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# A Psychometric Evaluation of the Treatment Self-Regulation Questionnaire (TSRQ) for Assessing Motivations for Responsible Drinking

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A PSYCHOMETRIC EVALUATION OF THE TREATMENT SELF-  
REGULATION QUESTIONNAIRE (TSRQ) FOR ASSESSING  
MOTIVATIONS FOR RESPONSIBLE DRINKING

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Charles Ambler, Ph.D.  
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## **Dedication**

To my fiancée, Katherine.

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REGULATION QUESTIONNAIRE (TSRQ) FOR ASSESSING  
MOTIVATIONS FOR RESPONSIBLE DRINKING

by

DYLAN K. RICHARDS, B.S.

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## Abstract

Self-determination theory (SDT) may be useful for understanding alcohol use and alcohol-related consequences among college students. A version of the Treatment Self-Regulation Questionnaire (TSRQ; Ryan & Connell, 1989) exists for assessing motivations proposed by SDT for responsible drinking, but no study has evaluated its psychometric properties. Thus, the purpose of the present studies was to provide a psychometric evaluation of this version of the TSRQ. In Study 1, among a convenience sample of college student drinkers ( $n = 308$ ), a four-factor structure of the TSRQ that is theoretically consistent with SDT was supported; however, the amotivation subscale demonstrated unacceptable internal consistency. In Study 2, among a sample of college student drinkers ( $n = 192$ ) who were recruited from a random sample of students, mixed evidence was found for the concurrent and incremental validity of the TSRQ. Generally, the findings of Study 2 support the proposals of SDT that motivations for responsible drinking exist on a continuum of self-determination and that motivation is increasingly related to positive alcohol-related outcomes as motivation increases in self-determination. There were, however, exceptions to this pattern of findings. More specifically, psychometric limitations emerged for the introjected regulation and amotivation subscales. These two subscales contain only two items each and may lack content validity. Future studies are needed to refine the TSRQ for assessing motivations for responsible drinking to further research on the application of SDT to understanding alcohol use and alcohol-related consequences among college students.

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## **Chapter 1: Introduction**

### **Alcohol Misuse among College Students**

Alcohol misuse among college students in the U.S. is a significant public health concern (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2015). Compared to their same-age peers who do not attend college, full-time college students report higher rates of current alcohol use (51.9% vs. 60.3%), binge drinking (35.0% vs. 40.1%), and heavy drinking (10.7% vs. 14.4%) (Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). Alcohol misuse, particularly binge and heavy drinking, is associated with a myriad of consequences among college students, such as academic problems, risky sexual behavior, and physical injury (e.g., Perkins, 2002). There is evidence that the college environment promotes alcohol misuse among young adults (e.g., Beck, Caldeira, Vincent, & Arria, 2013). Thus, studies examining the antecedents of alcohol use and alcohol-related consequences among college students are warranted.

### **Drinking Motives**

Motivation is proposed to be the most proximal antecedent of alcohol use (Cox & Klinger, 1988). In other words, all other factors (e.g., personality) that influence alcohol use do so through motivation. The dominant conceptualization of motivation in relation to alcohol use is drinking motives based on a motivational model of alcohol use proposed by Cox and Klinger (1988, 2000). Generally, this model proposes that there are different reasons for why people drink. More specifically, the model assumes that people make a conscious or unconscious decision to consume an alcoholic drink on the basis of whether the affective changes of drinking outweigh the affective changes of not drinking. The affective changes of drinking can be characterized using two dimensions: valence (positive or negative) and source (internal or external) (Cox & Klinger, 1988, 1990). Thus, crossing these two dimensions results in four categories of drinking motives that are proposed by this model: 1) enhancement (positive and internal; e.g., “Because you like the feeling”), 2) social (positive and external; e.g., “Because it helps you to enjoy a party”), 3) coping

(negative and internal; e.g., “To forget your worries”), and 4) conformity (negative and external; e.g., “Because your friends pressure you to drink”) (Cooper, 1994).

Research has confirmed that college students drink for different reasons that represent the four categories of drinking motives described above (e.g., MacLean & Lecci, 2000; Martens, Rocha, Martin, & Serrao, 2008). Social motives are the most frequently reported motives for drinking among college students with fewer students reporting enhancement and coping motives (Kuntsche, Knibbe, Gmel, & Engels, 2005). The four categories of drinking motives differentially relate to alcohol use and alcohol-related consequences, such that some drinking motives are associated with greater alcohol misuse than others. For example, it has been consistently shown that coping motives are positively associated with alcohol-related consequences whereas social motives are positively associated with indicators of moderate alcohol use (e.g., Kuntsche et al., 2005). Indeed, coping motives are perhaps the best predictor of alcohol-related consequences among college students (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). Overall, a large body of research supports drinking motives as important antecedents of alcohol use and alcohol-related consequences among college students. As mentioned previously, however, drinking motives are different reasons for why people drink. While it is important to understand why people drink, it is equally important to understand why people drink responsibly, i.e. avoid drinking in a manner that puts them at greater risk of experiencing negative consequences.

### **Responsible Drinking and Protective Behavioral Strategies**

Studies (e.g., Barry & Goodson, 2011a, 2011b) have investigated how college students conceptualize and practice responsible drinking and “responsible drinking” is a phrase that has been used in many alcohol advertisements and public health campaigns. However, prior to these studies, there had been no empirical attempts to define responsible drinking. Barry and Goodson (2011a) found seven themes regarding how college students conceptualize and practice responsible drinking. The seven themes are as follows: 1) refrain from drinking and driving, 2) drink in moderation, 3) monitor and limit consumption, 4) pace one’s drinking rate, 5) know one’s personal

limits, 6) take precautions to avoid intoxication, and 7) plan ahead. Notably, these themes are nearly identical to another construct, alcohol-related protective behavioral strategies (Barry & Goodson, 2011a). Protective behavioral strategies (PBS) are most commonly defined as behaviors that are used while drinking to reduce alcohol use and/or limit alcohol-related consequences (Martens et al., 2005). The three subscales of the Protective Behavioral Strategies Scale (Martens et al., 2005; revised by Treloar, Martens, & McCarthy, 2015)—the most widely used and well-validated measure of PBS use among college students (Prince, Carey, & Maisto, 2013)—demonstrate the conceptual overlap between the seven themes of responsible drinking and PBS: serious harm reduction (e.g., “Use a designated driver”), stopping/limiting drinking (e.g., “Determine not to exceed a set number of drinks”), and manner of drinking (e.g., “Drink slowly, rather than gulp or chug”). Thus, it can be argued that how college students conceptualize and practice responsible drinking is analogous to PBS use.

In a review of the literature on PBS use among college students, Pearson (2013) found that nearly all of the 62 published articles included in the review provided evidence that more frequent PBS use is related to reduced alcohol use and alcohol-related consequences. There is also some evidence that PBS use is a proximal outcome (i.e., mediator) of interventions for alcohol misuse among college students (Larimer et al., 2007; Barnett, Murphy, Colby, & Monti, 2007; Murphy et al., 2012). That is, interventions for alcohol misuse among college students may reduce alcohol use and alcohol-related consequences, in part, by increasing the frequency of PBS use. Given the above, it is important to understand why people drink responsibly as such efforts may provide targets for treatment and interventions. Further, theoretical frameworks are needed to inform why people drink responsibly. Just as people are motivated to drink, people may also be motivated to drink responsibly. Indeed, motivation for responsible drinking may be more important than motivation for drinking for certain people and in particular contexts, such as people who drink at low-risk levels or when people are actively making changes, or maintaining changes, to their drinking. There is evidence that PBS use mediates the associations between certain drinking motives and alcohol use and alcohol-related consequences (Pearson, 2013). This suggests that

people who drink for certain reasons may drink more and experience more alcohol-related consequences, in part, because of less frequent PBS use. However, Cox and Klinger's motivational model from which drinking motives are derived does not provide insight into why people may be more likely to drink responsibly. One theoretical framework that may be useful for understanding why people are more likely to drink responsibly, as well as less likely to drink responsibly, is self-determination theory.

### **Self-Determination Theory (SDT)**

Self-determination theory (SDT; Deci & Ryan, 1985a; Ryan & Deci, 2000) is a general, humanistic theory of motivation that has been applied to health behaviors and behaviors in an extensive number of other domains (e.g., education, politics, work). According to SDT, motivation is a multi-dimensional construct that exists on a continuum of self-determination, or autonomy (Ryan & Deci, 2000). In other words, there are different types of motivation that vary in the extent to which they are self-determined. The cornerstone of SDT is *intrinsic motivation*, the most self-determined type of motivation, which refers to engaging in a behavior because the behavior itself is inherently satisfying. Opposite of intrinsic motivation on the continuum is *amotivation*, the least self-determined type of motivation, which refers to the absence of intent to act. In the middle of the continuum is *extrinsic motivation*, which broadly refers to engaging in a behavior to attain something other than the inherent satisfaction of engaging in the behavior. Extrinsic motivation is further categorized into four regulatory styles that vary in degree of self-determination. The four regulatory styles, from least to most self-determined, are as follows: 1) *external regulation*, engaging in a behavior to avoid external punishments or obtain external rewards; 2) *introjected regulation*, engaging in a behavior to avoid internal punishments (e.g., guilt) or obtain internal rewards (e.g., pride); 3) *identified regulation*, engaging in a behavior because one values the behavior; and 4) *integrated regulation*, engaging in a behavior because one has assimilated the behavior with one's sense of self (Deci & Ryan, 1985a; Ryan & Deci, 2000). Notably, external and introjected regulation are often grouped together as *controlled motivation*

because the perceived locus of causality (i.e., one's perception of the origin of their reasons for engaging in a behavior) for both is mostly external. Similarly, identified and integrated regulation are often grouped together as *autonomous motivation* because the perceived locus of causality for both is mostly internal. As motivation is *internalized*, or shifts from less to more self-determined, it becomes increasingly associated with positive outcomes, i.e. psychological and physical well-being (Ryan & Deci, 2000). SDT is humanistic in that it proposes that people are naturally inclined toward more self-determined motivation and the positive outcomes associated with it. This natural inclination is fulfilled under certain environmental and personality conditions.

SDT specifies the environmental and personality conditions that facilitate self-determined motivation for engaging in a behavior. Environmental conditions that satisfy three fundamental psychological needs for autonomy, competence, and relatedness are proposed to facilitate self-determined motivation (Ryan & Deci, 2000). In contrast, environmental conditions that thwart the psychological needs are proposed to impede self-determined motivation. Through interaction with the environment over the lifespan, individual differences develop in the propensity for the types of motivation described by SDT (Deci & Ryan, 1985a, 1985b). For example, those whose environment supports the psychological needs develop a propensity toward more self-determined types of motivation. Deci (1980) refers to these individual differences as *causality orientations* which represent fundamental aspects of personality that affect the regulation of behavior. According to Deci and Ryan (1985a), there are three types of causality orientations: autonomy, controlled, and impersonal. *Autonomy orientation* is the perception of choice in the regulation of behavior, and thus results in intrinsic motivation and more self-determined types of extrinsic motivation (i.e., identified and integrated regulation). *Controlled orientation*, on the other hand, involves external contingencies influencing behavior which relates to less self-determined types of extrinsic motivation (i.e., external and introjected regulation). Finally, *impersonal orientation*, the experience of futility, is a predisposition for amotivation. These orientations constitute the global (i.e., personality) level of motivation which influences motivation in particular contexts and situations (Vallerand, 1997). In sum, under certain environmental and personality conditions,

people fulfill their natural inclination toward more self-determined motivation and the positive outcomes associated with it.

### **SDT and Health Behaviors**

The framework of motivation proposed by SDT that was described above may be useful for understanding motivation for engaging in health behaviors (Ryan, Patrick, Deci & Williams, 2008). In the context of health behaviors, SDT proposes that more self-determined types of motivations for engaging in a health behavior are associated with an increased likelihood of initiating and maintaining that health behavior (Williams, Deci, & Ryan, 1998). Importantly, SDT is most applicable to understanding motivations for engaging in healthy behaviors as opposed to unhealthy behaviors (e.g., tobacco cessation as opposed to tobacco use). This is because SDT is humanistic in that it proposes that people are inclined toward self-determined motivation and positive outcomes. Further, the self-determination continuum of motivation does not apply to unhealthy behaviors. More self-determined types of motivation for engaging in unhealthy behaviors, in particular, is inconsistent with the conceptual model. In other words, people neither value unhealthy behaviors nor assimilate unhealthy behaviors with their sense of self, according to SDT. Another important point regarding SDT in the context of health behaviors is that intrinsic motivation is not applicable to most healthy behaviors because such behaviors are not inherently satisfying (Ryan et al., 2008). For example, the behaviors associated with adhering to a medication regimen to manage diabetes are not inherently satisfying. In contrast, other behaviors to which SDT has been applied (e.g., playing a sport or musical instrument) are inherently satisfying, at least to some people. This is important because, according to SDT, the successful initiation and maintenance of health behaviors is contingent on the process of internalizing extrinsic motivation as opposed to experiencing intrinsic motivation (Ryan et al., 2008). In other words, valuing and assimilating with one's sense of self (i.e., autonomous motivation) a health behavior that was previously regulated by external and internal punishments and rewards (i.e., controlled motivation)

is necessary for maintaining that health behavior over time. The process of internalization is thus proposed to be a psychological mechanism underlying health behavior change.

Research supports the proposal of SDT that more self-determined types of motivation for engaging in health behaviors are associated with an increased likelihood of successfully initiating and maintaining those health behaviors. The Treatment Self-Regulation Questionnaire (TSRQ; Ryan & Connell, 1989) was initially developed to assess elementary school students' motivations for achievement-related and prosocial behaviors, but revised versions of the TSRQ have been developed to assess motivations for engaging in health behaviors. One study (Levesque et al., 2007) found support for a four-factor structure of the TSRQ that is theoretically consistent with SDT for three different versions for engaging in tobacco cessation, healthy eating, and exercise. Notably, researchers (e.g., Williams et al., 2009) have adapted the TSRQ for other health behaviors, such as medication adherence to manage diabetes. The four factors of the TSRQ found by Levesque et al. represent amotivation (3 items; e.g., "I really don't think about stopping smoking"), external regulation (4 items; e.g., "Because I feel pressure from others to stop smoking permanently"), introjected regulation (2 items; e.g., "Because I would feel guilty or ashamed of myself if I smoked"), and autonomous motivation (i.e., identified and integrated regulation) (6 items; e.g., "Because stopping smoking is very important for being as healthy as possible"). Across the different versions of the TSRQ, the items are the same with the exception of the behavior. Levesque et al. found patterns of cross-sectional associations among the motivations and between the motivations and health outcomes (e.g., fruit and vegetable intake) that were consistent with SDT. Motivations closer on the self-determination continuum were more positively associated than motivations further on the continuum. Additionally, amotivation was negatively associated with the health outcomes and the other three types of motivation were positively associated with the health outcomes. The magnitude of the associations were consistent with a simplex pattern such that external regulation had the smallest positive associations and autonomous motivation had the largest positive associations with the health outcomes. Furthermore, studies have found support for the predictive utility of the TSRQ subscales,

especially autonomous motivation. For example, one study (Silva et al., 2011) found that autonomous motivation, but not other types of motivation, predicted weight loss at a three-year follow-up among women. This finding is important because it supports the proposal of SDT that autonomous motivation is important for the maintenance of health behaviors and that internalization is a psychological mechanism underlying health behavior change. Thus, it may be important for interventions that attempt to promote healthy behavior to initiate internalization.

Given the above, the environmental and personality conditions under which motivation is internalized are particularly important as these conditions can potentially be targeted by interventions promoting health behaviors to initiate internalization. Again, environmental conditions refer to the extent to which the environment satisfies or thwarts the psychological needs and personality conditions refer to dispositional orientations toward the types of motivation. Indeed, a meta-analysis of 184 studies with independent data sets found that autonomy support in health care settings was associated with greater satisfaction of the psychological needs ( $r = .31 - .48$ ), which were, in turn, associated with better health outcomes (e.g., weight loss;  $r = .07 - .53$ ) (Ng et al., 2012). In addition to supporting the psychological needs, treatment and interventions for promoting healthy behaviors can be tailored on the basis of a person's causality orientation (i.e., personality). For example, Neighbors, Lewis, Bergstrom, and Larimer (2006) found that a computer-delivered personalized normative feedback intervention for alcohol misuse among college students was more effective among students higher in controlled orientation. In other words, an intervention targeting the social influences on drinking was more effective among people who are generally more motivated by extrinsic factors. Despite the usefulness of applying SDT to understand and promote health behaviors, relatively few studies have applied SDT to alcohol use in comparison to other health behavior domains.

### **SDT and Alcohol Use**

Most studies that have applied SDT to alcohol use (e.g., Chawla, Neighbors, Logan, Lewis, & Fossos, 2009; Knee & Neighbors, 2002; Neighbors, Walker, & Larimer, 2003) have focused on

controlled orientation (i.e., personality) as a risk factor for alcohol misuse and related consequences among college students. For example, one of these studies found that positive expectations of alcohol use were related to greater alcohol use and alcohol-related consequences among college student drinkers higher in controlled orientation (Neighbors et al., 2003). Despite the importance of these studies, and the fact that they support SDT in relation to alcohol use, they ignore the nuanced self-determination continuum of motivation proposed by SDT, which is most applicable to healthy behaviors. Notably, there are studies that have applied the self-determination continuum to healthy behaviors and that are related to alcohol use, but none of these studies have directly examined motivations for drinking behaviors. For example, Ryan, Plant, and O'Malley (1995) found that, among outpatients entering a clinic for the treatment of alcohol use disorders, autonomous motivation for entering treatment was associated with better treatment outcomes, such as greater involvement and retention in treatment. Other studies have found that autonomous motivation for academics (Wormington et al., 2011) and athletic involvement (Rockafellow & Saules, 2006) is associated with less alcohol use. Again, these studies provide support for SDT in relation to alcohol use, but do not directly examine motivations for drinking behaviors. Just as people are motivated to drink, they may also be motivated to drink responsibly, or engage in drinking behaviors that reduce alcohol use and alcohol-related consequences. Thus, I aim to address this gap in the literature by examining motivations for responsible drinking.

There is currently no validated measure for assessing motivations described by SDT for responsible drinking. As mentioned previously, the TSRQ has been revised to assess motivations for engaging in health behaviors, and several versions of the TSRQ regarding different healthy behaviors (e.g., tobacco cessation) have been validated. A version of the TSRQ for assessing motivations for responsible drinking exists (retrieved from <https://selfdeterminationtheory.org/>), but there have been no studies that have attempted to psychometrically evaluate this version of the TSRQ. The items of the version of the TSRQ for assessing motivations for responsible drinking are the same as the other versions of the TSRQ with the exception of the behavior. For example, the item "I really don't think about stopping smoking" in the tobacco cessation version is "I really

don't think about using alcohol responsibly" in the responsible drinking version. Studies are needed to determine whether the version of the TSRQ for assessing motivations for responsible drinking has the same four-factor structure that is theoretically consistent with SDT as the other versions of the TSRQ. Furthermore, studies are needed to determine whether the TSRQ subscales are associated with one another and with alcohol-related outcomes in a manner that is theoretically consistent with SDT. I conducted the present two studies to address these aims.

## **The Present Studies**

### **Study 1**

The purpose of the first study was to attempt to confirm the four-factor structure of the TSRQ found by Levesque et al. (2007) among a convenience sample of college student drinkers. I hypothesized that the four-factor structure of the TSRQ would provide an adequate fit to the data, as the self-determination continuum of motivation is proposed to apply across behaviors and thus the factor structure for different versions of the TSRQ should be the same. Additionally, if the four-factor structure of the TSRQ is supported, the internal consistency of the four subscales will be examined. Overall, Levesque et al. found adequate internal consistency estimates for the four subscales, and I hypothesized that this finding would be replicated in the first study.

### **Study 2**

The aim of the second study was to attempt to establish the concurrent and incremental validity of the four TSRQ subscales, if they are supported in the first study, among college student drinkers that were recruited from a random sample. Consistent with this aim, associations among the motivations were tested. I hypothesized that a simplex pattern of associations would emerge that is consistent with SDT such that motivations closer on the self-determination continuum will be more positively associated than motivations further on the continuum. Second, associations between the motivations and PBS use, alcohol use, and alcohol-related consequences were tested. Because autonomous motivation and introjected and external regulations all represent motivation for responsible drinking, I hypothesized that all three would demonstrate positive associations with

PBS use and negative associations with alcohol use and alcohol-related consequences. Again, a simplex pattern of associations was hypothesized to emerge such that more self-determined motivations would demonstrate associations of greater magnitude. In contrast, amotivation for responsible drinking represents a lack of intent to engage in responsible drinking and will thus demonstrate negative associations with PBS use and positive associations with alcohol use and alcohol-related consequences. While it may be more appropriate to test PBS use as a mediator of the effects of motivations for responsible drinking on alcohol use and alcohol-related consequences, these analyses are beyond the scope of the present studies. Third, the associations between motivations for responsible drinking and alcohol use and alcohol-related consequences were tested after controlling for socio-demographic characteristics and drinking motives. I hypothesized that motivations for responsible drinking will be associated with alcohol use and alcohol-related consequences above and beyond socio-demographic characteristics and drinking motives. Furthermore, I hypothesized that autonomous motivation for responsible drinking would be the most important correlate of alcohol-related outcomes among the motivations proposed by SDT.

If the hypotheses are supported, the present studies will be the first to provide evidence for different motivations for responsible drinking that are theoretically consistent with SDT. The present studies would also be the first to demonstrate that motivations for responsible drinking that are more self-determined are related to more frequent PBS use and less alcohol use and alcohol-related consequences.

## **Chapter 2: Study 1: Confirmation of the Four-Factor Structure and Internal Consistency of the TSRQ for Assessing Motivations for Responsible Drinking**

### **Method**

Participants were 308 (71.7% female;  $M_{age} = 21.3$  years,  $SD = 5.1$ , range: 18-51 years, 86.7% traditional college student age [i.e., between 18 and 24 years of age]) undergraduate students enrolled in psychology courses at the University of Texas at El Paso (UTEP), a Hispanic Serving Institution on the U.S. border with México. Inclusion criteria were as follows: report having consumed alcohol at least once in the past three months,  $\geq 18$  years of age, and be sufficiently fluent in English to complete the study survey. Ethnicity/national origin of the sample was 88.6% Hispanic (i.e., Mexican National, Mexican American, and / or “Other Hispanic”), 16.2% non-Hispanic White, 3.2% African American, 0.6% Asian American, 1.3% Native American, and 1.0% “Other.” Note that these percentages do not sum to 100% because participants were instructed to choose as many ethnic/national origin group(s) that they identified with.

Participants responded to the study posting on the Psychology Department’s online research participation system and were provided with a link to access the online survey. Participants completed the study survey to receive partial course credit. After providing informed consent, participants completed the TSRQ and other self-report questionnaires assessing socio-demographic characteristics and alcohol and PBS use. This study was conducted to fulfill the First-Year Research Project requirement for the Doctoral Program in Psychology at UTEP. Notably, the statistical analysis of these data for Study 1 of the present Master’s Thesis differ from the statistical analysis of these data for the First-Year Research Project. Approval for this study was obtained from the Institutional Review Board at UTEP (IRBNet ID: 803971).

### **Motivations for responsible drinking**

The TSRQ (Ryan & Connell, 1989), which was previously described in greater detail, was used to assess motivations described by SDT for responsible drinking. Items are reasons for

drinking responsibly that reflect either amotivation (3 items; e.g., “I really don’t think about it”), external regulation (4 items; e.g., “Because I want others to see I can do it”), introjected regulation (2 items; e.g., “Because I would feel guilty or ashamed of myself if I did not use alcohol responsibly”), or autonomous motivation (6 items; e.g., “Because I personally believe it is the best thing for my health”). Participants indicate the extent to which each item is true for them using a 1 (*Not at all true*) to 7 (*Very true*) Likert-type scale.

### **Alcohol use**

A Quantity-Frequency Index (QFI; Dimeff, Baer, Kivlahan, & Marlatt, 1999) was used to assess alcohol use in the past three months that includes three items assessing frequency of alcohol use, quantity of drinks on a typical drinking occasion, and peak consumption (i.e., quantity of drinks on the heaviest drinking occasion) (each assessed with one item). A standard drink was defined as “14.0 grams (0.6 ounces) of pure alcohol, which is typically found in 12-ounces of beer (5% alcohol content), 8-ounces of malt liquor (7% alcohol content), 5-ounces of wine (12% alcohol content), 1.5-ounces or a ‘shot’ of 80-proof (40% alcohol content) distilled spirits or liquor (e.g., gin, rum, vodka, whiskey).” Response options for the frequency item ranged from 1 (*Less than once a month*) to 6 (*Once a day or more*) and response options for the two quantity items ranged from 1 (*1 drink*) to 31 (*More than 30 drinks*).

### **PBS**

The 15-item Protective Behavioral Strategies Scale (PBSS; Martens et al., 2005) was used to assess frequency of engagement in PBS. The PBSS consists of three subscales that reflect different types of strategies: stopping/limiting drinking (S/LD) (7 items; e.g., “Determine not to exceed a set number of drinking”), manner of drinking (MOD) (5 items; e.g., “Drinking slowly, rather than gulp or chug”), and serious harm reduction (SHR) (3 items; e.g., “Use a designated driver”). Participants are instructed to rate the degree to which they engage in PBS when using alcohol or “partying” on a 6-point response scale ranging from 1 (*Never*) to 6 (*Always*). The PBSS is the most widely used and well-validated measure of PBS among college students (Prince, Carey,

& Maisto, 2013). Previous studies have found adequate estimates of internal consistency for the S/LD and MOD subscales ( $\alpha = .82$  and  $\alpha = .74$ , respectively) but not for the SHR subscale ( $\alpha = .59$ ) (Martens, Pedersen, LaBrie, Ferrier, & Cimini, 2007).

### **Analytic approach**

A confirmatory factor analysis (CFA) was used to test whether or not the four-factor structure of the TSRQ for assessing motivations for responsible drinking provided an adequate fit to the data. The CFA was conducted using *Mplus* Version 8 (Muthén & Muthén, 1998–2017) with maximum likelihood estimation with robust standard errors that accounts for missing data (MLR). All item loadings onto their respective factors were estimated and the unit of measurement of the latent variables was fixed by setting the factor variances to 1. The covariances between the latent factors were also estimated. Global fit of the model was assessed using the joint criteria suggested by Hu and Bentler (1999):  $CFI \geq .95$ ,  $RMSEA \leq .06$ , and  $SRMR \leq .08$ . To protect against confirmation bias, alternative models were tested and the global fit indices of these alternative models were compared to those of the model being evaluated (i.e., the four-factor TSRQ) (e.g., MacCallum & Austin, 2000). The alternative models were also compared to the model being evaluated using the Akaike information criterion (AIC) where the model with the lowest AIC is the preferred model (Brown, 2014). The first alternative model that was tested was a three-factor model in which the external and introjected regulation items loaded onto a common factor as opposed to two separate factors. Notably, the amotivation and autonomous motivation factors are consistent across the three-factor alternative model and the four-factor model that is being evaluated. External and introjected regulation both have an external perceived locus of causality and are sometimes combined to represent a higher-order category of motivation, controlled motivation. This three-factor model is consistent with how the TSRQ has been used in some previous research (Levesque et al., 2007) and previous research on SDT in general has grouped these two types of regulation together (Ryan & Deci, 2000). A second alternative model that was

tested was a one-factor model as it is conceptually plausible that the TSRQ items represent a single motivational construct.

If the four-factor structure of the TSRQ is supported, the internal consistencies of the four subscales will be examined by computing Cronbach's alpha ( $\alpha$ ) for each of the subscales and 95% confidence intervals constructed around  $\alpha$  using 10,000 bias-corrected bootstrap resamples (Padilla, Divers, & Newton, 2012). In addition, based on the recommendation of Eisinga, te Grotenhuis, and Pelzer (2013), standardized  $\alpha$  (i.e., Spearman-Brown stepped-up reliability coefficient) for two-item subscales will be computed. The 'psych' (Revelle, 2018) package for R (R Core Team, 2018) was used to compute the  $\alpha$  estimates and their associated confidence intervals.

## **Results and Discussion**

Table 1 presents the descriptive statistics of the alcohol use variables for the sample.

### **Factor structure**

The four-factor model did not provide an adequate fit to the data. However, the examination of modification indices suggested that Item 10 ("Because it is easier to do what I am told than think about it") load onto the external regulation factor (modification index = 70.78). Modification indices also suggested allowing Item 4 ("Because others would be upset with me if I did not") to load onto the other three factors in addition to the external regulation factor (modification index = 15.77 - 25.49). A modification index is the amount that  $\chi^2$  will decrease if the parameter is relaxed (Sörbom, 1989). Caution should be taken when relaxing model parameters based on modification indices because such decisions are based on data and are thus susceptible to capitalization on chance characteristics of the data (MacCallum, Roznowski, & Necowitz, 1992). That said, Item 10 weakly loaded onto the amotivation factor ( $\lambda = .17$ ,  $SE = .12$  [standardized estimates]) and the reading of the item stem provided conceptual justification for allowing Item 10 to load onto the external regulation factor. According to SDT, amotivation is lack of intent to engage in a behavior and external regulation is engaging in a behavior to satisfy

an external demand (Ryan & Deci, 2000). Engaging in responsible drinking because you are told to do so by others seems to be more consistent with the definition of external regulation than amotivation because one is complying with the external pressure of being told what to do. Consistent with the idea that Item 10 represents external regulation, Item 10's loading onto the amotivation factor was the smallest ( $\lambda = .33$  [unstandardized estimate]) factor loading reported by Levesque et al. (2007). Modification indices also suggested that Item 4, an external regulation item, cross-loads onto the three other factors. The decision was made to drop this item because the cross-loadings indicate that the item may not adequately represent external regulation for responsible drinking. It may be that others getting upset with you for not drinking responsibly is implicated in other types of motivation as well. For example, it could be that one reason for feeling bad about yourself for not drinking responsibly (i.e., introjected regulation) is because others get upset with you.

A second CFA was then conducted for a revised model in which Item 10 loaded onto the external regulation factor as opposed to the amotivation factor and Item 4 was removed. This revised model provided an acceptable fit to the data (see Table 2). However, neither the CFI nor the RMSEA values met the criteria suggested by Hu and Bentler. Nevertheless, others have suggested that CFI values close to .90 are indicative of a good fitting model (Blackburn, Donnelly, Logan, & Renwick, 2004) and RMSEA values of .08 are indicative of a "mediocre" fitting model (MacCallum, Browne, & Sugawara, 1996). CFAs were then conducted for the two conceptually plausible alternative models that were previously described. The modifications made to the four-factor model were also made to the two alternative models. For both alternative models, Item 4 was removed. Item 10 was loaded onto the controlled motivation factor as opposed to the amotivation factor for the three-factor alternative model. The modification concerning Item 10 was not applicable to the one-factor model as all items load onto a single factor. The three-factor alternative model provided a poor fit to the data (see Table 2). The one-factor alternative model also provided a poor fit to the data (see Table 2). Thus, the hypothesized four-factor model was selected as the preferred model because it provided the best fit to the data based on global model

fit indices and AIC. Table 3 presents the standardized factor loadings for the revised four-factor model and the item descriptives. Further, the interfactor correlations ranged from -.56 to .74.

Although the revised four-factor model provided an adequate fit the data and a better fit to the data than two alternative models, the RMSEA value for the revised four-factor model was indicative of only a mediocre fitting model. Notably, however, the RMSEA value was consistent with the range of RMSEA values found by Levesque et al. (2007) (RMSEA = .06 - .09) for other versions of TSRQ across four different studies. Nevertheless, I conducted a series of exploratory factor analyses (EFAs) in *Mplus* to potentially identify poor performing items and an alternative factor solution. Each EFA was conducted with a parallel analysis (Horn, 1965) to determine the number of factors to retain. The items for the factor solution supported by the parallel analyses were then examined for low loadings and cross-loadings (Tabachnick & Fidell, 2007) which were subsequently removed from further EFAs. This process started with all 15 original items and was repeated until a final EFA was conducted where there were no items with low loadings or cross-loadings. The result of this process was a two-factor model with 12 items (i.e., 3 items were dropped). However, this two-factor model provided a poor fit to the data based on global fit indices and thus further results of these EFA procedures are not presented. Given the above, I determined that the revised four-factor model was still the preferred model, especially because it is consistent with the findings of previous studies.

Previous research supports a four-factor structure of the TSRQ for assessing motivations for engaging in healthy behaviors (e.g., tobacco cessation) that is theoretically consistent with SDT (Levesque et al., 2007). In Study 1, I found support for a revised four-factor structure of the TSRQ for assessing motivations for responsible drinking. The revisions made include using Item 10 as an external regulation item as opposed to an amotivation item and dropping Item 4. General support for the four-factor structure was hypothesized as there is no reason to believe that the factor structure would vary—the continuum of motivation proposed by SDT is theorized to apply across behaviors (Ryan & Deci, 2000).

## **Internal consistency**

The internal consistency estimates for autonomous motivation ( $\alpha = .90$ , 95% CI [.88, .92]), introjected regulation ( $\alpha = .84$ , 95% CI [.79, .89]; standardized  $\alpha = .85$ ), and external regulation ( $\alpha = .80$ , 95% CI [.75, .84]) were all acceptable as each of these estimates were greater than the commonly accepted cutoff value of .70. However, the internal consistency estimate for amotivation ( $\alpha = .58$ , 95% CI [.46, .67]; standardized  $\alpha = .59$ ) was unacceptable as it was less than .70. These findings are somewhat consistent with previous research. Levesque et al. (2007) found acceptable internal consistency estimates for the autonomous motivation, introjected regulation, and external regulation subscales across four studies. In contrast, the amotivation subscale demonstrated an unacceptable internal consistency estimate in one study ( $\alpha = .41$ ) but acceptable internal consistency estimates in the other three studies ( $\alpha = .73 - .79$ ) conducted by Levesque et al. Notably, the range of estimates for the amotivation subscale was lower than the ranges for the other subscales reported by Levesque et al. One consideration is that the amotivation subscale included one less item in the present study and the number of items affects  $\alpha$  such that  $\alpha$  generally gets larger as the number of items increases (e.g., Morera & Stokes, 2016). The findings of the present study warrant caution when using the current amotivation subscale to assess amotivation for responsible drinking as the items were not internally consistent. Future studies should attempt to improve the internal consistency of the amotivation subscale by generating additional items.

In sum, Study 1 provides preliminary support for using the TSRQ subscales to assess motivations for responsible drinking. The findings are largely consistent with previous psychometric work on the TSRQ in that a factor structure theoretically consistent with SDT was supported. In other words, four factors representing types of motivation that vary in degree of self-determination provided an adequate fit to the data. The purpose of the proposed analyses for Study 2 is to test the concurrent and incremental validity of the derived subscales by examining whether the subscales are associated with alcohol-related outcomes in a manner that is theoretically consistent with SDT.

## **Chapter 3: Study 2: Concurrent and Incremental Validity of the TSRQ for Assessing Motivations for Responsible Drinking**

### **Method**

Participants were 192 undergraduate students (58.9% female;  $M_{\text{age}} = 23.4$  years,  $SD = 6.6$ , range: 18-69 years) at UTEP who reported having consumed alcohol at least once in the past 30 days that were recruited from a pool of randomly selected students. Most of the sample identified as Hispanic (89.6%). Additionally, the sample was 10.4% freshman, 20.3% sophomore, 38.0% junior, and 31.3% senior.

Approval for this study was obtained from the Institutional Review Board at UTEP (IRBNet ID: 854071). Following ethical approval of the study, the Latino Alcohol and Health Disparities Research Center was provided with the contact information for 760 randomly selected undergraduate students at UTEP by the Center for Institutional Evaluation, Research, and Planning. Seven hundred sixty undergraduate students were randomly selected on the basis of a power analysis that was conducted for analyses to test other hypotheses that the study was designed to address and a desired two-thirds response rate. Participants were recruited from the pool of randomly selected students to complete an online survey for a study on the influence of cultural and psychological factors on health behaviors. Recruitment took place from October 2016 to October 2017. Intensive recruitment efforts were used to attempt to meet the desired two-thirds response rate. During the year-long recruitment period, potential participants were sent weekly emails with instructions and a link to the online study survey. In addition, several undergraduate research assistants made two attempts to both call and text message potential participants to assess their willingness to participate in the study. Those who expressed willingness over the telephone to participate were directed to the emails that had been sent to them. Those who expressed unwillingness to participate in the study, either by email or phone, were not contacted again. Incentives for participation were a \$20 Target® gift card and a lottery to win one of four iPad® Air 2's. Three hundred seventy-one students (48.8% participation rate) completed the survey in

its entirety, and, among those who completed the survey, just over 50% reported having consumed alcohol at least once in the past month. For the purpose of the present study, the online survey included the self-report questionnaires listed below in addition to the TSRQ and PBSS, which were described previously. The TSRQ and PBSS were the 12<sup>th</sup> and 13<sup>th</sup>, respectively, measures administered. The internal consistency estimates for the TSRQ subscales are provided in the results section. The S/LD ( $\alpha = .83$ ) and MOD ( $\alpha = .74$ ) subscales of the PBSS demonstrated adequate internal consistency; however, the SHR ( $\alpha = .53$ ) subscale did not. In total, 14 other measures were included in the study survey that were not used for the present study. These other measures assessed psychological (e.g., self-regulation), cultural (e.g., acculturation), and alcohol-related constructs (e.g., drinking norms).

### **Alcohol use**

Alcohol use in the past 30 days was assessed using four items from the Behavioral Risk Factor Surveillance Survey (BRFSS; Centers for Disease Control and Prevention [CDC], 2015). The four items assess frequency of alcohol use, quantity of drinks consumed on a typical drinking occasion, peak consumption, and number of binge drinking episodes ( $\geq 4$  drinks for women and  $\geq 5$  drinks for men during a single drinking occasion). These items are consistent with the recommendations of the NIAAA Task Force on Recommended Alcohol Questions (2003). A standard alcoholic drink was defined for participants as “a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor.” The alcohol use measure was the 2<sup>nd</sup> measure that was administered.

### **Alcohol-related consequences**

Alcohol-related consequences experienced over the past year were assessed with the 18-item version of the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989; revised by White & Labouvie, 2000). The RAPI items (e.g., “Not able to do your homework or study for a test”) each represent a symptom or negative consequence from alcohol misuse. Participants indicate how frequently they have experienced each problem during the past year using a 4-point

response scale ranging from 0 (*Never*) to 3 (*More than 5 times*). The items are summed to create a total score. High internal consistency estimates for the RAPI were found in the initial validation study at two time points ( $\alpha = .92$  and  $\alpha = .93$ ) (White & Labouvie, 2000). Similarly, a high internal consistency estimate ( $\alpha = .95$ ) was found for the RAPI in the present study. The RAPI was the 11<sup>th</sup> measure administered.

### **Drinking motives**

Drinking motives were assessed using a 9-item scale where each item represents a particular reason for why people may decide to use alcohol (Mills & Caetano, 2012; Mills, Caetano, & Vaeth, 2014). Response options range from 0 (*Not a reason*) to 3 (*Very important reason*). Sample items include: “Drinking is a good way to celebrate,” “I drink because there isn’t anything else to do,” and “I like the feeling of getting high or drunk.” This scale has exhibited a unidimensional factor structure and moderate internal consistency ( $\alpha = 0.84$ ) in previous studies (Mills & Caetano, 2012). The scale also exhibited moderate internal consistency ( $\alpha = 0.85$ ) in the present study. The drinking motives measure was the 7<sup>th</sup> measure administered.

### **Analytic approach**

Similar to Study 1,  $\alpha$  (and standardized  $\alpha$  for the two-item subscales) was computed to assess the internal consistency of the four TSRQ subscales. Ninety-five percent confidence intervals were constructed around each  $\alpha$  using 10,000 bias-corrected bootstrap resamples. Again, the ‘psych’ package for R was used.

To test the concurrent validity of the TSRQ, the Pearson product-moment correlation was computed for the associations among the TSRQ subscales and the associations between the TSRQ subscales and other study variables. Testing the hypotheses of the simplex pattern of associations that is theoretically consistent with SDT required statistically comparing the magnitude of correlation coefficients. For example, it is expected that both autonomous and introjected motivations for responsible drinking will be positively associated with PBS use. According to SDT, however, the associations between autonomous motivation and PBS use should be greater

in magnitude than the associations for introjected regulation. To compare the magnitude of correlation coefficients, Lee and Preacher's (2013) online utility (<http://quantpsy.org/corrtest/corrtest2.htm>) for conducting tests of the equality of two dependent correlations with one variable in common was used. It was expected that the distributions of some of the study variables, such as alcohol use which is count data, will be non-normal. Thus, prior to conducting the correlation analyses, the normality of the distributions of the alcohol use variables were examined. For the alcohol-related variables with non-normal distributions, a non-parametric test of association (i.e., Spearman rank-order correlation) was computed instead of the Pearson correlation.

Given that the distributions of the alcohol-related variables were non-normal (which is discussed in further detail in the results section), a series of Poisson regressions were conducted to test the incremental validity of the TSRQ. That is, the associations between the TSRQ subscales and alcohol-related variables were tested while statistically controlling for socio-demographic variables and drinking motives. A previous study found that generalized linear models (e.g., Poisson regression) provide a better fit to alcohol-related variables than ordinary least squares regression (Neal & Simons, 2007). More specifically, three separate regressions were conducted to predict peak consumption, number of binge drinking episodes, and alcohol-related consequences. Peak consumption and number of binge drinking episodes were selected over the other alcohol use variables because irregular heavy drinking has been shown to be associated with an increased burden of alcohol-related diseases and injury conditions (Room, Babor, & Rehm, 2005). For all three of these regressions, socio-demographic variables (i.e., gender and age) that the literature suggests are associated with alcohol use and alcohol-related consequences were entered in the regression models. The total score for the drinking motives measure was also entered in the regression models. Finally, three of the four TSRQ subscales were entered in the regression models; amotivation was not entered because it demonstrated inadequate internal consistency in both Study 1 and Study 2.

## **Power analysis**

A post hoc power analysis was conducted using G\*Power 3.1.9.2 (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007) to determine the achieved statistical power to detect associations between autonomous motivation and alcohol-related outcomes, if the associations exist in the population. The power analysis was conducted in relation to autonomous motivation because, according to SDT, autonomous motivation should have the strongest associations with positive alcohol-related outcomes (i.e., more frequent PBS use and less alcohol use and alcohol-related consequences). Thus, autonomous motivation has the greatest potential for application—it may be particularly important for treatment and interventions for alcohol misuse to target autonomous motivation for responsible drinking. Data from Study 1 were used to provide estimates of the size of the correlation coefficients for the associations between autonomous motivation and alcohol-related outcomes. The statistically significant correlations between autonomous motivation and alcohol-related outcomes ranged from  $r = -.27$  to  $.32$ . The correlation coefficient with the smallest absolute value (i.e.,  $r = -.27$ ) was used to inform the power analysis. The post hoc power analysis yielded a power of approximately 97% to detect a correlation coefficient of at least  $r = |.27|$  (two-tailed) with  $n = 192$  at  $\alpha = .05$ .

## **Results and Discussion**

Table 1 presents the descriptive statistics of the alcohol-related variables (i.e., alcohol use and alcohol-related consequences) for the sample. As expected, examination of the distributions of the alcohol-related variables revealed that each was positively skewed. The skewness statistics ranged from 1.71 to 3.88 and the kurtosis statistics ranged from 3.25 to 20.83.

## **Internal consistency**

The internal consistency estimates for autonomous motivation ( $\alpha = .90$ , 95% CI [.86, .93]), introjected regulation ( $\alpha = .86$ , 95% CI [.78, .92]; standardized  $\alpha = .86$ ), and external regulation ( $\alpha = .74$ , 95% CI [.67, .80]) were all acceptable, but the internal consistency estimate for amotivation ( $\alpha = .57$ , 95% CI [.40, .70]; standardized  $\alpha = .58$ ) was unacceptable. These findings are consistent

with both Study 1 and a previous study (Levesque et al., 2007). Again, caution is warranted against the use of the amotivation subscale.

### **Correlation analyses**

Table 4 presents the Pearson correlations among the TSRQ subscales, PBSS subscales, and drinking motives total scores, as well as the descriptive statistics for each variable. Pertinent to the hypotheses for the present study are the correlations among the TSRQ subscales and between the TSRQ subscales and the PBSS subscales.

The hypothesis that types of motivation would be increasingly related the closer together the types of motivation are on the self-determination continuum was largely supported. For example, a large, positive correlation emerged between autonomous motivation and introjected regulation, but a weaker positive correlation was found between autonomous motivation and external regulation—the magnitude of these correlations statistically differed ( $p < .05$ ). Further, autonomous motivation was negatively correlated with amotivation. These findings are consistent with previous studies that tested the concurrent validity of three versions of the TSRQ for health behaviors other than responsible drinking (Levesque et al., 2007). There was some contrasting evidence, however. The correlation between autonomous motivation and external regulation was greater than the correlation between introjected regulation and external regulation, although the magnitude of these correlations did not statistically differ. Introjected and external regulation are closer on the self-determination continuum and thus should have a stronger association. However, the overall pattern of correlations were largely consistent with the proposal of SDT that the associations between motivations are contingent on the degree to which they are self-determined.

The correlations of the autonomous motivation, introjected regulation, and external regulation subscales with the three PBSS subscales were all in a positive direction, which was consistent with hypotheses. Statistically significant correlations emerged for the autonomous motivation and introjected regulation subscales with all three PBSS subscales. Thus, greater endorsement of autonomous motivation and introjected regulation for responsible drinking were

associated with more frequent PBS use. The external regulation subscale, however, was significantly correlated with only the SHR subscale. Overall, the autonomous motivation subscale demonstrated the largest correlations with the PBSS subscales compared to the introjected and external regulation subscales; the exception was the SHR subscale as its correlation with introjected regulation was larger. However, the SHR subscale demonstrated poor internal consistency in the present study and in previous studies (Martens et al., 2007), and recent studies have improved the content validity of the SHR in a revised version of the PBSS (Treloar et al., 2015). That said, only the correlation for the S/LD subscale statistically differed—the correlation between autonomous motivation and S/LD was larger than the correlation between introjected regulation and S/LD ( $p < .05$ ). The correlations for autonomous motivation and introjected regulation with MOD did not differ statistically and neither did the correlations for autonomous motivation, introjected regulation, and external regulation with SHR. The correlations between the amotivation subscale and the three PBSS subscales were all in a negative direction, as expected, but only the correlation between amotivation and S/LD was statistically significant. Overall, hypotheses were supported that motivations for responsible drinking greater in self-determination would be more strongly related to more frequent PBS use.

Table 5 presents the Spearman correlations between the alcohol-related variables and the other study variables. Again, because the alcohol-related variables were all positively skewed, non-parametric correlations were used. Important to the hypotheses of the present study are the correlations between the alcohol-related variables and the TSRQ subscales. As shown, no statistically significant correlations emerged between the TSRQ subscales and frequency of alcohol use and number of binge drinking episodes. Because responsible drinking represents strategies used *while* drinking, motivations for responsible drinking may not necessarily be associated with the frequency of drinking and binge drinking. Both autonomous motivation and introjected regulation were negatively correlated with the other three alcohol-related variables. These correlations were generally larger in magnitude for introjected regulation than autonomous motivation. However, the magnitude of these correlations could not be statistically compared as I

know of no test to compare the magnitude of non-parametric correlations. In contrast, a positive, significant correlation was found between external regulation and RAPI scores and there were no significant correlations between amotivation and any of the alcohol-related variables. While both greater autonomous motivation and introjected regulation for responsible drinking were associated with fewer alcoholic drinks consumed on a typical drinking occasion and the heaviest drinking occasion as well as experiencing fewer alcohol-related consequences, the hypothesized simplex pattern was mostly unsupported. The negative correlations described above were generally larger for introjected regulation than autonomous motivation. Thus, there was mixed evidence for the hypotheses that motivations for responsible drinking would be increasingly associated with less alcohol use and related consequences as motivation increases in self-determination.

### **Regression analyses**

Table 6 presents the results of the Poisson regression analyses predicting peak consumption, number of binge drinking episodes, and RAPI scores. As shown, the introjected regulation subscale was negatively associated with peak consumption while controlling for gender, age, and drinking motives. For the regression analysis predicting number of binge drinking episodes, none of the three TSRQ subscales were significant predictors, holding all else constant. Finally, the autonomous motivation subscale was positively associated with RAPI scores and the external regulation subscale was negatively associated with RAPI scores while controlling for gender, age, and drinking motives. The results of the Poisson regressions testing the incremental validity of the TSRQ provided little support for hypotheses. It was hypothesized that, while controlling for age, gender, and drinking motives, autonomous motivation would emerge as the most important correlate of the alcohol-related variables but this was not the case.

In sum, there was mixed evidence for the concurrent and incremental validity of the TSRQ for assessing motivations for responsible drinking. While many of the correlations among the TSRQ subscales and correlations of the TSRQ subscales with the PBSS subscales and alcohol-related variables were consistent with SDT, some were not. In particular, several correlations

inconsistent with SDT emerged for the introjected regulation subscale with the other TSRQ subscales, PBS use, and alcohol-related variables. Support for the incremental validity of the TSRQ was also mixed. According to SDT, autonomous motivation for responsible drinking should be the strongest correlate of positive alcohol-related outcomes in comparison to other types of motivation for responsible drinking; however, this was generally not the case.

## Chapter 4: General Discussion

Although SDT provides a useful framework for understanding why people engage in health behaviors and this framework has been supported in relation to certain health behaviors, few studies have applied SDT to alcohol use. Those studies (e.g., Chawla et al., 2009, Knee & Neighbors, 2002; Neighbors et al., 2003) that have applied SDT to alcohol use have primarily focused on the dispositional propensity toward controlled motivation as a risk factor for alcohol misuse. Thus, despite the importance of these studies, they ignore the full spectrum of motivation proposed by SDT that is applicable to engagement in healthy behaviors, such as responsible drinking. Furthermore, while the Treatment Self-Regulation Questionnaire (TSRQ) has been adapted to assess motivations for responsible drinking, there have been no psychometric evaluations of this version of the TSRQ. I attempted to validate this version of the TSRQ in Studies 1 and 2.

Support for the validity of the version of the TSRQ for assessing motivations for responsible drinking was mixed. A four-factor structure for the TSRQ emerged as the best fitting model in Study 1 which is theoretically consistent with SDT and consistent with findings for other versions of the TSRQ for other health behaviors (Levesque et al., 2007). In addition, many of the correlations testing the concurrent validity of the TSRQ in Study 2 were consistent with what would be expected based on SDT. However, there was some evidence of model misfit (i.e., low CFI value and high RMSEA value) and the amotivation subscale demonstrated low internal consistency in Study 1. Also, in Study 2, several correlations among the TSRQ subscales and correlations of the TSRQ subscales with PBS use and alcohol-related variables did not support hypotheses derived from SDT—most of these discrepant correlations involved the introjected regulation subscale. One potential explanation for these psychometric limitations is that two of the TSRQ subscales (introjected regulation and amotivation) include only two items. Thus, these two factors may lack content validity as the constructs of introjected regulation and amotivation for responsible drinking may be inadequately represented. Indeed, the two introjected regulation

items are extremely similar—both reflect avoiding negative affect that may result from not drinking responsibly. It may be the similarity in the two item stems that results in the emergence of an introjected regulation factor as opposed to the content of the items representing unique aspects of an introjected regulation construct. According to SDT, introjected regulation is engaging in a behavior to avoid internal punishments and/or obtain internal rewards. There are currently no introjected regulation items included in the TSRQ that reflect engaging in responsible drinking to obtain internal rewards. The amotivation items are also similar and reflect uncertainty regarding responsible drinking. SDT defines amotivation as the absence of intent to act. While people may not engage in responsible drinking because they are uncertain about it, people may also consciously decide to not engage in responsible drinking. A conscious decision not to engage in responsible drinking is not reflected in the existing amotivation items.

The results of the regression analyses also evidenced mixed support for the validity of the TSRQ. In two of the regression models, introjected regulation was a stronger correlate of alcohol-related outcomes than autonomous motivation, which is inconsistent with SDT. These findings may also be explained by a lack of construct validity of the introjected regulation subscale. Another issue regarding the regression analyses is that motivations for responsible drinking may not directly affect alcohol use or alcohol-related consequences, *per se*. Rather, motivations for responsible drinking may indirectly affect alcohol use and alcohol-related consequences through PBS use (i.e., mediation). In support of this explanation, the correlations between the TSRQ subscales and PBSS subscales were more consistent with the hypotheses than the results of the regression models. Testing this mediation model was beyond the scope of the current studies, however. Longitudinal designs are necessary for appropriately testing mediational processes (e.g., Maxwell & Cole, 2007). That said, an indirect effect of motivations for responsible drinking on alcohol use and related consequences may be another reason why autonomous motivation did not emerge as a significant predictor of two of the alcohol-related variables.

## **Limitations**

Several limitations of the present studies should be acknowledged. First, Item 4 was determined to be a potentially problematic item and was removed from further analyses on the basis of results from Study 1. However, this item was not removed from the TSRQ that Study 2 participants completed. It is unclear if and how responding to Item 4 influenced responses to the 14 items that were retained. Second, self-report measures of alcohol use and alcohol-related consequences were used. Although research suggests that self-reported alcohol use is generally valid (Sobell & Sobell, 1990), participants self-reported alcohol use and alcohol-related consequences may be biased. For example, participants may have reported drinking less and experiencing fewer alcohol-related consequences to be perceived more favorably, i.e. social desirability bias. Given the data that were collected, it is not possible to determine the validity of self-reported alcohol use and alcohol-related consequences in the present studies. Finally, the results of the present studies may not generalize to the population of U.S. college students. The present studies were conducted at a predominantly Hispanic-serving institution and thus both samples were predominantly Hispanic. While the demographic make-up of these samples may also be considered a strength, predominantly Hispanic samples are not representative of the population of U.S. college students.

## **Conclusions**

The present studies are important because they are an initial step to the application of SDT to understanding alcohol use and alcohol-related consequences among college students. The present studies further research on the application of SDT to alcohol use among college students by attempting to validate a measure for assessing motivations described by SDT for responsible drinking. Previous studies have not directly examined motivations for drinking-related behaviors. The present studies found mixed support for the TSRQ for assessing motivations for responsible drinking. Based on the findings of these studies, I do not advise that researchers use the TSRQ to assess motivations for responsible drinking, although the autonomous and external motivation

subscales demonstrated some promise. Particularly, findings from the present studies indicated psychometric limitations of the introjected regulation and amotivation subscales. This may be because each of these subscales contain only two items and thus lack content validity. Thus, the present studies caution against the use of the introjected regulation and amotivation subscales for the responsible drinking version of the TSRQ. Future studies are needed to develop a refined measure of types of motivation described by SDT for responsible drinking, or other drinking-related behaviors; the TSRQ may serve as a starting place. Using focus groups to develop items that reflect the different types of motivation for responsible drinking may be especially beneficial. Existing versions of the TSRQ were slightly adapted to assess motivations for responsible drinking. However, the items were not developed specifically to assess motivations for responsible drinking. A similar issue is that there are other drinking-related behaviors than responsible drinking that the TSRQ could be used to assess motivations for. It is unclear why the TSRQ was adapted to assess motivations for responsible drinking as opposed to some other drinking-related behavior. One disadvantage of responsible drinking is that it does not have a clear definition and people's conceptualization of responsible drinking may differ. Focus groups may generate items that better reflect the types of motivation described by SDT for responsible drinking or other drinking-related behaviors.

Developing a psychometrically sound measure of motivations in relation to drinking-related behaviors informed by SDT is important because SDT offers a nuanced theoretical framework for understanding health behaviors. SDT has received more attention in other health domains (e.g., exercise) and has received considerable support in these domains (e.g., Wilson, Mack, & Grattan, 2008). SDT may offer insight into the targets for treatment and interventions for alcohol misuse and the mechanisms underlying changes in alcohol use. Thus, future efforts to refine the TSRQ for assessing motivations for responsible drinking or developing new measures are imperative to extending research on the application of SDT to alcohol use.

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Table 1: Descriptive Statistics for the Alcohol-Related Variables for the Study 1 and Study 2 Samples

Categorical variables	Study 1		Study 2	
	<i>n</i>	%	<i>n</i>	%
Frequency of alcohol use				
Less than once a month	83	26.9	-	-
Once a month	46	14.9	-	-
Two to three times a month	114	37.0	-	-
Once or twice a week	52	16.9	-	-
Three to four times per week	12	3.9	-	-
Nearly every day	1	0.3	-	-
Binge episode				
Yes	-	-	86	44.8
No	-	-	106	55.2
Continuous variables	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Frequency of alcohol use				
Drinking days per month	-	-	5.89	4.97
Alcohol use				
Typical quantity	3.81	2.98	4.44	4.89
Peak consumption	6.16	4.67	5.59	4.64
Binge episodes <sup>a</sup>	-	-	3.88	4.58
Alcohol-related consequences				
RAPI	-	-	3.91	7.71

*Note.* Frequency of alcohol use = Frequency of alcohol use in the past 3 months (Study 1) or 30 days (Study 2); Binge episode = Any binge drinking episode in the past 30 days; Typical quantity = Number of alcoholic drinks consumed on a typical drinking occasion in the past 3 months (Study 1) or 30 days (Study 2); Peak consumption = Number of alcoholic drinks consumed on the heaviest drinking occasion in the past 3 months (Study 1) or 30 days (Study 2); Binge episodes = Number of binge drinking episodes in the past 30 days among those who engaged in at least one binge drinking episode (*n* = 86); RAPI = Total scores on the Rutgers Alcohol Problem Index.

Table 2: Summary of Global Fit Indices for TSRQ Confirmatory Factor Analysis Models in Study 1

Model	SB $\chi^2$	<i>df</i>	CFI	RMSEA (90% CI)	SRMR	AIC
Four-Factor TSRQ	222.73	71	.907	.083 (.071, .096)	.052	15585.532
Three-Factor TSRQ	542.69	74	.714	.143 (.132, .155)	.116	15883.387
One-Factor TSRQ	574.51	77	.696	.145 (.134, .156)	.117	16032.087

*Note.* TSRQ = Treatment Self-Regulation Questionnaire; SB  $\chi^2$  = Satorra-Bentler scaled  $\chi^2$ ; CFI = Comparative Fit Index; RSMSEA = Root mean square error of approximation; CI = Confidence interval; SRMR = Standardized root mean square residual; AIC = Akaike information criterion.

Table 3: Standardized Factor Loadings (Standard Errors) and Item Descriptives of the TSRQ in Study 1

Item	$\lambda$ (SE)	$M$ ( $SD$ )
Autonomous motivation		
1. Because I feel that I want to take responsibility for my own health	.73 (.04)	5.94 (1.61)
3. Because I personally believe it is the best thing for my health	.77 (.04)	5.30 (2.02)
6. Because I have carefully thought about it and believe it is very important for many aspects of my life	.81 (.03)	5.15 (1.97)
8. Because it is an important choice I really want to make	.86 (.03)	5.47 (1.70)
11. Because it is consistent with my life goals	.76 (.03)	4.87 (2.16)
13. Because it is very important for being as healthy as possible	.79 (.03)	5.33 (1.84)
Introjected regulation		
2. Because I would feel guilty of ashamed of myself if I did not use alcohol responsibly	.84 (.04)	5.51 (1.85)
7. Because I would feel bad about myself if I did not use alcohol responsibly	.87 (.04)	5.42 (1.89)
External regulation		
9. Because I feel pressure from others to do so	.63 (.07)	2.46 (1.75)
10. Because it is easier to do what I am told than think about it	.60 (.07)	2.40 (1.66)
12. Because I want others to approve of me	.81 (.04)	2.57 (1.94)
14. Because I want others to see I can do it	.77 (.05)	3.02 (2.21)
Amotivation		
5. I really don't think about it	.64 (.06)	3.09 (2.01)
15. I don't really know why	.65 (.06)	2.02 (1.58)

*Note.* TSRQ = Treatment Self-Regulation Questionnaire;  $\lambda$  = Standardized factor loading; SE = Standard error. Items are numbered in the order in which they appear in the Treatment Self-Regulation Questionnaire.

Table 4: Pearson Correlations among the TSRQ Subscales, PBSS Subscales, and Drinking Motives Scores in Study 2

Variable	1	2	3	4	5	6	7	8
1. Autonomous motivation	-							
2. Introjected regulation	.65**	-						
3. External regulation	.33**	.29**	-					
4. Amotivation	-.26**	-.12	.06	-				
5. Stopping/limiting drinking	.41**	.26**	.11	-.11	-			
6. Manner of drinking	.34**	.24**	.02	-.19*	.52**	-		
7. Serious harm reduction	.27**	.31**	.20*	-.04	.44**	.28**	-	
8. Drinking motives	-.15*	-.11	.16*	.16*	-.31**	-.37**	-.02	-
<i>M</i>	5.32	5.31	2.42	2.50	25.41	19.24	13.44	1.06
<i>SD</i>	1.66	1.94	1.43	1.50	8.57	5.65	3.62	0.62

Note. TSRQ = Treatment Self-Regulation Questionnaire; PBSS = Protective Behavioral Strategies Scale.

\*  $p < .05$ . \*\*  $p < .01$ .

Table 5: Spearman Correlations between the Alcohol-Related Variables and All Other Study Variables in Study 2

Variable	Frequency	Typical quantity	Peak consumption	Binge episodes	RAPI
Autonomous motivation	-.11	-.22**	-.18*	-.00	-.19*
Introjected regulation	-.13	-.25**	-.29**	.08	-.16*
External regulation	-.04	.09	.14	.07	.22**
Amotivation	-.06	.11	.07	-.09	.08
Stopping/limiting drinking	-.05	-.18*	-.18*	-.03	-.31**
Manner of drinking	-.07	-.36**	-.39**	-.10	-.30**
Serious harm reduction	.02	.09	.05	-.05	-.04
Drinking motives	.23**	.40**	.38**	.27*	.47**

*Note.* Frequency = Number of drinking days in the past 30 days; Typical quantity = Number of alcoholic drinks consumed on a typical drinking occasion in the past 30 days; Peak consumption = Number of alcoholic drinks consumed on the heaviest drinking occasion in the past 30 days; Binge episodes = Number of binge drinking episodes in the past 30 days among those who engaged in at least one binge drinking episode (n = 86); RAPI = Total scores on the Rutgers Alcohol Problem Index.

\*  $p < .05$ . \*\*  $p < .01$ .

Table 6: Poisson Regressions Predicting Peak Consumption, Binge Episodes, and RAPI Scores in Study 2

Variable	Peak consumption	Binge episodes	RAPI
	B (95% CI)	B (95% CI)	B (95% CI)
Gender (female = 0)	-0.11 (-0.25, 0.03)	-0.18 (-0.41, 0.06)	-0.40 (-0.55, -0.24)**
Age	0.02 (0.01, 0.02)**	0.03 (0.02, 0.04)**	0.02 (0.01, 0.03)**
Drinking motives	0.42 (0.31, 0.53)**	0.49 (0.29, 0.68)**	1.24 (1.11, 1.37)**
Autonomous motivation	0.02 (-0.03, 0.08)	-0.06 (-0.16, 0.04)	-0.09 (-0.17, -0.02)*
Introjected regulation	-0.08 (-0.13, -0.04)**	0.06 (-0.02, 0.14)	0.06 (-0.01, 0.12)
External regulation	0.07 (0.02, 0.12)	0.09 (-0.01, 0.18)	0.15 (0.09, 0.21)**

*Note.* Peak consumption = Number of alcoholic drinks consumed on the heaviest drinking occasion in the past 30 days; Binge episodes = Number of binge drinking episodes in the past 30 days among those who engaged in at least one binge drinking episode (n = 86); RAPI = Total scores on the Rutgers Alcohol Problem Index; CI = Confidence interval.

\*  $p < .05$ . \*\*  $p < .01$ .

## **Vita**

Dylan K. Richards is a doctoral student in the Health Psychology program at the University of Texas at El Paso. He received a Bachelor of Science in Psychology with summa cum laude and departmental honors from George Mason University in 2014. His undergraduate honors project investigated anthropomorphizing germs as a cognitive vulnerability to obsessive compulsive symptoms and was conducted under the supervision of John H. Riskind, Ph.D.

Generally, his current research interests are in the behavioral and psychological factors that protect against alcohol misuse. He is particularly interested in the application of self-determination theory to better understand alcohol use and changes in alcohol use. He conducts research related to these interests under the supervision of Craig A. Field, Ph.D., M.P.H. as a graduate research assistant at the Latino Alcohol and Health Disparities Research Center. He expects to graduate with a Doctor of Philosophy in Psychology with a concentration in health in May 2020.

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