = 13.82(1)$	<.001
Previous alcohol use treatment	9 (6.98%)	24 (18.75%)	$\chi^2 = 9.11(1)$	< .05
Number of experiences	3.78 (6.24)	4.00 (5.93)	$t = 0.10 (31)$	.925
Previous 12-step experience	8 (6.20%)	41 (32.03%)	$\chi^2 = 29.14(1)$	<.001
Have sponsor	1 (0.78%)	7 (5.47%)	$\chi^2 = 0.10 (1)$	.749*
Considering treatment	5 (3.88%)	26 (20.31%)	$\chi^2 = 16.40(1)$	<.001
Considering self-change	72 (55.81%)	99 (77.34%)	$\chi^2 = 20.75(1)$	<.001
Confident could change drinking on own <sup>b</sup>	5.98 (1.24)	5.26 (1.49)	$t = -4.22 (244.66)$	<.001
Last drink				
Within last hour	3 (2.33%)	24 (18.75%)	$\chi^2 = 44.82(4)$	<.001
Within last 24 hours	38 (29.46%)	61 (47.66%)		
Within last week	56 (43.41%)	38 (29.69%)		
Over a week ago	19 (14.73%)	3 (2.34%)		
Over a month ago	13 (10.08%)	2 (1.56%)		
<b>Assessments</b>				
Ambivalence (CASES)				
Double-barreled scale				
3 items	8.68 (4.78)	11.62 (5.25)	$t = 4.65(250)$	< .001
6 items	19.87 (8.29)	24.90 (8.14)	$t = 4.83(247)$	< .001
Change scale				
4 difference scores	11.79 (5.60)	14.87 (6.40)	$t = 3.97(253)$	< .001
8 difference scores	23.78 (11.54)	29.48 (12.63)	$t = 3.74(250)$	< .001
Sustain scale				
4 difference scores	-19.75 (6.05)	-17.35 (6.67)	$t = 3.00(251)$	< .01
8 difference scores	-37.99 (10.64)	-33.35(12.04)	$t = 3.23(247)$	< .01
Ambivalence score				
4 difference scores	-8.02 (10.64)	-2.42 (12.07)	$t = 3.91(250)$	< .001
8 difference scores	-14.63 (19.73)	-3.92 (23.12)	$t = 3.90(243)$	< .001
Emotion scale				
5 items	16.57 (7.81)	22.22 (8.43)	$t = 5.56(254)$	< .001

10 items	30.85 (16.07)	40.89 (17.22)	$t = 4.82(254)$	< .001
AUDIT total score	11.50 (4.54)	17.68 (7.72)	$t = 7.66$ (199.80)	< .001
Short-form Alcohol Dependence Data questionnaire (SADD)	11.14 (8.36)	15.63 (10.02)	$t = 3.75$ (222.76)	< .001
Approach & Avoidance of Alcohol Questionnaire				
Approach	37.70 (15.97)	48.21 (18.04)	$t = 4.86$ (242.42)	< .001
Avoidance	25.84 (18.49)	24.47 (18.01)	$t = -0.59$ (249)	.555
SOCRATES				
Ambivalence	9.37 (4.61)	12.52 (4.77)	$t = 5.32$ (250)	< .001
Problem recognition	14.20 (7.27)	19.40 (8.22)	$t = 5.34$ (247.30)	< .001
Taking steps	20.58 (8.88)	23.11 (8.33)	$t = 2.33$ (249)	< .05
Felt Ambivalence (Lipkus)	24.26 (9.40)	27.25 (9.57)	$t = 2.41(233)$	< .05
Readiness to change (RTC)				
Precontemplation	-0.13 (3.60)	-1.80 (3.75)	$t = -$ 3.59(247)	< .001
Contemplation	-0.63 (4.37)	2.11 (3.94)	$t = 5.17(246)$	< .001
Action	-0.85 (4.56)	0.50 (4.15)	$t = 2.43(247)$	< .05
Alcohol and Drug Consequences Questionnaire				
Costs	26.11 (15.62)	34.81 (16.53)	$t = 4.12(229)$	< .001
Benefits	49.02 (19.96)	48.42 (18.60)	$t = -$ 0.24(229)	.814
Apathy Evaluation Scale	9.90 (8.70)	14.18 (11.39)	$t = 3.28$ (220.82)	< .01
Positive and Negative Affect Scale				

Positive affect	34.44 (8.95)	31.32 (9.58)	$t = -2.58(234)$	< .05
Negative affect	20.65 (9.91)	21.89 (10.88)	$t = 0.92(234)$	.359
Brief resiliency scale	3.43 (0.84)	3.35 (1.02)	$t = -0.66(238)$	.509

\*one cell had a minimum expected count less than five



Table 4. Factor loadings of only Double-Barreled items for each group

Double-barreled item	Students	Internet sample		
	Factor 1	Factor 1 <sup>a</sup>	Factor 2 <sup>a</sup>	Factor 1 <sup>b</sup>
Percentage of variance accounted for	50.56%	39.72%	6.76%	39.17%
#4. I know that I drink too much, but I just don't want to stop.	.640		.664	
#21. Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad.	.530	.616		.523
#35. I really want to change my drinking, I just don't know why I don't stop.	.868	.873		.775
#37. I really want to quit drinking or drink less, but every time I try something happens that makes it impossible.	.786	.664		.748
#41. Sometimes I think that I should cut down on my drinking, but other times I think that I don't need to.	.536		.542	
#47. I always say that I want to change my drinking, but then I just do things as I've always done.	.827	.619		.784

<sup>a</sup> from initial EFA when two factors with eigenvalues over one emerged, scree plot suggested one factor, factors correlated ( $r = .64$ )

<sup>b</sup> from subsequent EFA when a one-factor solution was specified, scree plot suggested 1 factor

Table 5. Factor loadings of Double-Barreled and select negative affect items from the PANAS for each group

Double-barreled item	Students		Internet sample	
	Factor 1	Factor 1 <sup>a</sup>	Factor 2 <sup>a</sup>	Factor 1 <sup>b</sup>
Percentage of variance accounted for	44.69%	14.60%	38.82%	14.63%
<b>Double-barreled items</b>				
#4. I know that I drink too much, but I just don't want to stop		.619		.466
#21. Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad.		.471		.415
#35. I really want to change my drinking, I just don't know why I don't stop.		.835		.711
#37. I really want to quit drinking or drink less, but every time I try something happens that makes it impossible.		.790		.694
#41. Sometimes I think that I should cut down on my drinking, but other times I think that I don't need to.		.573		.452
#47. I always say that I want to change my drinking, but then I just do things as I've always done.		.863		.833
<b>PANAS negative affect items</b>				
#1. Afraid	.799		.804	
#7. Guilty	.735		.835	
#9. Upset	.748		.850	
#14. Distressed	.907		.619	
#17. Ashamed	.774		.838	
#19. Scared	.923		.941	

<sup>a</sup> scree plots suggested two factors, factors correlated ( $r = .49$ ) in the student group and ( $r = .41$ ) in the internet group using Promax rotation

Table 6. Factor loadings of Double-Barreled and *Felt Ambivalence* items for each group

Item	Student Sample		Internet Sample	
	Factor 1 <sup>a</sup>	Factor 2	Factor 1 <sup>b</sup>	Factor 2
<b>Percentage of variance accounted for Double-Barreled items</b>	49.08%	8.39%	47.60%	5.22%
#4. I know that I drink too much, but I just don't want to stop.		.582		
#21. Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad.				.472
#35. I really want to change my drinking, I just don't know why I don't stop.		.851		.833
#37. I really want to quit drinking or drink less, but every time I try something happens that makes it impossible.		.821		.815
#41. Sometimes I think that I should cut down on my drinking, but other times I think that I don't need to.			.632	
#47. I always say that I want to change my drinking, but then I just do things as I've always done.		.840		.601
<b>Felt Ambivalence items</b>				
#1. You have strong feelings both for and against drinking alcohol.	.704		.592	
#2. You have conflicting thoughts about drinking alcohol; sometimes good, other times bad.	.846		.763	
#3. Your gut feeling and your thoughts do not seem to agree on whether you should drink alcohol.	.848		.784	
#4. You find yourself feeling torn between wanting and not wanting to drink alcohol.	.752		.796	
#5. You have equally strong reasons for wanting and not wanting to drink alcohol.	.900		.766	
#6. At times you feel good that you drink alcohol; other times you feel bad that you drink alcohol.	.684		.782	
#7. Sometimes you feel bothered that you drink alcohol, and other times you do not seem bothered that you drink alcohol.	.614		.663	

<sup>a</sup> scree plot suggested one factor, factors correlated ( $r = .65$ )

<sup>b</sup> scree plot suggested one factor, factors correlated ( $r = .72$ )

Table 7. Factor loadings of *Change* and *Sustain* difference scores on two factors for both groups

<i>Change</i> and <i>Sustain</i> difference score	Student Sample <sup>a</sup>		Internet Sample <sup>b</sup>	
	Factor 1	Factor 2	Factor 1	Factor 2
Percentage of variance accounted for	24.34%	15.22%	25.94%	15.03%
1. drink to feel better				.656
2. manage stress				.524
3. solution to problems		.472		.458
4. like drinking (desire)				.478
5. happiness		.554		.531
6. drink to deal with life		.530		.531
7. change scary		.749		.552
8. change imaginable		.613		
9. caring about alcohol problems	.466			
10. importance (to drink less)	.757		.541	
11. ideal life	.802		.831	
12. getting ahead	.642		.816	
13. health problems				
14. legal problems			.535	
15. relaxation				.550
16. fun		.795		.570
17. friends	-.507	.485		.604
18. family	.662		.781	
19. alcohol social lubricant				.589
20. relationships in general	.778		.842	
21. problems with others			.612	
22. disappointment/personal responsibility	.669		.710	
23. having drinking problem	.780		.823	
24. drunken mistakes	.614		.735	
25. self-concept	.731		.752	
26. self-efficacy		.485		

<sup>a</sup>Varimax rotation, scree plot suggested one or two factors

<sup>b</sup>Varimax rotation, scree plot suggested two factors

Table 8. Factor loadings of *Change* and *Sustain* difference scores on a single factor for both groups

<i>Change</i> and <i>Sustain</i> difference score	Student Sample Factor 1 <sup>a</sup>	Internet Sample Factor 1 <sup>b</sup>
Percentage of variance accounted for	29.96%	26.90%
1. drink to feel better	-.534	
2. manage stress	-.486	
3. solution to problems		
4. like drinking (desire)		
5. happiness	-.455	
6. drink to deal with life	-.611	
7. change scary	-.591	
8. change imaginable		
9. caring about alcohol problems		
10. importance (to drink less)	.624	.530
11. ideal life	.772	.837
12. getting ahead	.694	.811
13. health problems		
14. legal problems		.532
15. relaxation		
16. fun	-.479	
17. friends	-.663	
18. family	.678	.789
19. alcohol social lubricant	-.549	
20. relationships in general	.818	.839
21. problems with others		.559
22. disappointment/personal responsibility	.682	.729
23. having drinking problem	.817	.855
24. drunken mistakes	.621	.745
25. self-concept	.688	.728
26. self-efficacy	-.495	-.456

<sup>a</sup>scree plot suggested one or two factors

<sup>b</sup>scree plot suggested two factors

Table 9. Factor loadings of *Emotion* items on a single factor for each group

Item	Student Sample	Internet Sample
	Factor 1 <sup>a</sup>	Factor 1 <sup>a</sup>
<b>Percentage of variance accounted for Emotion items</b>	61.54%	58.36%
59.1 Two ways about my drinking	.615	.573
59.2 Afraid of changing	.806	.841
59.3 Ambivalent about changing		
59.4 Scared	.847	.777
59.5 Conflicted	.771	.785
59.6 Stuck	.874	.881
59.7 Controlled by my drinking	.704	.725
59.8 Like I want to change and not change my drinking at the same time	.746	.725
59.9 Despair over not being able to change	.813	.794
59.10 Uncomfortable	.844	.774
59.11 Like giving up hope I will ever change	.776	.778
59.12 Confused	.859	.837
59.13 Uncertain about what to do	.817	.745
59.14 Unable to decide what to do about my drinking	.817	.790
59.15 Like I should cut down but I don't want to	.739	.661
59.16 Like I will always be a drinker	.560	.508
59.17 Unsure	.748	.796
59.18 Undecided	.742	.747
59.19 A lot of suffering about what to do	.826	.800
59.20 Doubtful	.856	.847
59.21 Conflicted about what to do	.878	.838
59.22 Unsure about what to do about my drinking	.902	.806
59.23 Torn	.889	.859
59.24 Pulled in different directions	.877	.864
59.25 Like I'm sure I should quit drinking	.689	.646
59.26 Scared about how to make the change	.863	.841
59.27 Like I waiver back and forth about what to do	.857	.851
59.28 Like there are good and bad things about drinking less	.576	.663
59.29 Mixed feelings about the decision to quit	.822	.803
59.30 Anxious	.827	.852
59.31 Annoyed	.706	.761
59.32 Like giving up	.784	.711

<sup>a</sup> scree plot suggested one factor

Table 10. Factor loadings of *Emotion*, the negative affect scale of the PANAS, *Felt Ambivalence*, and Double-Barreled items for each group

Item	Student Sample <sup>a</sup>		Internet Sample <sup>b</sup>	
	Factor 1	Factor 2	Factor 1	Factor 2
<b>Percentage of variance accounted for Emotion items</b>	49.04%	5.86%	45.88%	8.90%
59.1 Two ways about my drinking		.502	.768	
59.2 Afraid of changing	.782		.690	
59.3 Ambivalent about changing				
59.4 Scared	.928			.476
59.5 Conflicted	.735		.867	
59.6 Stuck	.894		.702	
59.7 Controlled by my drinking	.789		.462	
59.8 Like I want to change and not change my drinking at the same time	.510		.898	
59.9 Despair over not being able to change	.841			.476
59.10 Uncomfortable	.860		.526	
59.11 Like giving up hope I will ever change	.851			.506
59.12 Confused	.864		.513	
59.13 Uncertain about what to do	.659		.612	
59.14 Unable to decide what to do about my drinking	.719		.718	
59.15 Like I should cut down but I don't want to			.894	
59.16 Like I will always be a drinker	.506		.562	
59.17 Unsure	.573		.734	
59.18 Undecided	.512		.703	
59.19 A lot of suffering about what to do	.872			.600
59.20 Doubtful	.860		.640	
59.21 Conflicted about what to do	.687		.842	
59.22 Unsure about what to do about my drinking	.679		.803	
59.23 Torn	.779		.718	
59.24 Pulled in different directions	.682		.865	
59.25 Like I'm sure I should quit drinking	.519			
59.26 Scared about how to make the change	.850		.539	
59.27 Like I waiver back and forth about what to do	.611		.877	
59.28 Like there are good and bad things about drinking less	.459		.759	
59.29 Mixed feelings about the decision to quit	.638		.926	



59.30 Anxious	.892	.590	
59.31 Annoyed	.782		.558
59.32 Like giving up	.886		.737
<b>Negative Affect items (PANAS)</b>			
1. Afraid	.677		.903
3. Irritable			.716
6. Hostile	.458		.687
7. Guilty	.695		.888
9. Upset	.694		.938
12. Nervous			.754
14. Distressed	.706		.695
16. Jittery	.541		.696
17. Ashamed	.719		.886
19. Scared	.702		1.029
<b>Felt Ambivalence items</b>			
#1. You have strong feelings both for and against drinking alcohol.	.815	.469	
#2. You have conflicting thoughts about drinking alcohol; sometimes good, other times bad.	.916	.707	
#3. Your gut feeling and your thoughts do not seem to agree on whether you should drink alcohol.	.852	.722	
#4. You find yourself feeling torn between wanting and not wanting to drink alcohol.	.969	.803	
#5. You have equally strong reasons for wanting and not wanting to drink alcohol.	.946	.674	
#6. At times you feel good that you drink alcohol; other times you feel bad that you drink alcohol.	.783	.748	
#7. Sometimes you feel bothered that you drink alcohol, and other times you do not seem bothered that you drink alcohol.	.760	.762	
<b>Double-Barreled items</b>			
#4. I know that I drink too much, but I just don't want to stop.			
#21. Sometimes drinking makes me feel really happy, and other times drinking makes me feel really bad.	.517		
#35. I really want to change my drinking, I just don't know why I don't stop.	.525		
#37. I really want to quit drinking or drink less, but every time I try something happens that makes it impossible.	.526	.499	
#41. Sometimes I think that I should cut	.590	.774	

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down on my drinking, but other times I think that I don't need to.

#47. I always say that I want to change my drinking, but then I just do things as I've always done. .483 .765

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<sup>a</sup>Scree plot suggested one strong factor, factors correlated ( $r = .69$ )

<sup>b</sup>Scree plot suggested two factors, factors correlated ( $r = .62$ )

Table 11. Correlation matrix of CASES scales for the student group\*

Scale	DB3 <sup>a</sup>	DB6 <sup>b</sup>	C4 <sup>c</sup>	C8 <sup>d</sup>	S4 <sup>e</sup>	S8 <sup>f</sup>	A4 <sup>g</sup>	A8 <sup>h</sup>	E5 <sup>i</sup>	E10 <sup>j</sup>	G4 <sup>k</sup>	G8 <sup>l</sup>
DB 3 <sup>a</sup>	1											
DB 6 <sup>b</sup>	.930	1										
Change 4 <sup>c</sup>	.751	.755	1									
Change 8 <sup>d</sup>	.790	.788	.953	1								
Sustain 4 <sup>e</sup>	.508	.423	.570	.606	1							
Sustain 8 <sup>f</sup>	.479	.440	.540	.588	.916	1						
Ambiv 4 <sup>g</sup>	.706	.659	.884	.876	.888	.824	1					
Ambiv 8 <sup>h</sup>	.711	.690	.848	.898	.847	.885	.955	1				
Emotion 5 <sup>i</sup>	.713	.755	.613	.614	.311	.335	.514	.534	1			
Emotion10 <sup>j</sup>	.740	.774	.623	.634	.329	.356	.534	.559	.966	1		
Griffin 4 <sup>k</sup>	.537	.542	.704	.699	.344	.350	.589	.593	.417	.444	1	
Griffin 8 <sup>l</sup>	.569	.576	.688	.752	.388	.419	.605	.662	.419	.454	.919	1

<sup>a</sup>Double-barreled scale comprised of 3 items

<sup>b</sup>Double-barreled scale comprised of 6 items

<sup>c</sup>Change scale comprised of 4 items

<sup>d</sup>Change scale comprised of 8 items

<sup>e</sup>Sustain scale comprised of 4 items

<sup>f</sup>Sustain scale comprised of 8 items

<sup>g</sup>Sum of Change and Sustain scale comprised of 4 items

<sup>h</sup>Sum of Change and Sustain scale comprised of 8 items

<sup>i</sup>Emotion scale comprised of 5 items

<sup>j</sup>Emotion scale comprised of 10 items

<sup>k</sup>Griffin calculation of Change and Sustain scales comprised of 4 items

<sup>l</sup>Griffin calculation of Change and Sustain scales comprised of 8 items

\*all correlations  $p < .001$

Table 12. Correlation matrix of CASES scales for the internet group

Scale	DB3 <sup>a</sup>	DB6 <sup>b</sup>	C4 <sup>c</sup>	C8 <sup>d</sup>	S4 <sup>e</sup>	S8 <sup>f</sup>	A4 <sup>g</sup>	A8 <sup>h</sup>	E5 <sup>i</sup>	E10 <sup>j</sup>	G4 <sub>k</sub>	G8 <sup>l</sup>
DB 3 <sup>a</sup>	1											
DB 6 <sup>a</sup>	.919***	1										
Change 4 <sup>a</sup>	.696***	.663***	1									
Change 8 <sup>a</sup>	.683***	.652***	.951***	1								
Sustain 4 <sup>a</sup>	.515***	.420***	.702***	.727***	1							
Sustain 8 <sup>a</sup>	.492***	.426***	.673***	.741***	.948***	1						
Ambiv 4 <sup>a</sup>	.664***	.595***	.920***	.908***	.925***	.882***	1					
Ambiv 8 <sup>a</sup>	.637***	.586***	.876***	.936***	.895***	.929***	.960***	1				
Emotion 5 <sup>a</sup>	.629***	.687***	.433***	.443***	.255**	.270**	.376***	.383***	1			
Emotion10 <sup>a</sup>	.647***	.695***	.450***	.451***	.246**	.249**	.380***	.377***	.958***	1		
Griffin 4 <sup>a</sup>	.254**	.264**	.195*	.128	-.088	-.134	.055	.000	.345***	.327***	1	
Griffin 8 <sup>a</sup>	.186*	.230*	.138	.124	-.121	-.154	.007	-.012	.322***	.314***	.9*	1

<sup>a</sup>Double-barreled scale comprised of 3 items

<sup>b</sup>Double-barreled scale comprised of 6 items

<sup>c</sup>Change scale comprised of 4 items

<sup>d</sup>Change scale comprised of 8 items

<sup>e</sup>Sustain scale comprised of 4 items

<sup>f</sup>Sustain scale comprised of 8 items

<sup>g</sup>Sum of Change and Sustain scale comprised of 4 items

<sup>h</sup>Sum of Change and Sustain scale comprised of 8 items

<sup>i</sup>Emotion scale comprised of 5 items

<sup>j</sup>Emotion scale comprised of 10 items

<sup>k</sup>Griffin calculation of Change and Sustain scales comprised of 4 items

<sup>l</sup>Griffin calculation of Change and Sustain scales comprised of 8 items

\* $p < .05$

\* $p < .01$

\* $p < .001$

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## Appendices

### Appendix A: Change, Ambivalence, Sustain, and Emotion Scales (CASES-A) version 4.0

**Directions:** Thank you in advance for taking the time to complete this questionnaire.

Please answer the following questions as carefully as possible.

Circle the number that best matches how much you agree with the following statements.

Mark how true each statement is for you on a scale of 1 to 7, with 1 indicating absolute disagreement, and 7 indicating absolute agreement. If a question does not apply to you, please circle 1: Absolutely Disagree.

1. No matter what happens, I know that having a drink will make it all right.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>

2. I can't imagine my life without drinking.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>

3. Life wouldn't be as much fun if I didn't drink or drank less.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>

4. I know that I drink too much, but I just don't want to stop.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>

5. Drinking less is not that important to me.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>

6. I feel confident I could manage my life without drinking.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>

7. I'd be more shy and awkward around people if I didn't drink or drank less.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>

8. My drinking causes problems for me with other people.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>

9. I can see myself being happy without alcohol.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>

<b>Disagree</b>				<b>Agree</b>			<b>Agree</b>
	10. My drinking has not brought disappointment to myself or others.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	11. I don't find myself drinking to relieve my stress.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	12. I want to change my drinking because it doesn't fit with who I really am.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	13. I could quit drinking or drink less if I really wanted to.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	14. My family is upset about my drinking.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	15. I drink to deal with my stress.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	16. Drinking hasn't gotten me into any trouble with the law.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	17. My drinking is a problem.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	18. It bothers me that I drink when I think I shouldn't.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	19. I don't use drinking as a way to make myself feel better.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	
<b>Absolutely</b>			<b>Half</b>			<b>Absolutely</b>	
<b>Disagree</b>			<b>Agree</b>			<b>Agree</b>	
	20. My health is not a reason for me to quit or cut down.						
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	







- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
43. I'm not confident that I could quit drinking or drink less if I wanted to.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
44. I don't know if I'd be happy if I quit drinking or drank less.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
45. Quitting or cutting down doesn't scare me.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
46. I need to quit drinking or drink less because I've made a lot of mistakes when I'm drunk.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
47. I always say that I want to change my drinking, but then I just do things as I've always done.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
48. Alcohol helps me get along better with others.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
49. I don't feel that I have the strength to deal with my life right now if I quit drinking or drank less.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
50. The main thing that is holding me back in life is continuing to drink so much.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
51. My drinking doesn't keep me from being the person I want to be.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**  
52. Drinking isn't keeping me from getting ahead.
- 1 2 3 4 5 6 7  
**Absolutely** **Half** **Absolutely**  
**Disagree** **Agree** **Agree**

53. I'll never have the kind of life that I want if I continue to drink so much.
- 1 2 3 4 5 6 7  
**Absolutely Disagree** **Half Agree** **Absolutely Agree**
54. Drinking is one of my favorite things to do.
- 1 2 3 4 5 6 7  
**Absolutely Disagree** **Half Agree** **Absolutely Agree**
55. I don't really have a problem with alcohol.
- 1 2 3 4 5 6 7  
**Absolutely Disagree** **Half Agree** **Absolutely Agree**
56. Drinking doesn't keep me from accomplishing what I want in life.
- 1 2 3 4 5 6 7  
**Absolutely Disagree** **Half Agree** **Absolutely Agree**
57. My drinking has not caused me any problems with my family.
- 1 2 3 4 5 6 7  
**Absolutely Disagree** **Half Agree** **Absolutely Agree**
58. I don't use alcohol as a way to feel more comfortable around people.
- 1 2 3 4 5 6 7  
**Absolutely Disagree** **Half Agree** **Absolutely Agree**
59. When I think about drinking less, I feel...
- Absolutely Disagree** **Half Agree** **Absolutely Agree**

1. Two ways about my drinking	1	2	3	4	5	6	7
2. Afraid of changing	1	2	3	4	5	6	7
3. Ambivalent about changing	1	2	3	4	5	6	7
4. Scared	1	2	3	4	5	6	7
5. Conflicted	1	2	3	4	5	6	7
6. Stuck	1	2	3	4	5	6	7
7. Controlled by my drinking	1	2	3	4	5	6	7
8. Like I want to change and not change my drinking at the same time	1	2	3	4	5	6	7

9. Despair over not being able to change	1	2	3	4	5	6	7
10. Uncomfortable	1	2	3	4	5	6	7
11. Like giving up hope I will ever change	1	2	3	4	5	6	7
12. Confused	1	2	3	4	5	6	7
13. Uncertain about what to do	1	2	3	4	5	6	7
14. Unable to decide what to do about my drinking	1	2	3	4	5	6	7
15. Like I should cut down but I don't want to	1	2	3	4	5	6	7
16. Like I will always be a drinker	1	2	3	4	5	6	7
17. Unsure	1	2	3	4	5	6	7
18. Undecided	1	2	3	4	5	6	7
19. A lot of suffering about what to do	1	2	3	4	5	6	7
20. Doubtful	1	2	3	4	5	6	7
21. Conflicted about what to do	1	2	3	4	5	6	7
22. Unsure about what to do about my drinking	1	2	3	4	5	6	7
23. Torn	1	2	3	4	5	6	7
24. Pulled in different directions	1	2	3	4	5	6	7
25. Like I'm sure I should quit drinking	1	2	3	4	5	6	7
26. Scared about how to make the change	1	2	3	4	5	6	7
27. Like I waiver back and forth about what to do	1	2	3	4	5	6	7
28. Like there are good and bad things about	1	2	3	4	5	6	7

drinking less							
29. Mixed feelings about the decision to quit	1	2	3	4	5	6	7
30. Anxious	1	2	3	4	5	6	7
31. Annoyed	1	2	3	4	5	6	7
32. Like giving up	1	2	3	4	5	6	7

Appendix B. Approach and Avoidance of Alcohol Questionnaire (Klein, A. A., Stasiewicz, P. R., Koutsky, J. R., Bradizza, C. M., & Coffey, S. F. (2007). A psychometric evaluation of the Approach and Avoidance of Alcohol Questionnaire (AAAQ) in alcohol dependent outpatients. *Journal of Psychopathology And Behavioral Assessment*, 29(4), 231-240

Original Authors: McEvoy, P. M., Stritzke, W. K., French, D. J., Lang, A. R., & Ketterman, R. L. (2004). Comparison of three models of alcohol craving in young adults: A cross-validation. *Addiction*, 99(4), 482-497.

Please consider how you have thought about alcohol over this last week and rate your agreement with the following statements:

	Not At All <span style="float: right;">Very</span>								
	Strongly								
1. I would have liked to have a drink or two.	0	1	2	3	4	5	6	7	8
2. I cut down the amount I drank.	0	1	2	3	4	5	6	7	8
3. I was thinking of ways to get alcohol.	0	1	2	3	4	5	6	7	8
4. If I had been at a pub or club I would have wanted a drink.	0	1	2	3	4	5	6	7	8
5. I abstained from alcohol because of my personal beliefs/values.	0	1	2	3	4	5	6	7	8
6. Drinking did not seem such a good idea to me.	0	1	2	3	4	5	6	7	8

7. My desire to drink seemed overwhelming.	0	1	2	3	4	5	6	7	8
8. I avoided people who were likely to offer me a drink.	0	1	2	3	4	5	6	7	8
9. I had planned to drink alcohol.	0	1	2	3	4	5	6	7	8
10. I deliberately occupied myself so I would not drink alcohol.	0	1	2	3	4	5	6	7	8
11. I was thinking about the benefits of being sober.	0	1	2	3	4	5	6	7	8
12. I wanted to drink alcohol so much that if I started drinking I would have found it difficult to stop.	0	1	2	3	4	5	6	7	8
13. I would have accepted a drink if one had been offered.	0	1	2	3	4	5	6	7	8
14. I did things to take my mind off alcohol.	0	1	2	3	4	5	6	7	8
15. I avoided places in which I might have been tempted to drink alcohol.	0	1	2	3	4	5	6	7	8
16. I was thinking about alcohol a lot of the time.	0	1	2	3	4	5	6	7	8
17. I wanted to drink as soon as I had the chance.	0	1	2	3	4	5	6	7	8
18. The bad things that could happen if I	0	1	2	3	4	5	6	7	8

drank alcohol were fresh in my mind.									
19. If I had been at a party I would have had a drink without thinking twice.	0	1	2	3	4	5	6	7	8
20. If I had been in a social situation I would have wanted to avoid drinking.	0	1	2	3	4	5	6	7	8

### Appendix C. Attitudinal ambivalence about drinking less alcohol

Adapted from: Priester, J. R., & Petty, R. E. (2001). Extending the bases of subjective attitudinal ambivalence: Interpersonal and intrapersonal antecedents of evaluative tension. *Journal of Personality And Social Psychology*, 80(1), 19-34.

Please consider what you think about drinking less alcohol and answer the following questions:

1. What is your overall reaction to the idea of drinking less alcohol?

Negative

Positive

-4	-3	-2	-1	0	+1	+2	+3	+4
----	----	----	----	---	----	----	----	----

2. What is your overall reaction to the idea of drinking less alcohol?

Unfavorable

Favorable

-4	-3	-2	-1	0	+1	+2	+3	+4
----	----	----	----	---	----	----	----	----

Attitudinal Component technique (Armitage & Conner, 2000; Kaplan, 1972; Priester & Petty, 2001; Thompson, Zanna, & Griffin, 1995)

3. Considering only the positive things about drinking less alcohol, and ignoring any negative things about drinking less, I have:

No positive thoughts or feelings

Maximum positive thoughts or

feelings

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

4. Considering only the negative things about drinking less alcohol, and ignoring any positive things about drinking less, I have:



No negative thoughts or feelings  
feelings

Maximum negative thoughts or

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Adapted from: Armitage, C. J., & Conner, M. (2000). Attitudinal ambivalence: A test of three key hypotheses. *Personality and Social Psychology Bulletin*, 26(11), 1421-1432.

5. Drinking less alcohol in the future is...

Unpleasant

Pleasant

-3	-2	-1	0	+1	+2	+3
----	----	----	---	----	----	----

6. Drinking less alcohol in the future is...

Unenjoyable

Enjoyable

-3	-2	-1	0	+1	+2	+3
----	----	----	---	----	----	----

7. Drinking less alcohol in the future is...

Unsatisfactory

Satisfactory

-3	-2	-1	0	+1	+2	+3
----	----	----	---	----	----	----

## Appendix D. Subjective ambivalence

Adapted from: Priester, J. R., Petty, R. E., & Park, K. (2007). Whence univalent ambivalence? From the anticipation of conflicting reactions. *Journal of Consumer Research*, 34(1), 11-21.

Please consider how you feel when you think about drinking less alcohol and answer the following questions:

1. When I think about drinking less alcohol I feel:

Not at all conflicted Completely  
conflicted

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

2. When I think about drinking less alcohol I feel:

Not at all indecisive Completely  
indecisive

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

3. When I think about drinking less alcohol I feel:

Completely one-sided reactions Completely mixed  
reactions

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

4. When I think about drinking less alcohol I feel:

Not at all tense

Completely tense

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

5. When I think about drinking less alcohol I feel:

Not at all ambivalent

Completely

ambivalent

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Appendix E. Felt Ambivalence About Drinking Less Alcohol Scale (Adapted from:

Lipkus, Pollack, McBride, Schwartz-Bloom, Lyna, & Bloom, 2005).

You have strong feelings both for and against drinking alcohol.	Strongly Strongly Disagree Agree					
	1	2	3	4	5	6
You have conflicting thoughts about drinking alcohol; sometimes good, other times bad.	1	2	3	4	5	6
Your gut feeling and your thoughts do not seem to agree on whether you should drink alcohol.	1	2	3	4	5	6
You find yourself feeling torn between wanting and not wanting to drink alcohol.	1	2	3	4	5	6
You have equally strong reasons for wanting and not wanting to drink alcohol.	1	2	3	4	5	6
At times you feel good that you drink alcohol; other times you feel bad that you drink alcohol.	1	2	3	4	5	6
Sometimes you feel bothered that you drink alcohol, and other times you do not seem bothered that you drink alcohol.	1	2	3	4	5	6

Appendix F. The Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES)

Miller, W. R., & Tonigan, J. S. (1996). Assessing drinkers' motivation for change: The stages of change readiness and treatment eagerness scale (SOCRATES). *Psychology of Addictive Behaviors, 10*, 81-89.

Downloaded at <http://casaa.unm.edu/inst/SOCRATESv8.pdf>

Personal Drinking Questionnaire

**(SOCRATES 8A)**

INSTRUCTIONS: Please read the following statements carefully. Each one describes a way that you might (or might not) feel *about your drinking*. For each statement, circle one number from 1 to 5, to indicate how much you agree or disagree with it *right now*. Please circle one and only one number for every statement.

	<b>NO!</b> Strongly Disagree	<b>No</b> Disagree	<b>?</b> Undecided or Unsure	<b>Yes</b> Agree	<b>YE</b> Stro Agr
1. I really want to make changes in my drinking.	1	2	3	4	5
2. Sometimes I wonder if I am an alcoholic.	1	2	3	4	5
3. If I don't change my drinking soon, my problems are going to get worse.	1	2	3	4	5
4. I have already started making some changes in my drinking.	1	2	3	4	5
5. I was drinking too much at one time, but I've managed to change my drinking.	1	2	3	4	5
6. Sometimes I wonder if my drinking is hurting other people.	1	2	3	4	5
7. I am a problem drinker.	1	2	3	4	5
8. I'm not just thinking about changing my drinking, I'm already doing something about it.	1	2	3	4	5
9. I have already changed my drinking, and I am looking for ways to keep from slipping back to my old pattern.	1	2	3	4	5
10. I have serious problems with drinking.	1	2	3	4	5
11. Sometimes I wonder if I am in control of my drinking.	1	2	3	4	5

	<b>NO!</b> Strongly Disagree	<b>No</b> Disagree	<b>?</b> Undecided or Unsure	<b>Yes</b> Agree	<b>YE</b> Stro Agr
12. My drinking is causing a lot of harm.	1	2	3	4	5
13. I am actively doing things now to cut down or stop drinking.	1	2	3	4	5
14. I want help to keep from going back to the drinking problems that I had before.	1	2	3	4	5
15. I know that I have a drinking problem.	1	2	3	4	5
16. There are times when I wonder if I drink too much.	1	2	3	4	5
17. I am an alcoholic.	1	2	3	4	5
18. I am working hard to change my drinking.	1	2	3	4	5
19. I have made some changes in my drinking, and I want some help to keep from going back to the way I used to drink.	1	2	3	4	5

Appendix G. Readiness to Change Questionnaire (Rollnick, S., Heather, N., Gold, R., & Hall, W. (1992). Development of a short 'readiness to change' questionnaire for use in brief, opportunistic interventions among excessive drinkers. *British Journal of Addiction*, 87(5), 743-754).

Please mark how much you agree with the following statements:

	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Unsure</i>	<i>Agree</i>	<i>Strongly Agree</i>
1. I don't think I drink too much (P).	1	2	3	4	5
2. I am trying to drink less than I used to (A).	1	2	3	4	5
3. I enjoy my drinking, but sometimes I drink too much (C).	1	2	3	4	5
4. Sometimes I think I should cut down on my drinking (C).	1	2	3	4	5
5. It's a waste of time thinking about my drinking (P).	1	2	3	4	5
6. I have just recently changed my drinking habits (A).	1	2	3	4	5
7. Anyone can talk about wanting to do something about drinking, but I am actually doing something about it (A).	1	2	3	4	5
8. I am at the stage where I should think about drinking less alcohol (C).	1	2	3	4	5
9. My drinking is a problem sometimes (C).	1	2	3	4	5
10. There is no need for me to think about changing my drinking (P).	1	2	3	4	5
11. I am actually changing my drinking habits right now (A).	1	2	3	4	5
12. Drinking less alcohol would be pointless for me (P).	1	2	3	4	5

Appendix H. The Alcohol Use Disorders Identification Test (AUDIT)  
 Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993).  
 Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO  
 collaborative project on early detection of persons with harmful alcohol consumption: II.  
*Addiction*, 88(6), 791-804.

Downloaded at: <http://casaa.unm.edu/inst/Audit.pdf>

### **AUDIT**

Please circle the answer that is correct for you.

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

NEVER

MONTHLY OR LESS

TWO TO FOUR TIMES A MONTH

TWO TO THREE TIMES A WEEK

FOUR OR MORE TIMES A WEEK

NOTE: For answering these questions, one “drink” is equal to 10 ounces of beer, or 4 ounces of wine, or 1 ounce of liquor

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

1 OR 2

2 OR 4

5 OR 6

7 TO 9

10 OR MORE

#### **3. How often do you have six or more drinks on one occasion?**

NEVER

LESS THAN MONTHLY

MONTHLY

WEEKLY

DAILY OR  
ALMOST  
DAILY

#### **4. How often during the last year have you found that you were not able to stop drinking once you had started?**

NEVER

LESS THAN MONTHLY

MONTHLY

WEEKLY

DAILY OR  
ALMOST  
DAILY



**5. How often during the last year have you failed to do what was normally expected from you because of drinking?**

NEVER      LESS THAN MONTHLY      MONTHLY      WEEKLY      DAILY OR  
ALMOST  
DAILY

**6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?**

NEVER      LESS THAN MONTHLY      MONTHLY      WEEKLY      DAILY OR  
ALMOST  
DAILY

**7. How often during the last year have you had a feeling of guilt or remorse after drinking?**

NEVER      LESS THAN MONTHLY      MONTHLY      WEEKLY      DAILY OR  
ALMOST  
DAILY

**8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?**

NEVER      LESS THAN MONTHLY      MONTHLY      WEEKLY      DAILY OR  
ALMOST  
DAILY

**9. Have you or someone else been injured as a result of your drinking?**

NEVER

YES, BUT NOT IN THE LAST YEAR

YES, DURING THE LAST YEAR

**10. Has a relative or friend, or a doctor or other health worker been concerned about your drinking or suggested you cut down?**

NEVER

YES, BUT NOT IN THE LAST YEAR

YES, DURING THE LAST YEAR

Scoring Rules for the AUDIT Screening Questionnaire

## Item 1

- 0 = Never
- 1 = Monthly or less
- 2 = Two to four times a month
- 3 = Two to three times a week
- 4 = Four or more times a week

## Item 2

- 0 = 1-2 drinks
- 1 = 3-4 drinks
- 2 = 5-6 drinks
- 3 = two to three times a week
- 4 = four or more times a week

## Item 3-8

- 0 = Never
- 1 = Less than monthly
- 2 = Monthly
- 3 = Weekly
- 4 = Daily or almost daily

## Item 9-10

- 0 = No
- 1 = Yes, but not in the last year
- 2 = Yes, during the last year

Maximum possible score = 40

A score of 8 or more indicates a strong likelihood of hazardous or harmful alcohol consumption, and warrants more careful assessment.

Appendix I. Short-form alcohol dependence data questionnaire (SADD; Raistrick, D., Dunbar, G., & Davidson, R. (1983). Development of a questionnaire to measure Alcohol Dependence. *British Journal of Addiction*, 78(1), 89-95).

The following questions cover a wide range of topics to do with drinking. Think about your most recent drinking habits and answer each question by choosing the most appropriate heading.

	<i>Never</i>	<i>Sometimes</i>	<i>Often</i>	<i>Nearly Always</i>
1. Do you find difficulty in getting the thought of a drink out of your mind?	0	1	2	3
2. Is getting drunk more important than you next meal?	0	1	2	3
3. Do you plan your day around when and where you can drink?	0	1	2	3
4. Do you drink in the morning, afternoon, and evening?	0	1	2	3
5. Do you drink for the effect of alcohol without caring what drink it is?	0	1	2	3
6. Do you drink as much as you want irrespective of what you are doing the next day?	0	1	2	3
7. Given that many problems might be caused by alcohol do you still drink too much?	0	1	2	3
8. Do you know that you won't be able to stop drinking once you start?	0	1	2	3
9. Do you try to control your drinking by giving it up completely for days or weeks at a time?	0	1	2	3
10. The morning after a heavy drinking session do you need your first drink to get yourself going?	0	1	2	3
11. The morning after a heavy drinking session do you wake up with a definite shakiness of your hands?	0	1	2	3
12. After a heavy drinking session do you wake up and retch or vomit?	0	1	2	3
13. The morning after a heavy drinking session do you go out of your way to	0	1	2	3

avoid people?				
14. After a heavy drinking session do you see frightening things that later you realize were imaginary?	0	1	2	3
15. Do you go drinking and the next day find you have forgotten what happened the night before?	0	1	2	3

## Appendix J. Alcohol and Drug Consequences Questionnaire

Cunningham, J. A., Sobell, L. C., Gavin, D. R., Sobell, M. B., & Breslin, F. (1997).

Assessing motivation for change: Preliminary development and evaluation of a scale measuring the costs and benefits of changing alcohol or drug use. *Psychology of Addictive Behaviors*, 11(2), 107-114.

Directions: How important would the following things be to you if you stopped or cut down on your alcohol use? Please rate your agreement with the following consequences of reducing your alcohol use on a scale from 0 (not applicable) to 5 (extremely important).

0	1	2	3	4
5	Not important	Slightly important	moderately important	Very important
N/A				
Extremely important				
1. I will live longer.				
5				0 1 2 3 4
2. I will be irritable.				
5				0 1 2 3 4
3. I will be more financially stable.				
5				0 1 2 3 4
4. I will have difficulty having a good time.				
5				0 1 2 3 4
5. I will feel stressed out.				
5				0 1 2 3 4
6. I will be more in control of life.				
5				0 1 2 3 4
7. I will get depressed.				
5				0 1 2 3 4
8. I will feel better about myself.				
5				0 1 2 3 4
9. I will miss the taste.				
5				0 1 2 3 4
10. I will have more money to do other things with.				
5				0 1 2 3 4
11. I will feel withdrawal or craving.				
5				0 1 2 3 4

12. I will have a better relationship with my friends. 5	0 1 2 3 4
13. I will miss the feeling of being high. 5	0 1 2 3 4
14. I will have a better relationship with my family. 5	0 1 2 3 4
15. I will feel frustrated and anxious. 5	0 1 2 3 4
16. My health will improve. 4 5	0 1 2 3
17. I will have fewer problems with my friends. 5	0 1 2 3 4
18. I will be more active and alert. 5	0 1 2 3 4
19. I will have fewer problems with my family. 5	0 1 2 3 4
20. I will feel bored.	0 1 2 3 4 5
21. I will have difficulty relaxing.	0 1 2 3 4 5
22. I will have difficulty coping with my problems. 5	0 1 2 3 4
23. I will change a lifestyle I enjoy. 5	0 1 2 3 4
24. I will save more money. 5	0 1 2 3 4
25. I will accomplish more of the things that I want to get done.	0 1 2 3 4 5
26. I will regain some self-respect. 5	0 1 2 3 4
27. I will feel better physically. 4 5	0 1 2 3
28. I will have too much time on my hands. 5	0 1 2 3 4
29. I will have difficulty not drinking or using drugs. 5	0 1 2 3 4

### Appendix K. The Apathy Evaluation Scale

Lane-Brown, A. T., & Tate, R. L. (2009). Measuring apathy after traumatic brain injury: Psychometric properties of the Apathy Evaluation Scale and the Frontal Systems Behavior Scale. *Brain Injury*, 23(13-14), 999-1007.

Directions: Please consider how characteristic the following statements have been of you during the last four weeks.

	Not at all characteristic		Very characteristic	
	1	2	3	4
1. I am interested in things.	1	2	3	4
2. I get things done during the day.	1	2	3	4
3. Getting things started on my own is important to me.	1	2	3	4
4. I am interested in having new experiences.	1	2	3	4
5. I am interested in learning new things.	1	2	3	4
6. I put little effort into anything.	1	2	3	4
7. I approach life with intensity.	1	2	3	4
8. Seeing a job through to the end is important to me.	1	2	3	4
9. I spend time doing things that interest me.	1	2	3	4
10. Someone has to tell me what to do each day.	1	2	3	4
11. I'm less concerned about my problems than I should be.	1	2	3	4
12. I have friends.	1	2	3	4
13. Getting together with friends is important to me.	1	2	3	4
14. When someone good happens, I get excited.	1	2	3	4
15. I have an accurate understanding of my problems.	1	2	3	4
16. Getting things done during the day is important to me.	1	2	3	4

17. I have initiative.	1	2	3	4
18. I have motivation.	1	2	3	4



### Appendix L. The Brief Resiliency Scale

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008).

The Brief Resilience Scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine*, 15(3), 194-200.

Directions: Please indicate the extent to which you agree with each of the following statements by using the following scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

1. I tend to bounce back quickly after hard times.	1	2	3	4	5
2. I have a hard time making it through stressful events (R).	1	2	3	4	5
3. It does not take me long to recover from a stressful event.	1	2	3	4	5
4. It is hard for me to snap back when something bad happens (R).	1	2	3	4	5
5. I usually come through difficult times with little trouble.	1	2	3	4	5
6. I tend to take a long time to get over setbacks in my life (R).	1	2	3	4	5

## Appendix M. Positive and Negative Affect Scale (PANAS)

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS Scales. *Journal of Personality and Social Psychology*, 54, 1063-1070.

Instructions:

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way today.

1 = Not at all   2 = A little   3 = Moderately   4 = Quite a bit   5 = Extremely

1. Afraid (N)	1	2	3	4	5
2. Excited (P)	1	2	3	4	5
3. Irritable (N)	1	2	3	4	5
4. Determined (P)	1	2	3	4	5
5. Enthusiastic (P)	1	2	3	4	5
6. Hostile (N)	1	2	3	4	5
7. Guilty (N)	1	2	3	4	5
8. Alert (P)	1	2	3	4	5
9. Upset (N)	1	2	3	4	5
10. Interested (P)	1	2	3	4	5
11. Proud (P)	1	2	3	4	5
12. Nervous (N)	1	2	3	4	5
13. Inspired (P)	1	2	3	4	5
14. Distressed (N)	1	2	3	4	5
15. Strong (P)	1	2	3	4	5
16. Jittery (N)	1	2	3	4	5
17. Ashamed (N)	1	2	3	4	5
18. Attentive (P)	1	2	3	4	5

19. Scared (N)	1	2	3	4	5	
20. Active (P)		1	2	3	4	5

Note: N = negative affect, P = positive affect.

## Appendix N. Demographic questionnaire

Please answer the following questions:

1. What is your gender?

\_\_\_\_ male      \_\_\_\_ female

2. What is your age?

\_\_\_\_\_

3. What is your race?

- a. White, non-Hispanic
- b. Black or African American
- c. Asian or Asian American
- d. Indigenous or Native American
- e. Other \_\_\_\_\_

4. Are you Hispanic or Latino/a?                      Yes \_\_\_\_\_ No \_\_\_\_\_

5. What country do you live in?

\_\_\_\_\_

6. Are you currently an undergraduate college student? Yes \_\_\_\_\_ No \_\_\_\_\_

7. What is your marital status?

- a. Single
- b. Married or cohabitating
- c. Other

8. What is your highest level of education?

- a. No degree
- b. High school or GED

- c. Bachelors degree
- d. Masters degree
- e. Doctoral degree

9. What is your annual household income?

\_\_\_\_\_

10. Are you concerned about your drinking? Yes \_\_\_\_\_ No \_\_\_\_\_

11. When was your last drink?

\_\_\_ within the last hour, \_\_\_ within the last 24 hours, \_\_\_ within the last week,  
 \_\_\_ over a week ago, \_\_\_ over a month ago, \_\_\_ over a year ago, \_\_\_ over five  
 years ago

12. Do you want to drink less alcohol, quit drinking alcohol completely, or maintain  
 your current drinking style?

- a. Drink less alcohol
- b. Quit drinking completely
- c. Keep drinking like I am now

13. Have you ever received inpatient or outpatient treatment for an alcohol use  
 disorder? Yes \_\_\_\_\_ No \_\_\_\_\_

- a. If yes, how many formal treatment experiences have you had?

\_\_\_\_\_

14. Have you ever gone to an Alcoholics Anonymous or other 12-step meeting  
 because of your drinking?

- a. If yes, do you have a sponsor? Yes \_\_\_\_\_ No \_\_\_\_\_

15. Do you feel like you both want to change and not want to change your drinking at the same time?

Yes \_\_\_\_\_ No \_\_\_\_\_

16. Are you considering seeking formal treatment for your drinking?

Yes \_\_\_ No \_\_\_

a. If yes, referral information will be given at the end of this study, or visit:

<http://alcoholism.about.com/od/support/u/help.htm>

17. Are you considering trying to change your drinking on your own?

Yes \_\_\_ No \_\_\_

18. How confident do you feel that you could change your drinking on your own if you wanted to?

1	2	3	4	5	6	7
Not at						Very
all confident						Confident

19. How did you hear about this study?

- a. Word of mouth
- b. Yahoo groups
- c. Facebook
- d. Craig's List
- e. Alibi
- f. Alcohol-related website
- g. Flyer
- h. Other \_\_\_\_\_

Appendix O. Consent page for survey completion.

<https://esurvey.unm.edu/opinio/s?s=9452>

## University of New Mexico

### Informed Consent Cover Letter for Anonymous Surveys

#### ATTITUDES ABOUT ALCOHOL

Samara Rice and Dr. Harold Delaney from the Department of Psychology at the University of New Mexico are conducting a research study about alcohol attitudes and behavior. The purpose of the study is to ask people, who think they may drink too much alcohol, about their experiences with alcohol and possible motivations for drinking less. You are being asked to participate in this study because you indicated that you are 18 or older, you think you may be drinking too much alcohol, and you are interested in completing a survey about your attitudes and experiences with alcohol.

Your participation will involve answering a series of questions. The survey should take about 20-25 minutes to complete. Your involvement in the study is voluntary, and you may choose not to participate. There are no names or identifying information connected with your answers to this survey. You will not be compensated for your time, but will be entered into a random drawing for one \$100 or two \$50 Amazon gift cards, as a thank you for your time and effort. We will ask for an e-mail address at the end of the survey to contact you if you win a gift card. Your e-mail address will not be used for any other purpose and will be erased from our records when we close the survey. Your e-mail address will also not be connected to your answers on the survey. Although the intention of the researchers is to protect your confidentiality, there is always some small risk of loss of confidentiality. The survey includes questions such as “How often do you have six or more drinks on one occasion?” and “What is your overall reaction to the idea of drinking less alcohol?” Some individuals may experience discomfort when answering personal questions, and you can refuse to answer any of the questions at any time and for any reason. Your answers will be collected on a secure and encrypted software program. This study is collecting sensitive information and there is a risk for loss of confidentiality (although minimal). Your answers will be disconnected from your e-mail address or UNM net ID before they are stored electronically. The de-identified data will be stored on Samara Rice’s dropbox account and kept electronically for five years from the date the study is closed by Samara Rice and then destroyed.

The findings from this project will provide information on the attitudes and drinking behavior of people who think they may drink too much alcohol, and who may also be considering drinking less. This research study will also result in the development of a questionnaire to measure ambivalence about drinking less alcohol, for the eventual purpose of testing if the resolution of ambivalence is associated with ending problem drinking. If published, results will be presented in summary form only.

If you have any questions about this research project, please feel free to call Samara Rice at (505) 925-2317. She may also be e-mailed at [rice.samara@yahoo.com](mailto:rice.samara@yahoo.com). If you

have questions regarding your legal rights as a research subject, you may call the UNM Human Research Protections Office at (505) 272-1129. If you are a University of New Mexico student and are participating in this research for extra credit, other extra credit options are available to you if you would prefer to not participate in this study.

By clicking the “continue” button you will be agreeing to participate in the above described research study. Please do not take this survey if you are under 18 years of age or if you are pregnant, as drinking during pregnancy is known to cause birth defects.

Thank you for your consideration, and if you enjoy taking this survey and think that others may too, please feel free to share this link with others.

Sincerely,

Researcher's Name  
Samara Rice, MS

Researcher's Title  
Doctoral Candidate



Appendix P. Final page of survey.

Thank you for completing this survey. Your time and effort is greatly appreciated, and we hope to use your answers to learn more about how people make changes in their drinking.

If you would like to be entered in a random drawing for one \$100 or one of two \$50

Amazon gift cards please e-mail me at: AlcoholAttitudes@gmail.com. Should you win, I will contact you at the e-mail address you provide in the text of your e-mail.

If you feel that you may want help to reduce or stop drinking please visit the websites listed below:

1. The website listed below will check your drinking pattern and inform you about how you compare to the US population, will help you see signs of a problem if you have one, and will help you get tools to make a change.  
<http://rethinkingdrinking.niaaa.nih.gov/>
2. This next website reports information about getting help from a wide variety of sources such as treatment facilities, recovery support groups, and pharmaceutical treatment.  
<http://alcoholism.about.com/od/support/u/help.htm>
3. This is the official website of the National Institute on Alcohol Abuse and Alcoholism and contains a lot of useful information about drinking.  
<http://www.niaaa.nih.gov/>

Thanks again and best wishes to you!