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# The role of acquired capability as a differentially-specific risk factor for disordered eating and problematic alcohol use in female college students: A measure development and validation study

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The Role of Acquired Capability as a Differentially-Specific Risk Factor  
for Disordered Eating and Problematic Alcohol Use in Female College Students:  
A Measure Development and Validation Study

by

Christa D. Labouliere

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctorate of Philosophy  
in Clinical Psychology  
Department of Psychology  
College of Arts and Sciences  
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## **Dedication**

Without the boundless love and support of Nicholas Edwards, my parents, and an incredible network of family and friends, the completion of this manuscript and my doctoral degree would never have been possible. Your esteem and tireless faith in me sustained me through difficult times, and your presence and perspective transformed my life into an extraordinary mirth-filled journey. Words alone cannot adequately express how thoroughly you have touched my life and changed me for the better. I will forever look fondly on the past we shared, and am ecstatic for the adventures of the future.

*Grazie!*

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## Table of Contents

List of Tables .....	iii
List of Figures .....	vi
Abstract .....	vii
Introduction.....	1
Risky Behaviors in College Students.....	3
Common Risk Factors: Affect Regulation and Risky Behavior.....	7
Negative Affect Model .....	8
Positive Affect Model.....	12
Common Risk Factors: Sensation-Seeking and Risky Behavior.....	13
Strengths and Limitations of Common Risk Factor Research.....	16
Differentiating Trajectories of Risk: Specific Risk Factors for Risky Behaviors .....	18
Acquired Capability and Risky Behavior .....	20
A Model of Common and Differentially-Specific Risk Factors for Risky Behaviors in College Students.....	24
Justification for Extending the Acquired Capability Construct to Other Domains of Risk .....	29
Objectives of This Study.....	34
Study 1 .....	40
Method .....	40
Participants.....	40
Materials .....	43
Recruitment letter and instructions to experts .....	43
Expert rating survey .....	44
Definition sheet.....	44
Procedure .....	45
Results.....	48
Discussion.....	66
Study 2 .....	69
Method.....	69
Participants.....	69
Measures .....	70
Demographics .....	70

Newly-developed scale .....	70
Scales administered for convergent, divergent, and incremental validity testing .....	71
Procedure .....	74
Results .....	75
Preliminary analyses and descriptive statistics .....	75
Hypothesis testing .....	78
Discussion .....	135
General Discussion & Conclusions .....	146
Limitations .....	149
References .....	156
Appendices .....	188
Appendix A: Proposed Measure Items .....	189
Appendix B: Definition Sheet .....	191
Appendix C: Sample Keywords for Literature Searches .....	193
Appendix D: “Acquired Capability for Maladaptive Behaviors” measure .....	194

## List of Tables

Table 1	Tiered list of experts contacted, with number of publications, citation index, and h-index per expert .....	41
Table 2	Descriptive statistics for the relevance and clarity of the final wording of items for the Acquired Capability-Enhancing Events for Disordered Eating scale as rated by content experts .....	49
Table 3	Descriptive statistics for the relevance and clarity of the final wording of items for the Acquired Capability-Related Beliefs for Disordered Eating scale as rated by content experts .....	52
Table 4	Descriptive statistics for the relevance and clarity of the final wording of items for the Acquired Capability-Enhancing Events for Problematic Alcohol Use scale as rated by content experts .....	55
Table 5	Descriptive statistics for the relevance and clarity of the final wording of items for the Acquired Capability-Related Beliefs for Problematic Alcohol Use scale as rated by content experts .....	58
Table 6	Descriptive statistics for the relevance and clarity of all items, and the relevance and clarity of items by risk behavior domain, construct, and subscale for the Acquired Capability for Maladaptive Behaviors measure as rated by content experts .....	62
Table 7	New items for the Acquired Capability for Risky Behaviors survey as suggested by content experts .....	64
Table 8	Total number of items retained, dropped, modified, and added by domain for the Acquired Capability for Risky Behaviors survey as suggested by content experts .....	65
Table 9	Descriptive statistics and statistical assumption information for the scales administered for convergent, divergent, and incremental validity testing .....	77

Table 10	Descriptive statistics and statistical assumption information for the items of the "Acquired Capability for Maladaptive Behaviors" scale.....	79
Table 11	Eigenvalues, proportion of variance, and cumulative variance accounted for by different factor solutions suggested by the Kaiser criterion, examination of the scree plot, parallel analyses, and interpretability .....	93
Table 12	Intercorrelations among factors .....	94
Table 13	Pattern and structure coefficients of the four-factor solution to the factor analysis of the items of the Acquired Capability for Maladaptive Behaviors survey.....	96
Table 14	Items that did not load on any factor of the four-factor solution of the items of the Acquired Capability for Maladaptive Behaviors survey.....	105
Table 15	Fit indices for the one factor confirmatory factor analyses of each factor suggested by the exploratory factor analysis of the "Acquired Capability for Maladaptive Behavior" scale.....	110
Table 16	Fit indices for the confirmatory factor analysis of the "Acquired Capability for Maladaptive Behavior" scale .....	121
Table 17	Descriptive statistics and statistical assumption information for the subscales of the final four-factor "Acquired Capability for Maladaptive Behaviors" scale.....	126
Table 18	Patterns of association to determine convergent and divergent validity, as assessed by Pearson product moment correlations between the subscales of the newly-developed "Acquired Capability for Maladaptive Behaviors Scale" and self-report of problematic behavior in the past year .....	128
Table 19	Hierarchical regression analyses examining the incremental validity of acquired capability subscales from the "Acquired Capability for Maladaptive Behaviors" scale over other common risk factors in associations with self-reported disordered eating behavior.....	132



Table 20	Hierarchical regression analyses examining the incremental validity of acquired capability subscales from the "Acquired Capability for Maladaptive Behaviors" scale over other common risk factors in associations with self-reported problematic alcohol use .....	133
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## List of Figures

Figure 1	A Model of common and differentially-specific risk factors for risky behaviors in college students .....	30
Figure 2	Proposed factor structure for the “Acquired Capability for Maladaptive Behaviors” scale.....	37
Figure 3	Suggested alternate factor structures for the “Acquired Capability for Maladaptive Behaviors” scale .....	37
Figure 4	Online survey for experts to provide ratings of items on clarity and relevance to the construct of acquired capability, including capability-enhancing events and capability-related beliefs.....	46
Figure 5	Standardized path estimates for the one-factor confirmatory factor analysis of factor 1 of the "Acquired Capability for Maladaptive Behaviors" scale.....	113
Figure 6	Standardized path estimates for the one-factor confirmatory factor analysis of factor 2 of the "Acquired Capability for Maladaptive Behaviors" scale.....	114
Figure 7	Standardized path estimates for the one-factor confirmatory factor analysis of factor 3 of the "Acquired Capability for Maladaptive Behaviors" scale.....	115
Figure 8	Standardized path estimates for the one-factor confirmatory factor analysis of factor 4 of the "Acquired Capability for Maladaptive Behaviors" scale.....	116
Figure 9	Standardized path estimates for the confirmatory factor analysis of the four-factor model of the "Acquired Capability for Maladaptive Behaviors" scale.....	124

## **Abstract**

Traditional college students are members of an age bracket noted for high levels of risky behavior, and research has shown that certain risky behaviors, such as disordered eating and problematic alcohol use, are particularly common among undergraduates. It is well established that certain events in the learning history predispose vulnerable persons to engage in maladaptive risky behaviors. What is less clear is why some persons facing these events go on to develop maladaptive behavior while others do not, or why people facing similar events develop different varieties of maladaptive behaviors. Current research has focused extensively on risk factors that are common across dysregulated behaviors (e.g., affect dysregulation, impulsivity, etc.); however, few studies have yet explored which risk factors differentiate risk for different maladaptive behaviors. Likely, certain mediating factors, such as beliefs about one's capability to tolerate the aversive aspects of a specific behavior, may differentiate groups at-risk for engaging in different maladaptive behaviors. Being able to determine specific risk factors for maladaptive behaviors would have obvious predictive value for targeted prevention and intervention efforts. Nevertheless, current research in the fields of risky behavior has relatively neglected the exploration of these specific risk factors, leading to theoretical, measurement, and application gaps in the literatures surrounding these problematic areas.

This study aspires to address some of those gaps, by extending the construct of *acquired capability* (i.e., the role of exposure and habituation to certain events in the learning history that predict the development of the ability to engage in risky behaviors despite emotional or physical discomfort) from the field of self-harm to other risky behaviors. Acquired capability as a differentially-specific risk factor has been widely validated in the field of self-harm, but has been relatively unexplored in the fields of disordered eating and problematic alcohol. As such, this study aims to develop a measure of acquired capability for disordered eating and problematic alcohol use, then validate this measure by exploring associations between acquired capability-enhancing events in the learning history, acquired capability-related beliefs, and actual risk behaviors, over and above the contributions of other common risk factors (e.g., affect dysregulation, sensation seeking) in a sample of college undergraduates.

## **Introduction**

Traditional college students are members of an age bracket noted for high levels of risky behavior (Jackson & Knapp, 2004; Labouliere, 2009), and research has shown that risky behaviors, such as disordered eating and problematic alcohol use, are particularly common among undergraduates (Kashubeck, Walsh, & Crowl, 1994; Labbe, & Maisto, 2011). A number of risk factors for engaging in risky behavior have been identified (e.g., demographic and environmental variables, psychopathology, affect dysregulation, urgency, etc.), but the majority of these risk factors are common across domains of risky behavior and do not specifically predict the likelihood of engaging in one behavior as opposed to any other (Schwartz, Forthun, Ravert, Zamboanga, Umaña-Taylor, Filton, et al., 2010). A better understanding of what leads an individual to engage in a specific risky behavior could aid in prevention and intervention efforts, as the sequelae of engaging in such behaviors are a problem of considerable morbidity and mortality in the college population.

It is well established that certain events in the learning history predispose vulnerable persons to engage in maladaptive risky behaviors, such as problematic alcohol use and disordered eating (Wang, Kruger, & Wilke, 2009). What is less clear is why some persons facing these events go on to develop maladaptive behavior while others do not, or why people facing similar events develop different varieties of maladaptive behaviors. Likely, certain mediating factors such as beliefs about one's capability to

tolerate the aversive aspects of a specific behavior may differentiate groups at-risk for engaging in different maladaptive behaviors. Being able to determine these specific risk factors for maladaptive behaviors would have obvious predictive value for targeted prevention and intervention efforts. Nevertheless, current research has relatively neglected the exploration of these specific risk factors, leading to theoretical, measurement, and application gaps in the literatures surrounding these problematic areas.

This study aspires to address some of those gaps, by extending the construct of *acquired capability* (i.e., the role of exposure and habituation to certain events in the learning history that predict the development of the ability to engage in risky behaviors despite emotional or physical discomfort) from the field of self-harm to other risky behaviors. Acquired capability as a differentially-specific risk factor has been widely validated in the field of self-harm (Joiner, 2005; Joiner, Conwell, Fitzpatrick, Witte, Schmidt, Berlim, ... & Rudd, 2005; Joiner, Van Orden, Witte, Selby, Ribiero, Lewis, & Rudd, 2009a; Joiner et al., 2009b; Selby, Anestis, Bender, Ribiero, Nock, Rudd, ... Joiner, 2010; Van Orden, Witte, Gordon, Bender, & Joiner, 2008), but has been relatively unexplored in the fields of disordered eating and problematic alcohol. As such, this study aims to develop a measure of acquired capability for disordered eating and problematic alcohol use, then validate this measure by exploring associations between acquired capability-enhancing events in the learning history, acquired capability-related beliefs, and actual risk behaviors, over and above the contributions of other common risk factors (e.g., affect dysregulation, sensation seeking) in a sample of college undergraduates.

## **Risky Behavior in College Students**

A spectrum of self-destructive behaviors exists that spans risky behavior (such as problematic alcohol use or disordered eating), deliberate self-injury (such as cutting or superficial tissue damage without conscious suicidal intent), suicide attempts, and actual death by suicide (King, Ruchkin, & Schwab-Stone, 2003). These behaviors are all inherently self-destructive, but vary in their social norms and societal acceptability (Suyemoto, 1998). Although it seems contrary to all survival instincts when people deliberately hurt themselves or do not care that their actions have dangerous or aversive consequences (Joiner, 2005), these behaviors are relatively common in the population, especially amongst young adults (Gratz, 2001; 2003; Labouliere, 2009).

The prevalence of risky behaviors among college students varies hugely depending on what is defined as “risky.” This problem with determining prevalence is compounded by the multiple different and often ambiguous meanings ascribed to these behaviors even within the mental health community. For the purpose of this study, the following definitions will be used (based on common consensus in the field; Frank, DeBenedetti, Volk, Williams, Kivlahan, & Bradley, 2008; Neumark-Sztainer, Eisenberg, Fulkerson, Story, & Larson, 2008; Pisetsky, Chao, Dierker, May, & Striegel-Moore, 2008; Sheffiled, Darkes, Del Boca, & Goldman, 2005; Thompson, Coover, Richards, Johnson, & Cattarin, 1995). *Disordered eating* will refer to a number of dysfunctional eating behaviors, including extremely restrictive eating, self-starvation, binge eating, and engaging in compensatory behavior after eating, such as compulsive exercise, purging, or laxative abuse, that occur at a level and frequency that result in impairment of functioning. Persons who experience disordered eating may meet criteria for a DSM-IV

diagnosis of anorexia nervosa (American Psychiatric Association, 2000, p. 589) or bulimia nervosa (American Psychiatric Association, 2000, p. 594); alternatively, they may also experience eating pathology at a clinically-significant level that does not meet criteria for these disorders (e.g., Eating Disorder Not Otherwise Specified, a variant of eating symptomology that impairs functioning but does not meet the specific diagnostic criteria for anorexia or bulimia). *Problematic alcohol use* refers to a number of dysfunctional alcohol-related behaviors, including behaviors that meet DSM-IV diagnostic criteria for alcohol abuse and/or dependence (e.g., failure to fulfill role obligations as a result of alcohol use, use of alcohol in situations where it is dangerous, continued use despite social or interpersonal problems caused or exacerbated by alcohol use, etc.; American Psychiatric Association, 2000, pp. 197-199) as well as behaviors that are strongly associated with subsequent alcohol disorder (e.g., heavy consumption, binge drinking).<sup>1</sup>

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<sup>1</sup>These definitions of problematic behavior have been selected to address the concern that some behaviors that are normative in moderation may be, in their extreme, associated with problematic alcohol use or disordered eating. Normative levels of alcohol consumption or appropriate dieting and exercise practices are not the focus of this study, as they are not inherently problematic (and may be beneficial) without the effects that occur from extreme practices. To respond to potential concerns, it must be reiterated that *problematic* alcohol use and *disordered* eating are to be explored in this study, and at no point is it suggested that healthy dieting and exercise practices or moderate alcohol use *in general* are problematic. Extensive research has determined that moderate consumption of alcohol and appropriate dieting and exercise is typically not problematic and may have positive health, psychological, or social consequences (Ashley, Rehm, Bondy, Single, & Rankin, 2000; Baum-Baicker, 1985a & 1985b; German & Walzem, 2000). However, whereas alcohol use and eating/exercise behavior *in general* may be normative and have benign or positive consequences, *problematic* alcohol use and *disordered* eating are dysfunctional. All research cited regarding risky behavior and measures selected to identify risky behavior within this manuscript refer to *problematic* behaviors as defined above.

Additionally, throughout the manuscript, references will be made to risky behaviors with the recognition that these behaviors are not engaged in by the user to engender risk per se, but are instead behaviors that mediate higher likelihood of probabilistic risks that may occur after any given instance. Nevertheless, even with recognition of the probabilistic nature of risk, to measure all of the negative consequences that could occur probabilistically would not be feasible; the number of permutations would be innumerable, if one factored in the probability of any one risky event occurring after participating in risky behavior multiplied



These risky behaviors are a serious problem plaguing many young adults. As many as 10-13% of young adults may experience disordered eating, with an estimated 0.3-2% experiencing anorexia nervosa (Hoek, 2006; Treasure, Claudino, & Zucker, 2010), 0.5-5% experiencing bulimia nervosa (Devlin & Steinglass, 2010; Treasure et al., 2010), and as many as 10-40% suffering from subclinical syndromes (Neumark-Sztainer & Hannan, 2000; Labouliere, 2009; Treasure et al., 2010). An even larger proportion of young adults engage in problematic alcohol use, with 44% of students engaging in binge drinking and between 6-30% qualifying for a diagnosis of alcohol abuse or dependence (Hingson, Zha, & Weitzman, 2009; Weschler, Lee, Kuo, Seibring, Nelson, & Lee, 2002). Engaging in these risky behaviors has serious morbidity and mortality for the college population. Over 1825 college students die and an additional 599,000 college students are injured every year due to drinking (Hingson et al., 2009), whereas upwards of 5-20% of persons suffering from an eating disorder will die without treatment (Crow, Peterson, Swanson, Raymond, Specker, Eckert, & Mitchell, 2009; Keel, Dorer, Eddy, Franko, Charatan, & Herzog, 2003; Renfrew, 2003; Sullivan, 1995), a mortality rate that is twelve times higher than all other causes of death combined for college-aged persons (Renfrew, 2003). Despite the high mortality and morbidity associated with these dangerous behaviors, much still remains unknown regarding why people engage in risky behaviors that could result in serious impairment, injury, or even death. Having a better grasp of

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by the myriad number of possible risks that varies by the experiences of the participant. In addition, measuring probabilistic risks would not be measuring the behavior of interest – self-destructive behaviors in which participants engage despite risk. What makes self-destructive behavior such a viable research and clinical interest is that people continue to engage in these behaviors to achieve an end *despite* the risk such behaviors entail. As such, the focus of this study is levels of behavior that are problematic to the consumer, with the recognition that such behavior is, in fact, problematic partially due to its higher probability of engendering other associated risks. Measuring all such probabilistic risks is not within the scope of this project.

predictors leading to the development of risky behaviors is crucial to conducting meaningful empirical investigations of the phenomena and creating effective intervention and prevention efforts.

An additional complication to the study and treatment of risky behavior is the markedly high rates of comorbidity between different types of risk. An estimated 12-55% of persons diagnosed with an eating disorder also displayed concurrent alcohol abuse or dependence (Blinder, Cumella, & Sanathara, 2006; Holderness, Brooks-Gunn, & Warren, 1994; von Ranson, Iacono, & McGue, 2002; Wilson, 1991), and disordered eating attitudes and behaviors occur significantly more often in persons diagnosed with alcohol use disorders than in the general population (ranging from 2-41%; Higuchi, Suzuki, Yamada, Parrish, & Konno, 1993; Holderness et al., 1994; Taylor, Peveler, Hibbert, & Fairburn, 1993) or in psychiatric patients without alcohol use disorders (Grilo, Becker, Levy, & Walker, 1995). With such substantial comorbidity among behaviors, although treatment of and research into maladaptive behaviors have historically focused on discrete categories of pathology (Widiger & Samuel, 2005), it makes sense that researchers and clinicians alike have more recently begun to focus on common deficits that underlie many varieties of psychopathology (Moses & Barlow, 2006). Two risk factors that are frequently cited in the onset and maintenance of these risky behaviors are difficulties in affect regulation and high levels of sensation-seeking, which have been strongly implicated in the onset and maintenance of disordered eating (Claes, Vandereycken, & Vertommen, 2005; Dawe & Loxton, 2004; Loxton & Dawe, 2001; Sim & Zeman, 2006; Spoor, Becker, Van Strien, & van Heck, 2007; Whiteside, Chen, Neighbors, Hunter, Lo, & Larimer, 2007) and problematic alcohol use (Comeau, Stewart,

& Loba, 2001; Fischer, Forthun, Pidcock, & Dowd, 2007; Fox, Hong, & Sinha, 2008; Martin, Kelly, Rayens, Brogli, Brenzel, Smith, & Omar, 2002).

### **Common Risk Factors: Affect Regulation and Risky Behavior**

Before discussing the relationship between risky behaviors and affect regulation, a brief discussion of affect regulation in general must be reviewed. *Affect* can be defined as the superordinate category for all valenced states, whether positive or negative, which have certain attentional processes and valence appraisals in common (Gross & Thompson, 2006; Scherer, 1984); therefore, *affect regulation* refers to a number of processes individuals utilize in order to consciously or unconsciously influence these affective states (Rottenberg & Gross, 2007). When a conscious effort, this affect regulation process is often referred to as “coping,” “emotion regulation,” or “problem-solving” in the common parlance. Traditionally in the literature, coping refers to responses that address both the emotions associated with the stressful situation and the problem of the stressful situation itself, problem-solving refers to the specific subset of coping behaviors that address the stressful situation, and emotion regulation refers to the specific subset of coping behaviors that addresses the emotions associated with the stressful situation but not the external source of the stressful situation itself. In general, different varieties of affect regulatory response are neither inherently good nor bad, but may be more or less adaptive in a given situation (Lazarus & Folkman, 1984). For example, problem-solving coping strategies tend to be more adaptive when the situation is controllable than when it is uncontrollable; in situations that are uncontrollable, emotion regulation may be more helpful (Christensen, Benotch, Wiebe, & Lawton, 1995; Folkman & Moskowitz, 2004; Terry & Hynes, 1998). Additionally, a strategy that is

helpful in the short-term may be less effective in the long-term (DeLongis & Preece, 2002; Preece & DeLongis, 2005; Stone, Kennedy-Moore, & Neale, 1995). One clear finding, however, is that avoidant affect regulation strategies are typically related to poorer mental health outcomes (Folkman & Moskowitz, 2004), including disordered eating (Spoor et al., 2007) and problematic alcohol use (Willis, Sandy, Shinar, & Yaeger, 1999). The *affect regulation model* (Gross, 1998; Koole, 2009; Rottenberg & Gross, 2007) of risky behavior suggests that these behaviors typically occur either for the generation of positive affect (e.g., relaxation, relief, happiness, calm) or in order to reduce intolerable levels of arousal or negative affect (e.g., anxiety, depression, anger). It is likely that a combination of forces – the desire to avoid negative emotions while also desiring to “feel good” – may constitute a more complex affect regulatory model that encompasses both negative and positive reinforcement of risky behavior.

**Negative affect model.** It is commonly reported in the literature that individuals will drink excessively (Fischer et al., 2007; Fox et al., 2008; Hussong, Hicks, Levy, & Curran, 2001; Pierrehumbert, Bader, Milkovitch, Mazet, Amar, & Halfon, 2002) or engage in self-starvation, bingeing, purging, or compulsive exercise (Gilboa-Schechtman, Avnon, Zubery, & Jecmien, 2006; Pierrehumbert et al., 2002; Sim & Zeman, 2005; 2006; Whiteside et al., 2007) in order to reduce high levels of aversive affect. Most often, this is a desire to escape from feelings of extreme sadness, anger, tension, or anxiety, but this model can also extend to experiences such as numbness that can arise from strong emotion, loneliness, social anxiety or comparison concerns, or a desire for punishment that arises out of feelings of worthlessness (Klonsky, 2007). According to this model, risky behavior is both precipitated and maintained primarily by maladaptive negative

affect regulation. What is common across pathologies is that the individuals who engage in these risky behaviors may not have the requisite affect regulation skills to deal with strong affective states caused by stress, their skills may be insufficient to address their problems, or their skills may not be properly utilized when under duress (Gilboa-Schechtman et al., 2006; Pierrehumbert et al., 2002; Rotherham-Borus, Trautman, Dopkins, & Shrout, 1990; Whiteside et al., 2007); thus, they turn to maladaptive strategies that allow them to immediately avoid and escape the aversive experience (Labouliere, 2009). Over time, the individual reduces adaptive affect regulation (e.g., prosocial interaction, active problem-solving, etc.) in the coping repertoire and increases maladaptive avoidant affect regulation, such as intensified focus on weight loss or consuming alcohol (Curry, Miller, Waugh, & Anderson, 1992; Corstorphine, Mountford, Tomlinson, Waller, & Meyer, 2007; Spoor et al., 2007). In the short-term, this distracts the individual from the stressful situation, but over time, the continual avoidance of the problem may increase the frequency of triggering events (i.e., not addressing the problem may lead to additional interpersonal disagreements) or increased levels of the same negative affect that began the cycle of avoidant affect regulation strategies in the first place (Hilbert & Tuschen-Caffier, 2007; Kashdan, Uswatte, & Julian, 2006; Muraven, Collins, Morsheimer, Shiffman, & Paty, 2005).

This cycle of maladaptive regulatory choices is likely to lead to greater affective dysregulation in the form of increased anger, tension, anxiety, or sadness. Unable to respond to these emotions adaptively, the individual may wish to express him or herself (Evans, Hawton, & Rodham, 2005; Lynch, Cheavens, Morse, & Rosenthal, 2004), but does not know how, feels that he or she cannot, or feels guilty and undeserving, as is

common in eating disorders (Gratz & Chapman, 2007). Alternatively, as is more common in problematic alcohol use but also present in those who engage in disordered eating, the individual may wish to deny the existence of the negative emotions and may attempt to suppress them, usually resulting in a greater resurgence of negative affect over time (Wenzlaff, Wegner & Roper, 1988; Smart & Wegner, 1999). In any case, the affective dysregulation eventually becomes intolerable. At the height of affective dysregulation, individuals are desperate to feel better or escape their mood state, and so turn to problematic behaviors as a release, a method of coping and regulating their emotions (Deaver, Miltenberger, Smyth, Meidinger, & Crosby, 2003; Favazza & Conterio, 1989; Groholt, Ekeberg, & Haldorsen, 2000; Hilbert et al., 2007; Hussong et al., 2001; Laye-Gindhu & Schonert-Reichl, 2005; Nixon, Cloutier, & Aggarwal, 2002; Simons, Carey, & Gaher, 2004; Simons, Gaher, Correia, Hansen, & Christopher, 2005; Steinberg, Tobin, & Johnson, 2006).

Despite the maladaptiveness of such behavior but consistent with the principles of reinforcement, on the next occasion that their level of negative emotion rises, individuals who engaged in problematic behaviors in the past will be less likely to engage in more adaptive affect regulation and increasingly likely to turn to the maladaptive strategy that previously brought them emotional relief (Hilbert et al., 2007; Muraven et al., 2005). Over time, as other strategies drop off, the problematic behavior may become less effective and may itself cause additional problems and emotional stress (i.e., other people's reactions, feelings of shame, interference with functioning, etc.). When the previously reinforcing behavior no longer brings the same level of relief, problematic behavior may increase in frequency or severity, an "extinction burst" that occurs when a

previously reinforced behavior is no longer reinforced at the same level. If this heightened frequency or severity of problematic behavior is reinforced (in the form of providing relief from negative emotion), a cycle of escalating maladaptive affect regulation can ensue.

There is much empirical support for the affect regulation model of risky-behavior. Research has consistently shown that those who engage in disordered eating and problematic alcohol use also often demonstrate concomitant difficulties in the regulation of negative affect (Gilboa-Schechtman et al., 2006; Hussong et al., 2001; Labouliere, 2009; Pierrehumbert et al., 2002; Sim & Zeman, 2005; 2006; Simons et al., 2004; Simons et al., 2005; Whiteside et al., 2007). While affect regulation may not serve as the primary goal in disordered eating or problematic alcohol use, persons typically do report a release of tension or negative affect after bingeing and purging, excessive exercise (Deaver et al., 2003; Hilbert & Tuschen-Caffier, 2007; Steinberg et al., 2006), or becoming intoxicated (Cooper, Russell, Skinner, & Windle, 1992; Sher, Grekin, & Williams, 2005).

Considering that persons who engage in problematic behaviors often do so for the purpose of regulating affect, risky behaviors such as disordered eating and problematic alcohol use can therefore be viewed as “coping mechanisms,” albeit maladaptive ones (McAllister, 2003). Prospective longitudinal studies have also established the temporal precedence of affective dysregulation before the onset of risky behavior, ruling out the competing hypothesis that affect dysregulation is merely a correlate that results from the sequelae of dysregulated behavior rather than playing a causal role in the onset and maintenance of this behavior (Yen, Shea, Pagano, Sanislow, Grilo, McGlashan, ... Morey, 2003).

**Positive affect model.** Although failed regulation of negative affect is a common precipitant for engaging in risky behavior, many persons who engage in problematic behaviors also hope to create or maintain positive affect (e.g., relaxation, relief, calm, happiness, etc.). For example, many persons who engage in purging or restrictive dieting practices believe this will lead to the joy of weight loss (even when this is not necessarily the case; Belmonte, 2010) and perceived control (Fairburn, Shafran, & Cooper, 1998), and numerous persons who drink large quantities of alcohol believe that doing so will make them happier or have more fun (Littlefield, Sher, & Wood, 2010). Although positive affect enhancement may play a smaller role in the onset and maintenance of disordered eating (Kumar, Pepe, & Steer, 2004; Overton, Selway, Strongman, & Houston, 2005), which is seemingly maintained mostly by negative reinforcement (Machorian, 2001), it appears that positive affect may play a much larger role in problematic alcohol use (Cooper et al., 1992; Goldman, Del Boca, & Darkes, 1999; Littlefield et al., 2010; Sher et al., 2005). Alcohol, by the very nature of its chemical effects, has a biphasic effect upon the person who consumes, initially increasing their positive affect and mood, but eventually having a depressive effect on the central nervous system (Bruce, Steiger, Israel, Kin, Hakim, Schwartz, ... Mansour, 2011). It has been suggested that episodes of disordered eating may also similarly initially raise mood and activate neural reward circuitry via the release of endorphins (Klonsky, 2007).

Unfortunately, these maladaptive methods of positive mood induction are likely to be short-lived and, as is the case in negative mood avoidance, the person may begin to engage in these methods at the expense of other methods more likely to provide lasting positive affect (Kovacs, Rottenberg & George, 2009). As consequences of their



maladaptive behavior accumulate, individuals may progressively lose other options for positive mood induction (i.e., disordered eating or problematic alcohol use may adversely affect health or social relationships so that previously positively-reinforcing experiences happen less frequently or are less able to counteract negative influences). As such, people continue to turn to the risky behaviors that have allowed them to forget their troubles and raise their spirits in the past. Over time, as other strategies drop off, the problematic behavior may become less effective (i.e., bring less of the positive emotion expected), leading to increases in frequency or severity of risky behavior, another example of an “extinction burst” that occurs when a previously reinforced behavior is no longer reinforced at the same level. If this heightened frequency or severity of problematic behavior is reinforced (in the form of positive results like weight loss, pleasurable intoxication, or attention from others), the cycle of escalating maladaptive affect regulation continues.

### **Common Risk Factors: Sensation-Seeking and Risky Behavior**

In addition to affective dysregulation, sensation-seeking personality traits are also recognized as being common across domains of risk. Persons who engage in risky behaviors for positive mood induction frequently are found to be high in *sensation-seeking*, a process in which persons seek stimulation via varied, novel, complex, or intense experiences in order to achieve an optimal level of arousal (Zuckerman, Kolin, Price, & Zoob, 1964; Zuckerman, 1979; 1994; Hittner & Swickert, 2006). Previously it was believed that all organisms sought drive reduction, or the motivation to reduce activation to a minimal level; however, research seemed to suggest rather that an “optimal” level of stimulation was preferable to either under- or over-stimulation (Hebb

& Thompson, 1954; Fiske & Maddi, 1961; Zuckerman, 1979; Zuckerman et al., 1964). Rather than seeking drive reduction, individuals experiencing too little stimulation, as in cases of isolation, will seek to increase their levels of activation, whereas individuals experiencing too much stimulation, as in sensory or emotional overload, will seek to reduce their level of activation (Zuckerman, 1979; Zuckerman et al., 1964). Explicit in this theory of optimal stimulation was the recognition that “optimal” may vary widely between individuals (Zuckerman et al., 1964; Zuckerman, 1979; 1994), and that preference for simplicity versus complexity of experience may vary based on personality (Bieri, 1961). Like most aspects of personality, sensation-seeking is a normal trait which, in interaction with environmental demands, biological vulnerabilities, and other intrapersonal qualities, can sometimes become extreme and express itself in a manner consistent with psychopathology (Hittner & Swickert, 2006; Zuckerman & Neeb, 1979). Overly high levels of sensation-seeking can increase a person’s willingness to engage in risk-taking behavior, and has been found to be a strong predictor of participation in risk-taking behaviors such as problematic alcohol use and disordered eating (Dawe & Loxton, 2004; Hittner & Swickert, 2006; Johnson & Cropsey, 2000; Loxton & Dawe, 2001; Zuckerman & Neeb, 1979).

The literature explains the association between sensation-seeking and risk-taking behavior in a number of ways. Firstly, the sheer act of engaging in a risky behavior may be exciting (Zuckerman, 1994); for example, drinking alcohol may be proscribed by law or frowned upon by authority figures, whereas the secretive nature of disordered eating may provide a similar rush. Additionally, the sequelae of the behaviors themselves (i.e., the pharmacological effects of alcohol and the dopaminergic and endorphin responses

associated with alcohol consumption and disordered eating behaviors) provide a physiological increase in activation (Bruce et al., 2011; Klonsky, 2007). Furthermore, persons with high levels of sensation-seeking may underestimate the risks associated with risky behavior compared to their peers with low levels of sensation seeking counterparts, and therefore are less likely to consider problematic health risk behaviors to be as risky as they actually are (Hovath & Zuckerman, 1993; Hoyle, Stephenson, Palmgreen, Pugzles Lorch, & Donohew, 2002). Lastly, according to the UPPS (Urgency, Premeditation, Perseverance, and Sensation-Seeking) theory of multidimensional impulsivity, sensation-seeking is merely one facet of a larger construct of impulsivity, along with *urgency* (the tendency to act rashly when experiencing extreme emotions) and a *lack of premeditation and perseverance* (the tendency to act without thinking and the inability to remain focused on a task when distracted, respectively; Fischer & Smith, 2008; Klonsky & May, 2010). These facets of impulsivity, while distinct and having unique predictive value, are nevertheless moderately associated with each other. As such, persons high in sensation-seeking and other indicators of impulsivity are more likely to respond to instances of affective dysregulation, whether they be the desire to escape negative affect or to increase positive affect, by engaging in impulsive methods of coping. Since persons engaging in problematic alcohol use and disordered eating are likely to experience affective dysregulation (as previously discussed), high levels of sensation-seeking or other facets of impulsivity may increase the probability of maladaptive responses to these experiences (Fischer & Smith, 2008).

Impulsivity has been strongly implicated as a trait that underlies vulnerability to problematic alcohol use (Baker & Yardley, 2002; Fischer & Smith, 2008; Holderness et

al., 1994; Congdon & Canli, 2005) and disordered eating (Claes, Vandereycken, & Vertommen, 2005; Fischer & Smith, 2008). However, different facets of impulsivity have been differentially linked to various risk behaviors. Notably, high levels of urgency tend to predict alcohol-related problems, whereas high levels of sensation-seeking associate more strongly with frequency of alcohol consumption (Cyders, Flory, Rainer, & Smith, 2009; Fischer & Smith, 2008; Smith, Fischer, Cyders, Annus, Spillane, & McCarthy, 2007). Likewise, persons with bulimic-type eating pathology tend to exhibit greater urgency and sensation-seeking than persons with restricting-type pathologies or persons with no disordered eating tendencies (Fischer, Smith, & Anderson, 2003; Smith & Fischer, 2008).

### **Strengths and Limitations of Common Risk Factor Research**

Longitudinal studies have fortunately provided us with much evidence that the presence of common risk factors often precede the onset of risky behavior, ruling out the competing hypothesis that these common risk factors may be caused by the sequelae of dysregulated behavior. Prospective longitudinal studies of the role of common risk factors in problematic alcohol use found strong associations between negative affectivity and sensation-seeking at baseline and alcohol use (Brody & Ge, 2001; Measelle, Stice, & Springer, 2006; Shoal, Casteneda, & Giancola, 2005; Willis et al., 1999) and escalation (Stice, Myers, & Brown, 2004) at follow-ups between one and five years later. Similar associations between affect regulation at baseline and subsequent disordered eating (Ghaderi, 2003; Stice, 2001; Stice, Shaw, & Nemeroff, 1998) were also found at follow-ups six months to two years later, whereas prospective associations between sensation-seeking and disordered eating are not so clearly delineated (Krug, Pinheiro, Bulik,

Jimenez-Murcia, Granero, Penelo, ... & Fernandez-Aranda, 2009; Stice, 2002; Waxman, 2009). Longitudinal studies overwhelmingly supported the temporal precedence of affect dysregulation, although not all studies supported the affect regulation or sensation-seeking theories in full (Klonsky & May, 2010; Shoal et al., 2005; Stice et al., 1998; Stice, 2002). These studies, while still supporting the role of affect regulation and sensation-seeking partially, suggest that other heretofore-untested moderators may play important roles in these associations.

Unfortunately, it is difficult to determine what these moderators may be, as very little of the (longitudinal or cross-sectional) research supporting the affect regulation or sensation-seeking models has ever explored these factors across different types of risk behaviors of interest. Rather, most studies have simply explored the role of affect regulation or sensation-seeking in regard to a specific pathology, disallowing empirical investigation of whether these factors play a similar role across risk behaviors and what moderators may influence these relationships. As such, the role of affect regulation and sensation-seeking across problematic behaviors should be further explored empirically, so that future treatments can be developed and disseminated that address common factors effectively and parsimoniously.

## **Differentiating Trajectories of Risk: Specific Risk Factors for Risky Behavior**

Based on the previous discussion of underlying affective dysregulation and sensation-seeking common to multiple risky behaviors, it could be assumed that all persons experiencing such factors would also experience disordered eating and problematic alcohol use; likewise, it might be imagined that all persons engaging in one problematic behavior must also engage in the other, due to underlying vulnerability. However, despite substantial comorbidity across these problematic behaviors (Blinder, Cumella, & Sanathara, 2006; Higuchi et al., 1993; Holderness et al., 1994; Taylor et al., 1993; von Ranson et al., 2002; Wilson, 1991), many individuals experience only one problematic behavior rather than both, suggesting that more than just affective dysregulation or sensation-seeking is at play in the onset and maintenance of these disorders. It appears that affect dysregulation and sensation-seeking, while powerful forces in the onset and maintenance of problematic behaviors, are non-specific risk factors for their development, meaning that dysregulation and sensation-seeking are associated with many problematic behaviors but do not specifically predict any given one. What, then, leads one person experiencing affective dysregulation or high sensation-seeking to begin bingeing and purging, while another person drinks excessively? Why do some persons develop only one problematic behavior in the face of common vulnerabilities while others develop multiple pathologies?

Clearly, years of research have suggested myriad risk factors that may predispose a person to a certain risk trajectory. Weight preoccupation (Killen, Taylor, Hayward, Wilson, Hammer, Kraemer, ... & Strachowski, 1996), childhood digestive, eating, or weight problems (Marchi & Cohen, 1990), early onset of menarche (Graber, Brooks-

Gunn, Paikoff, & Warren, 1994), exposure to negative comments about one's weight, shape, or eating habits (Fairburn, Doll, Welch, Davies, & O'Conner, 1998; Fairburn, Shafran, & Cooper, 1998), or an unrealistic thin ideal or drive for thinness (Streigel-Moore, 2006) may incline someone to disordered eating in the presence of common vulnerabilities. Conversely, exposure to drinking in childhood (Ellis, Zucker, & Fitzgerald, 1997; Windle, 2000), propensity toward antisocial behavior (Fergusson, Swain-Campbell, & Horwood, 2002; Fergusson, Woodward, & Horwood, 1999), or extraversion (Hill, Shen, Lowers, & Locke, 2000) in the presence of common risk factors might promote the onset of problematic drinking. Even more bewildering, a different constellation of risk factors might predict comorbidity: in the presence of affect dysregulation and high sensation-seeking, dysfunctional family life or childhood abuse/neglect (Fotti, Katz, Afifi, & Cox, 2006), negative self-evaluation or low self-esteem (Striegel-Moore, 2006; Sher et al., 2005), executive dysfunction (Nigg, Glass, Wong, Poon, Jester, Fitzgerald, ... Zucker, 2004), serotonergic or dopamine abnormalities (Dick Edenberg, Xuei, Goate, Kuperman, Shuckit, ... Foroud, 2004; Kaye, Wagner, Fudge, & Paulus, 2011), or any of a substantial number of non-specific risk factors could be common to both domains of risk. With such a daunting list of potential risk factors (not to mention all of their possible permutations), none of which are both necessary and sufficient, it seems impossible to predict who will develop problematic behavior and who will not. However, a theory originating in the field of self-harm may shed light on how a person's pathway of risk may be differentiated. The utility of this research will provide the rationale for extending this construct from the domain in which

it was developed into a specific predictor for differentiating across different domains of risky behavior.

**Acquired capability and risky behavior.** Interestingly, although common risk factors research is most widespread in the study of risky behavior, the question of what experiences in the learning history led to the development of such behavior has been extensively treated in the self-harm field. According to the Joiner Interpersonal-Psychological Theory (Joiner, 2005; Joiner et al., 2005; Joiner et al., 2009a; 2009b; Selby et al., 2010; Stellrecht, Gordon, Van Orden, Witte, Wingate, Cukrowicz, ... & Joiner, 2006; Van Orden et al., 2008), although the psychological pain that drives one to be self-destructive may be present in a large number of individuals, only those who have personally or vicariously experienced substantial painful and provocative events in their lifetimes will be capable of overriding their own self-preservation instincts. This exposure to painful and provocative events functions as “practice,” causing a gradual wearing down through habituation to the pain and fear associated with self-harm (Joiner, 2005). The acquired capability theory assumes that habituation occurs through exposure and repetition, as suggested by opponent process theory (Solomon, 1980; which posits that the effects of a provocative stimulus diminish with repetition, which the opponent processes of the stimulus increase). Joiner (2005) states that the most direct manner in which to acquire capability to enact lethal self-injury is through a history of repeated suicide attempts or other self-harm behavior; however, capability can also be acquired through other more indirect avenues, such as recurring drug use, exposure to physical or sexual violence, bullying and victimization, invasive medical procedures, engaging in risky behavior, prostitution, contact sports, or any other activity that would expose a



person to fear, pain, or injury either directly or vicariously (Joiner, 2005; Van Orden et al., 2008; Stellrecht et al., 2006; Tarquini, Karver, & Totura, 2008). Thus, a person acquires capability to enact self-harm over time through frequent in vivo and/or vicarious exposure to painful or frightening events; as people habituate and eventually become less frightened of injury and pain, their ability to put themselves in harm's way and enact injury against the self increases (Van Orden et al., 2008; Stellrecht et al., 2006). The Joiner Interpersonal-Psychological Theory suggests that, although many persons may experience affective dysregulation, sensation-seeking, or other common risk factors for risky behavior, only those individuals that acquire the actual capability to overcome one's innate desire to avoid pain and negative consequences progress from self-harm ideation to action (Joiner, 2005; Selby et al., 2010).

Although a relatively new theory, research conducted to date has been exceedingly supportive. Studies have found that self-harming persons have higher tolerance for pain (Gratz, Hepworth, Tull, Paulson, Clarke, Remington, & Lejuez, 2011; Orbach, Mikulincer, King, Cohen, & Stein, 1997) and that a history replete with greater exposure to painful and provocative events leads to higher levels of acquired capability for self-harm actions (Van Orden et al., 2008). Acquired capability and exposure to painful or provocative events earlier in the learning history have also been shown to be predictive of the number of previous suicide attempts and subsequent death by suicide (Brown, Beck, Steer, & Grisham, 2000; Darke & Ross, 2002; Holm-Denoma, Witte, Gordon, Herzog, Franko, Fichter, ... & Joiner, 2008; Joiner et al., 2005; Joiner, Sachs-Ericsson, Wingate, Brown, Anestis, & Selby, 2007; Joiner et al., 2009a; 2009b; Kidd & Kral, 2002), even when accounting for depression and other relevant confounds. Lastly,

there is the overwhelmingly strong finding that the most direct pathway to acquired capability, prior self-harm behavior, is the best predictor of future self-harm behavior, often of increasing severity or lethality (Joiner 2005; Tarquini et al., 2008), and that a history of risky behavior also predicts subsequent onset of self-harm behavior (Tarquini et al., 2008).

Although Joiner never explicitly states it as such, implicit in the acquired capability theory is the assumption that acquired capability has both a physiological component (e.g., physical habituation to noxious stimuli) as well as a cognitive/affective component (e.g., increased belief that one is able to perform such an action in the face of lessening fear or emotional discomfort). Although Joiner's publications frequently discuss the physical habituation that occurs with repetition and exposure, relatively few of his publications directly measure or test the association between this exposure, repetition, or habituation and self-harm behavior (Van Orden et al., 2008). Rather, Joiner's Acquired Capability for Suicide Scale (ACSS; Bender, Gordon, & Joiner, 2007) focuses more strongly on the cognitive/affective beliefs that one is capable of enacting a self-harm behavior, despite such behaviors being traditionally aversive, frightening, and painful to most people (Van Orden et al., 2008). These capability-related beliefs function in a manner wherein previous experience with painful or provocative events teaches a person to anticipate that they can overcome noxious stimuli in order to act.

While the cognitive and physiological aspects of acquired capability have never been studied outside the field of self-harm, the overwhelming evidence for the construct's existence in one field of risky behavior suggests that similar physiological and cognitive/affective processes may occur across problematic behaviors. As such, it is

possible that an acquired capability construct exists in other domains of risky behavior, such as problematic alcohol use or disordered eating. Learning that one can withstand the discomfort of cutting or burning their flesh in order to achieve a desired end is not entirely unlike learning that one can overcome the physical discomfort associated with intoxication, starvation, or vomiting in order to achieve a desired end. That is, while many distressed individuals may have the emotional vulnerability that leads one to desire escape from noxious stimuli such as overwhelming affect, demands, or unpleasant situations, it is likely that only those who have had experiences in the learning history that allowed them to habituate to or tolerate a behavior's uncomfortable physical consequences and who believe that they can overcome or withstand these uncomfortable physical consequences will go on to engage in that specific behavior. For example, it is probable that only those who experience events that teach them to habituate to hunger and believe that one is capable of withstanding hunger would subsequently go on to develop disordered eating behaviors (Heatherton, Polivy, & Herman, 1989); all others would revert to typical eating behavior once hunger pangs became aversive. Likewise, only those who experience events that teach them to tolerate the effects of ingesting large quantities of alcohol and believe that one is capable of ingesting large quantities of alcohol would go on to develop problematic usages of alcohol (Park, 2003); all others would reduce their consumption after nausea or a hangover developed.

As of yet, these constructs have never been examined empirically across domains of risky behavior; nevertheless, it is quite possible that *all* risky behavior requires certain specific events in the learning history that drive the development of behavior-specific capability-related beliefs. Despite the highly exploratory nature of this inquiry, the

possibility that the acquired capability construct may play a role in other domains of risk is probable, as many similarities exist across fields. In the fields of disordered eating and problematic alcohol use, as in the field of self-harm, past participation in the behavior is highly predictive of future participation in the behavior, and behaviors tends to escalate over time (Ham & Hope, 2003; Stice, 2002), factors commonly referenced in the acquired capability for self-harm literature (Brown et al., 2000; Darke & Ross, 2002; Holm-Denoma et al., 2008; Joiner et al., 2005; 2007; 2009; Kidd & Kral, 2002; Tarquini et al., 2008). As such, whether the acquired capability construct exists across fields is therefore a viable empirical question. Across fields, it is possible that acquired capability creates a diathesis that is behaviorally-specific, but that this diathesis is only activated in the face of precipitating experiences such as affective dysregulation or sensation-seeking, triggers that are not specific across areas of risk.

### **A Model of Common and Differentially-Specific Risk Factors for Risky Behaviors in College Students**

Across different problem areas, different models have been looked at relative to their specific explanatory power within the problem area, but have not been systematically extended to other problem areas. What has been consistently missing from the literature is a comprehensive model that takes into account all of the previously mentioned models and that can apply across different problem areas. According to the newly proposed comprehensive model of common and differentially specific risk factors for risky behaviors in college students, all persons experience events in their learning history that are likely to enhance their capability for specific risky behaviors; that is, it is impossible to avoid all instances of discomfort, fear, pain, and exposure to risky

behaviors throughout one's life, and thus each person has some nonzero number of capability-enhancing events for any given risk behavior. Some of these events may be relatively benign and experienced by most people (e.g., the habituation to pain that occurs from everyday common childhood bumps and bruises or the habituation to feelings of hunger and nausea that occur due to the effects of illness, etc.), whereas other events may be more rare in the population and therefore be more directly related to specific variants of risk behavior capability (e.g., exposure to friends or family members who engage in disordered eating or problematic alcohol use, etc.).

For example, as commonly found in the self-harm field, while every person who has experienced pain will habituate slightly to the fear and arousal associated with painful experiences, persons who repetitively experience pain in various forms beyond the typical quantity of experiences or experience severe pain are likely to habituate more to the aversive fear and pain associated with self-harm. As such, a person who frequently engages in contact sports, experiences painful medical procedures, was physically or sexually abused, uses intravenous drugs, or was exposed vicariously to self-harm via others' self-harm behavior is far more likely to have enhanced capability for self-harm than a person with exposure to only mild or infrequent painful and frightening experiences (Joiner, 2005). Likewise, to extend to other domains of risk, a person who participates in activities in which a certain body-type, shape, or weight is preferred and encouraged to be maintained (e.g., modeling, dance, gymnastics, wrestling), withstood ridicule for his or her weight or shape, experienced significant gastrointestinal illness or dysfunction, was placed on an extreme dieting or exercise regimen at a young age, or who is exposed vicariously to unhealthy eating habits in peers or family members is far

more likely to have enhanced capability for disordered eating than a person with exposure only to the media's overemphasis on certain body types and body consciousness experienced by most in western culture. Lastly, a person who is exposed vicariously to alcohol use (and misuse) at an early age via peers or family members, is pressured by others to consume alcohol, or experiences fewer aversive physiological effects of alcohol when ingested is far more likely to have enhanced capability for problematic alcohol use than a person only exposed to the ubiquitous presentations of alcohol in television and movies. While all persons have some nonzero degree of capability for any given risk behavior, those persons who have more proximal, more frequent, or more severe exposure are likely to develop greater capability through the experience of these capability-enhancing events. High levels of sensation-seeking may increase the frequency of these capability-enhancing events based on a person's choices of preferred activities and peer-group.

Experiencing capability-enhancing events leads to the subsequent development of capability-related beliefs regarding any given risk behavior even before any engagement in the behavior is ever considered. Depending on one's experiences with the capability-enhancing events, these beliefs may be positive or negative in nature. In this manner, two people experiencing the same capability-enhancing event may develop similar levels of physiological capability for that specific risk behavior, but may cognitively appraise the event in widely discrepant ways. As such, two persons with equal levels of physiological capability may differ in their risk for subsequent engagement in the risk behavior depending on whether their capability-related beliefs about this behavior are positive or negative. Only if capability-related beliefs for a given risk behavior are positive will a

person with physiological capability be at increased risk for engaging in a risky behavior, as neither cognitive/affective barriers (e.g., fear, disgust) nor physiological barriers (e.g., tolerance of physical discomfort) are present to deter them from engaging in the behavior.

For example, persons exposed to years of pain as a result of playing contact sports will only be at increased risk of engaging in self-harm behavior if their experiences of habituation lead them to believe that they can tolerate the pain to achieve an end, such as a reduction in negative affect or increased attention. Likewise, people exposed to the discomfort associated with hunger as a result of deprivation due to adiposity treatment or illness will only be at increased risk of developing disordered eating if their experiences of habituation lead them to believe they can tolerate the discomfort of hunger for a desired outcome, such as weight loss or positive attention from their peers. Finally, persons exposed to alcohol at a young age will only be at increased risk of developing problematic alcohol use if their experiences of habituation to the physiological effects of alcohol lead them to believe that they can tolerate nausea, intoxication, or hangovers in pursuit of a desired effect, such as social facilitation or improved affect.<sup>2</sup> Each component by itself – physiological capability through capability-enhancing events or cognitive/affective capability via positive capability-related beliefs – is necessary but not

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<sup>2</sup> The construct of capability-related beliefs in self-harm functions much like behaviorally-specific outcome expectancies, wherein one's beliefs about the likelihood of a positive or negative outcome after engaging in a given behavior, are highly predictive of subsequent engagement in that behavior (Goldman, Brown, Christiansen, & Smith, 1991; Simmons, Smith, & Hill, 2002; Tolman, 1932). Although the field of self-harm most commonly refers to these beliefs as "predicted functions" or "capability-related beliefs" rather than expectancies (Favazza & Conterio, 1989; Groholt et al., 2000; Herpertz, 1995; Hjelmeland & Groholt, 2005; Kumar et al., 2004; Labouliere, 2009; Laye-Gindhu & Schonert-Reichl, 2005; Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Nixon et al., 2002; Nock & Prinstein, 2005), this is more of a semantic than theoretical difference. While some nuances do exist between the two constructs, capability-related beliefs can be considered a special case of outcome expectancies; expectancies more broadly may cover a wide range of social, psychological, and physical outcomes, where capability-related beliefs refer specifically to one's beliefs about the ability to tolerate aversive physical or emotional consequences of a behavior.

sufficient for increased risk; only the combination results in an increased risk that is differentially-specific for a given risk behavior. Additionally, research has shown that those who engage in any one of these behaviors initially is at higher risk for the behavior to re-occur than those persons who never engaged in the behavior (Kovacs et al., 2009). Thus, it is likely that initial experiences with a particular behavior may lead to further development of physiological habituation and changes in one's capability-related beliefs regarding that behavior, possibly mediating the strong predictive relationship between past and subsequent future behavior.

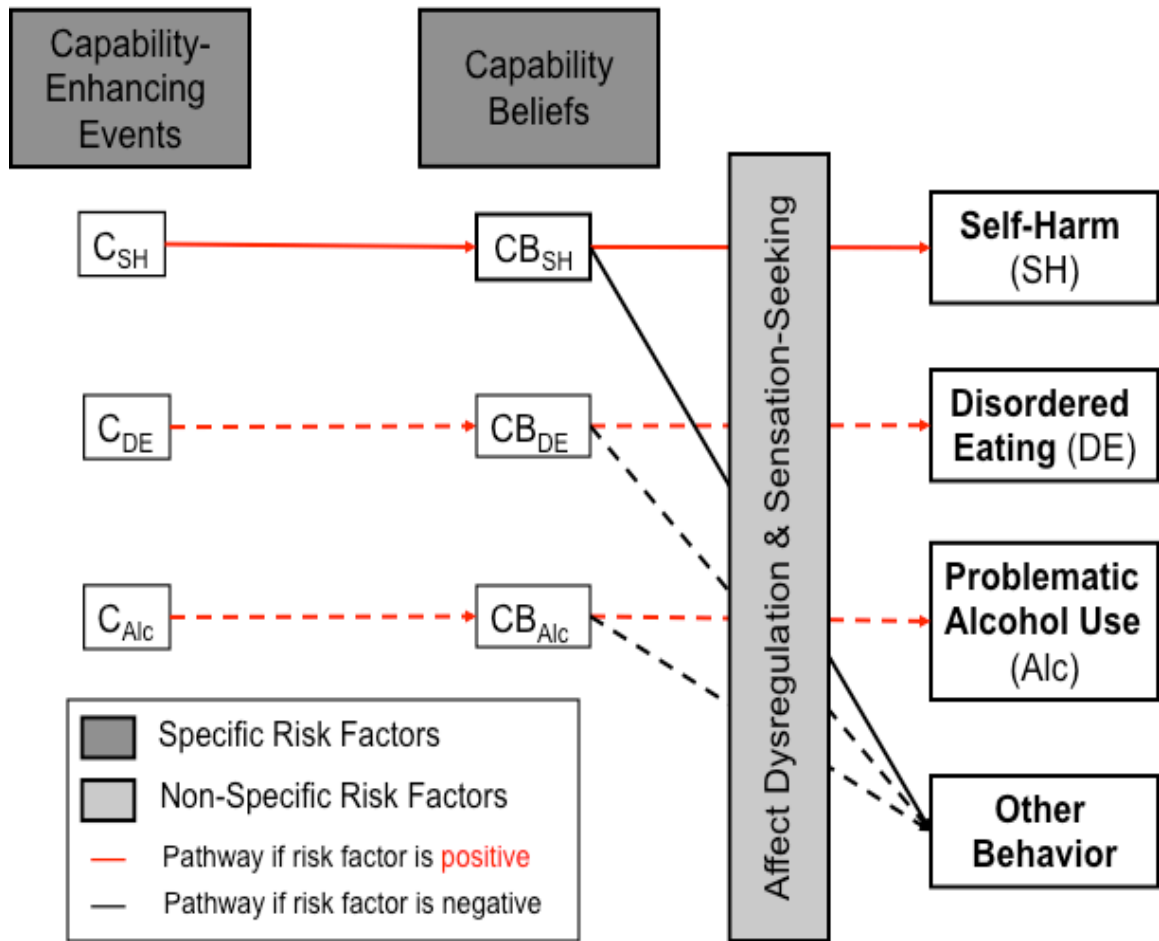
However, even when both specific risk factors are present, they alone do not typically result in maladaptive behavior – a common thread underlying the tendency to turn toward poor coping mechanisms such as risky behavior is the inability to manage one's affect appropriately while in strongly emotionally-valenced states. If a person had the ability to competently modulate their affect through more appropriate and adaptive means, it would be unlikely that they would turn to maladaptive affect regulation strategies such as risky behavior in attempts to alleviate negative or maintain positive affective states. As such, affective dysregulation and sensation-seeking serve as common risk factors for all types of risky behavior that are not differentially predictive. More specifically, in the presence of high levels of sensation-seeking, a person will only be at increased risk for a particular risky behavior if they cannot adequately modulate their affect (i.e., seek positive mood induction through less risky means) *and* have acquired the requisite level of physiological capability for that behavior through capability-enhancing events *and* if they harbor positive capability-related beliefs regarding the behavior. Likewise, in the presence of affective dysregulation, be it positively or negatively



valenced, a person will only be at increased risk for a particular risky behavior if they have acquired the requisite level of physiological capability for that behavior through capability-enhancing events *and* if they harbor positive capability-related beliefs regarding the behavior. If these specific risk factors are not in place, it is likely that the person will engage in an alternative behavior instead, which may or may not be an adaptive affect regulation strategy (see figure 1).

### **Justification for Extending the Acquired Capability Construct to Other Domains of Risk**

In summary, it is likely that affective dysregulation and sensation-seeking may serve as a common gateway for most maladaptive behaviors, but who goes on to engage in one maladaptive behavior versus another (or multiple maladaptive behaviors) is likely a function of capability-enhancing events in their learning history and subsequently-developed capability-enhancing beliefs for that particular behavior. Although it is highly likely that such constructs exist and play an important role in the onset and maintenance of many risky behaviors, no research to date has ever explored such. Perhaps the reason that researchers and clinicians have had so little success differentiating between similar but distinct groups of risk is that research has either measured vulnerabilities in only one type of pathology or, if exploring risk across multiple problem behaviors, has mistakenly been measuring the vulnerabilities, stressors, and experiences that are common across groups of risk, such as affective dysregulation or sensation-seeking. As such, research is critically necessary that will determine what factors make some persons able to habituate to some risks and not others, while others cannot tolerate any level of risk, and yet others can overcome their self-preservation instinct on numerous levels.



*Figure 1.* A Model of common and differentially-specific risk factors for risky behaviors in college students. Paths that have been substantiated by the research literature are depicted as solid lines, whereas paths to be determined empirically are depicted as dashed lines.

Myriad questions about the role of acquired capability across risk behaviors remain: Does the acquired capability construct exist in other risky behaviors as it does in self-harm? If so, what types of events are typically present in the learning history that lead to the development of such beliefs in different domains of risk? How does physiological capability interact with cognitive/affective capability-related beliefs to promote or prevent different risky behaviors? Furthermore, does the critical combination of frequent capability-enhancing events and positive capability-related beliefs regarding a behavior differentially predict who will engage in maladaptive behavioral outcomes? Does acquired capability show specific predictive validity of other risky behaviors such as disordered eating and problematic alcohol use over and above other common risk factors such as affective dysregulation and sensation-seeking (as has been demonstrated in the field of self-harm)?

With so many critical questions remaining to be answered about problems of such high prevalence and considerable morbidity, it is vital that research address such gaps. Alas, researchers across fields have yet to undertake this important yet inherently exploratory work. One of the difficulties associated with extending the acquired capability construct to other domains of risk is the overlap between this construct and other more frequently studied constructs in the fields of disordered eating and problematic alcohol use. One such candidate in the field of alcohol research is the construct of tolerance. *Tolerance* can be defined as a state where prior consumption of alcohol desensitizes a person to alcohol's effects, so that a constant amount of alcohol produces a lesser effect or increasing amounts of alcohol are necessary to produce the same effect (NIAAA, 2011). Tolerance is one criterion of alcohol dependence (APA,

2000), and is highly associated with increasing levels of alcohol consumption and alcohol-related problems (NIAAA, 2011; Tabakoff & Hoffman, 1988).

It is inherently recognized that tolerance overlaps substantially with acquired capability. Acquired capability, as defined in the self-harm literature, is the habituation to fear and pain associated with repeated exposure to either experiential or vicarious harm, thereby functioning as “practice” for increasing levels of self-harm. To extend this construct to the realm of problematic alcohol use would define acquired capability as the ability to withstand or habituate to the negative effects of alcohol, via either vicarious or experiential exposure, thereby functioning as “practice” for increasing levels of problematic alcohol use behavior. In so far as we are discussing the physiological habituation to the aversive effects of alcohol, acquired capability and tolerance are identical. However, despite this overlap, there are two major differences between the tolerance and acquired capability construct.

Firstly, tolerance refers to reduced sensitivity to alcohol’s effects, both positive and negative. As such, tolerance refers equally to the need to consume more alcohol to engender positive effects as well as reduced sensitivity to the negative aspects of intoxication. Alternatively, acquired capability refers only to an increasing capability to withstand the negative effects of alcohol consumption. Secondly and more importantly, tolerance only refers to direct, experiential, physiological habituation to the effects of alcohol, and does not address cognitive/affective habituation (i.e., increased ability to withstand shame at alcohol-induced behavior, increased beliefs that one can withstand the effects of alcohol successfully, reduced fear over placing oneself in alcohol-induced dangerous situations, reduced disgust/regret over physical side-effects of

overconsumption, etc.) or habituation that occurs vicariously (e.g., via exposure to problematic alcohol use in the media or by witnessing problematic alcohol use in friends or family members, etc.). Tolerance in its traditionally-used sense would never be used to describe the experiences of psychological or vicarious habituation; however, these experiences are critical components to the construct of acquired capability, given equal weight with physical habituation. As such, although tolerance and acquired capability do overlap in regard to physiological exposure and habituation, full understanding of the acquired capability construct includes both physiological habituation through capability-enhancing events and cognitive/affective habituation leading to the development of positive capability-related beliefs. Rather, tolerance to alcohol's effects is likely to function in a similar manner to reduced interoceptive awareness in disordered eating or increased pain tolerance in the self-harm field – necessary for the development of physiological capability, but only one critical component of the overall construct of acquired capability. The extension of the construct of acquired capability described herein would include all critical components (i.e., physiological and cognitive/affective habituation as a result of both experiential and vicarious exposure) and provide a unifying framework for explaining the exemplary risk factor research already conducted in other fields (i.e., studies of genetic and neurobiological vulnerabilities, risk conferred by family history of disorder or association with a deviant peer group, physiological characteristics such as increased tolerance or reduced interoceptive awareness, environmental risk, etc). As such, acquired capability could function as a transdiagnostic and translational theory that acknowledges the existence and importance of these individual fields of study, but provides a construct that could be measured quickly and easily via self-report. There is

obvious clinical and research utility to such a self-report method that could provide similar information more succinctly, parsimoniously, and economically than conducting genetic and neuroimaging studies or extensive assessment of previously mentioned predictors of risk individually.

However, while extending the construct of acquired capability to other domains of risk has obvious clinical and research merit, the primary difficulty in conducting such research is that measures of capability-enhancing events and capability-related beliefs do not exist outside of the field of self-harm, making comparisons across risk groups impossible. As a result, tests of the associations between predictive events in the learning history and beliefs about one's capability to engage in risky behaviors have yet to be conducted.

### **Objectives of This Study**

This dissertation aspires to address some of those critical gaps through two studies. Study 1 aims to develop a measure of acquired capability to engage in risky behaviors such as disordered eating and problematic alcohol use. Similar to measures already designed for the field of self-harm, this measure would assess both physiological and cognitive/affective components of acquired capability by exploring the role of exposure and habituation to certain events in the learning history in the development of capability-related beliefs. The specific objective of Study 1 is to create a measure of the relevant construct (physiological and cognitive/affective components of acquired capability for problematic alcohol use and disordered eating) in which the construct will be the same across the different problem areas, but the measure of the construct will be specific to each problem area. Study 2 aims to validate these measures by testing the

associations between common risk factors for risky behavior (e.g., affect dysregulation, sensation-seeking), and specific risk-factors (e.g., capability-enhancing events in the learning history and subsequently-developed capability-related beliefs) in a sample of college undergraduates. To date, no one has looked at these relationships across risk groups. Although self-harm researchers have looked at these relationships in regards to one specific type of maladaptive behavior, an exploration of the relationships between the physiological and cognitive/affective aspects of acquired capability across domains of risk has never been conducted. This prior narrow look has limited knowledge and broader theoretical development in the literature, as well as the possibility of more targeted and efficacious interventions. As such, the current study has the potential to make a tremendous contribution to the literature, both in the way of a new measure and a novel conceptual understanding.

Specific aims and hypotheses include:

**AIM 1:** Based on items derived from a thorough review of the literature and expert consensus, a new measure will be created that will assess the construct of acquired capability, including both physiological and cognitive/affective components (i.e., capability-enhancing events and capability-related beliefs), across multiple risk groups. Reliability of this newly-created measure will be demonstrated by appropriate internal consistency and corroborated by both exploratory and confirmatory factor analysis.

- **H1:** The “Acquired Capability for Maladaptive Behaviors” scale will be designed to measure exposure to capability-enhancing events and beliefs regarding one’s own capability for participation in both problematic alcohol use and disordered eating behaviors. It is hypothesized that this measure will contain four lower-order factors

(capability-enhancing events for problematic alcohol use, capability-related beliefs for problematic alcohol use, capability-enhancing events for disordered eating, and capability-related beliefs for disordered eating; see figure 2), as determined by an exploratory factor analysis.

- **H2:** It is hypothesized that items will show greater magnitude of associations with the factor on which they are supposed to load than on the remaining three factors (i.e., items designed for the capability-enhancing events for disordered eating subscale will load higher on that factor than on the other three factors previously derived).
- **H3:** It is hypothesized that confirmatory factor analysis using full maximum likelihood estimation will substantiate this four-factor solution (see figure 2). Model fit of alternative nested factor solutions (see figure 3 or possibly alternate structures suggested by exploratory factor analysis) will be compared to the proposed factor solution using the chi-square difference test to substantiate the proposed factor structure.
- **H4:** It is hypothesized that the proposed four factors (capability-enhancing events for problematic alcohol use, capability-related beliefs for problematic alcohol use, capability-enhancing events for disordered eating, and capability-related beliefs for disordered eating) as well as any higher-order factors present will show adequate internal consistency (Cronbach's alpha of .70 or greater).



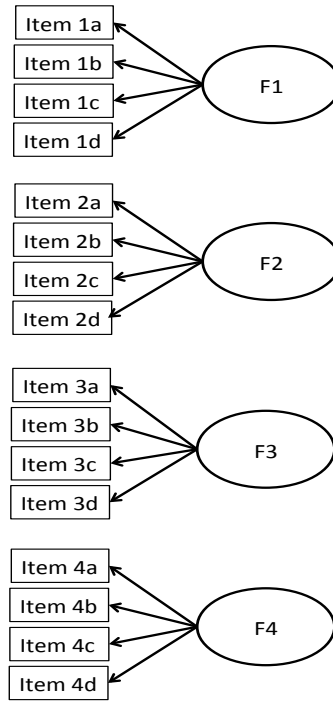


Figure 2. Proposed factor structure for the “Acquired Capability for Maladaptive Behaviors” scale.

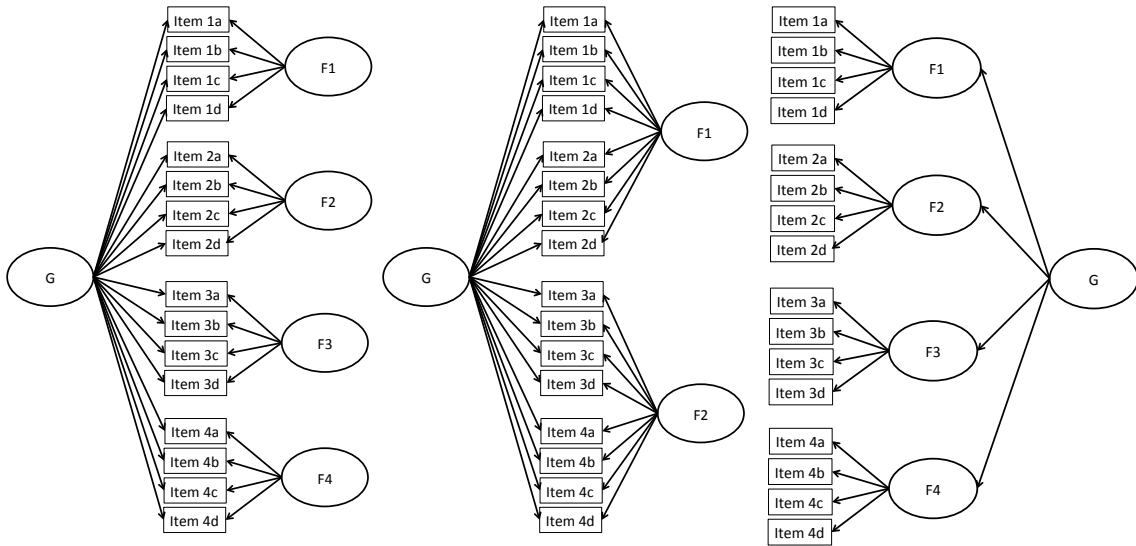


Figure 3. Suggested alternate factor structures for the “Acquired Capability for Maladaptive Behaviors” scale.

**AIM 2:** Convergent, divergent, and incremental validity for the “Acquired Capability for Maladaptive Behaviors” scale will begin to be established by demonstrating that: 1) capability-enhancing events and capability-related beliefs for a specific risk behavior will show moderate positive correlations with self-reports of participation in that risky behavior in the past year and will show negligible associations with self-reports of participation in other risky behavior groups, and 2) capability-enhancing events and capability-related beliefs for a specific risk behavior will show incremental association with self-report of participation in that risky behavior in the past year over other common predictors of risk.

- **H5:** Acquired capability-enhancing events and acquired capability-related beliefs for disordered eating will show large positive associations with self-reports of disordered eating (i.e.,  $r_s > .50$ ), and will show lower, minimal associations with self-reports of problematic alcohol use (i.e.,  $r_s < .20$ ).<sup>3</sup>
- **H6:** Acquired capability-enhancing events and acquired capability-related beliefs for problematic alcohol use will show large positive associations with self-reports of problematic alcohol use (i.e.,  $r_s > .50$ ), and will show lower, minimal associations with self-reports of disordered eating (i.e.,  $r_s < .20$ ).<sup>3</sup>
- **H7:** Acquired capability-enhancing events and acquired capability-related beliefs for disordered eating will continue to show a positive association with self-reported disordered eating behavior, even when other common predictors of risk, such as sensation seeking and affective dysregulation, are controlled for.

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<sup>3</sup> Magnitudes of predicted associations were chosen based on established practices in the field (DeVellis, 2003; Nunnally, 1978).

- **H8:** Acquired capability-enhancing events and acquired capability-related beliefs for problematic alcohol use will continue to show a positive association with self-reported problematic alcohol use behavior, even when other common predictors of risk, such as sensation seeking and affective dysregulation, are controlled for.

## Study 1

### Method

**Participants.** “Experts” were recruited to provide ratings on items related to the constructs of acquired capability in the areas of disordered eating and problematic alcohol use. Experts were defined as persons with a doctoral degree or equivalent education who had published peer-reviewed manuscripts in the fields of disordered eating and problematic alcohol use. Three tiers of experts to contact were defined, with tier 1 representing senior well-published content-expert researchers with extensive measurement development experience, tier 2 representing less senior but still well-published content-expert researchers with some measurement development experience, and tier 3 representing well-published content-expert researchers whose measurement development experience was unknown or minimal. The goal of this tiered procedure was to reach the more established researchers, with the recognition that these individuals are often quite busy and may not be willing to participate; in that event, the highest level of researcher who was willing was sought for participation. (See preliminary tiered list of experts in Table 1).

*Table 1.* Tiered List of experts contacted, with number of publications, citation index, and h-index per expert.

Tier	Disordered Eating	Problematic Alcohol Use
Tier 1	--- (235; 13972; 61)	--- (529; 19351, 73)
Senior, well-published content-expert	--- (235; 5412; 41)	--- (293; 9428; 8496)
researchers with extensive measurement	--- (190; 3890; 35)	--- (195; 6064; 44)
development experience	--- (160; 9515; 44)	--- (181; 5571; 40)
	--- (130; 7503; 39)	--- (176; 6326; 45)
	--- (128; 3781; 35)	--- (167; 4841; 36)
		--- (128; 2735; 29)
		--- (114; 3094; 31)

Table 1 (Continued)

Tier	Disordered Eating	Problematic Alcohol Use
Tier 2	--- (294; 10121; 57)	--- (83; 1618; 22)
Less senior but still well-published content-	--- (77; 9440; 39)	--- (77; 1911; 26)
expert researchers with some measurement	--- (26; 333; 12)	--- (77; 2881; 26)
development experience		--- (59; 875; 11)
		--- (46; 2507; 26)
Tier 3	--- (307; 6054; 45)	--- (153; 2095; 27)
Well-published content-expert researchers	--- (281; 10410; 57)	--- (127; 1647; 23)
whose measurement development	--- (233; 7499; 47)	--- (106; 2109; 26)
experience is unknown/	--- (116; 2329; 30)	--- (53; 1176; 19)
minimal	--- (101; 2697; 30)	

*Note:* Names redacted to protect confidentiality. Number of publications, citation index, and h-index are based on information contained in the Web of Knowledge database as of August 24, 2011.

As similar measurement development projects utilized between 6-10 experts (cf. Alvarez, 2007; Weersing, 2000), a total of 12 experts were recruited, with six experts from each content area. Participating experts were 60% female and 93.3% of non-Hispanic/Latino/a Caucasian descent; experts in disordered eating identified as 83.3% female and 100% of non-Hispanic/Latino/a Caucasian descent, whereas experts in problematic alcohol use identified as 50.0% female and 89.9% of non-Hispanic/Latino/a Caucasian descent. Of participating experts, 19.3% held medical degrees and 80.6% held doctorates of philosophy in psychology; approximately 35.7% of experts in disordered eating held medical degrees and 64.3% held PhDs in psychology, whereas 5.9% of experts in problematic alcohol use held medical degrees and 94.1% held PhDs in psychology. Participating experts had an average of 163.8 published articles at the time of their participation, with the six experts in disordered eating averaging 179.5 articles each and the six experts in problematic alcohol use averaging 150.8 articles each. Experts were either identified by the research team or were persons suggested by participating experts as qualified individuals in their field who may be willing to participate.<sup>4</sup>

**Materials.** Study 1 utilized a recruitment letter and instructions to experts, the expert rating survey, and a definitions sheet.

***Recruitment letter and instructions to experts.*** Experts received a personalized electronic letter requesting their participation. This letter explained that they were being

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<sup>4</sup> As no identifying information was collected from experts, there was no way to determine the percentage of experts recruited from each tier. It is known that at least one tier 1 expert from each domain of disordered eating and problematic alcohol use participated (i.e., responded within the two-week window before invitations were extended to tier 2 experts). However, it is possible that other tier 1 experts may have responded at a later date, after invitations to tier 2 and 3 experts had been extended. As such, it is impossible to speculate what percentage of participating experts were from each tier; however, all experts (regardless of tier) were extremely well qualified (see Table 1).

asked to participate in a measure development study due to their expertise in disordered eating or problematic alcohol use. They also received a brief summary of the study, including the rationale and an overview of the objectives of the entire dissertation. The letter included details of what was required to participate, how long participation would take, a link, and instructions that clicking on the link would lead them to further informed consent information. Lastly, the letter informed them that participation would result in entry for a cash raffle.

***Expert rating survey.*** An online survey was used to assess the ratings of the experts on proposed measure items (see Appendix A). The form assessed quantitatively how relevant each item was to the construct it was supposed to measure by asking the experts to rate each item on a 1 to 7 Likert scale, where higher numbers represented higher levels of relevance (See Figure 4). A qualitative feedback section was also included at the end of the survey where experts could write in additional items for areas they felt had not been adequately covered by the existing items. Experts were also asked to rate each item for clarity on a 1 to 7 Likert scale, where higher numbers represented higher levels of clarity. For items rated lower than 4, experts were asked if they could think of ways to clarify the item. A total of 63 items were rated (30 regarding disordered eating and 33 regarding problematic alcohol use). Lastly, experts provided demographic information, such as gender, degree, and race/ethnicity.

***Definition sheet.*** A page containing definitions of the constructs of interest (e.g., acquired capability, capability-enhancing events, and capability-related beliefs; see Appendix B) was made available for experts to use as a reference at any time during the survey. These definitions were based on prominent research from the fields with which



the constructs are most strongly associated (acquired capability and self-harm, such as Joiner, 2005; Selby et al., 2010; or Van Orden et al., 2008), modified to fit each domain of risk behavior (e.g., disordered eating and problematic alcohol use). This definitions page was the initial page reviewed by the experts upon providing informed consent and was also available at any time by clicking a link that opened a popup window, thereby not affecting survey completion (see Figure 4).

**Procedure.** In order to create items appropriate for the scales to be developed, a thorough literature search using relevant electronic databases (i.e., PsycInfo, ERIC, MedLine, Google Scholar, etc.) was conducted on risk factors for disordered eating and problematic alcohol use, as well as on acquired capability as it relates to disordered eating and problematic alcohol use (See Appendix C for sample keywords). From this literature search and examination of existing validated measures, items were developed for both the physiological (capability-enhancing events) and cognitive-affective (capability-related beliefs) components of acquired capability for each domain of risk (disordered eating and problematic alcohol use). All proposed items were thoroughly reviewed for specificity and construct-overlap. Any items that overlapped with the behaviors on outcome measures (i.e., self-report of disordered eating or problematic alcohol use) were removed from the list of items. Additionally, all items were screened for specificity to their construct of interest (i.e., acquired capability-enhancing events for disordered eating, acquired capability-related beliefs for disordered eating, acquired capability-enhancing events for problematic alcohol use, and acquired capability-related beliefs for problematic alcohol use). As such, it is proposed that all remaining items for a given risk behavior will have a “dose-response” relationship with that specific self-

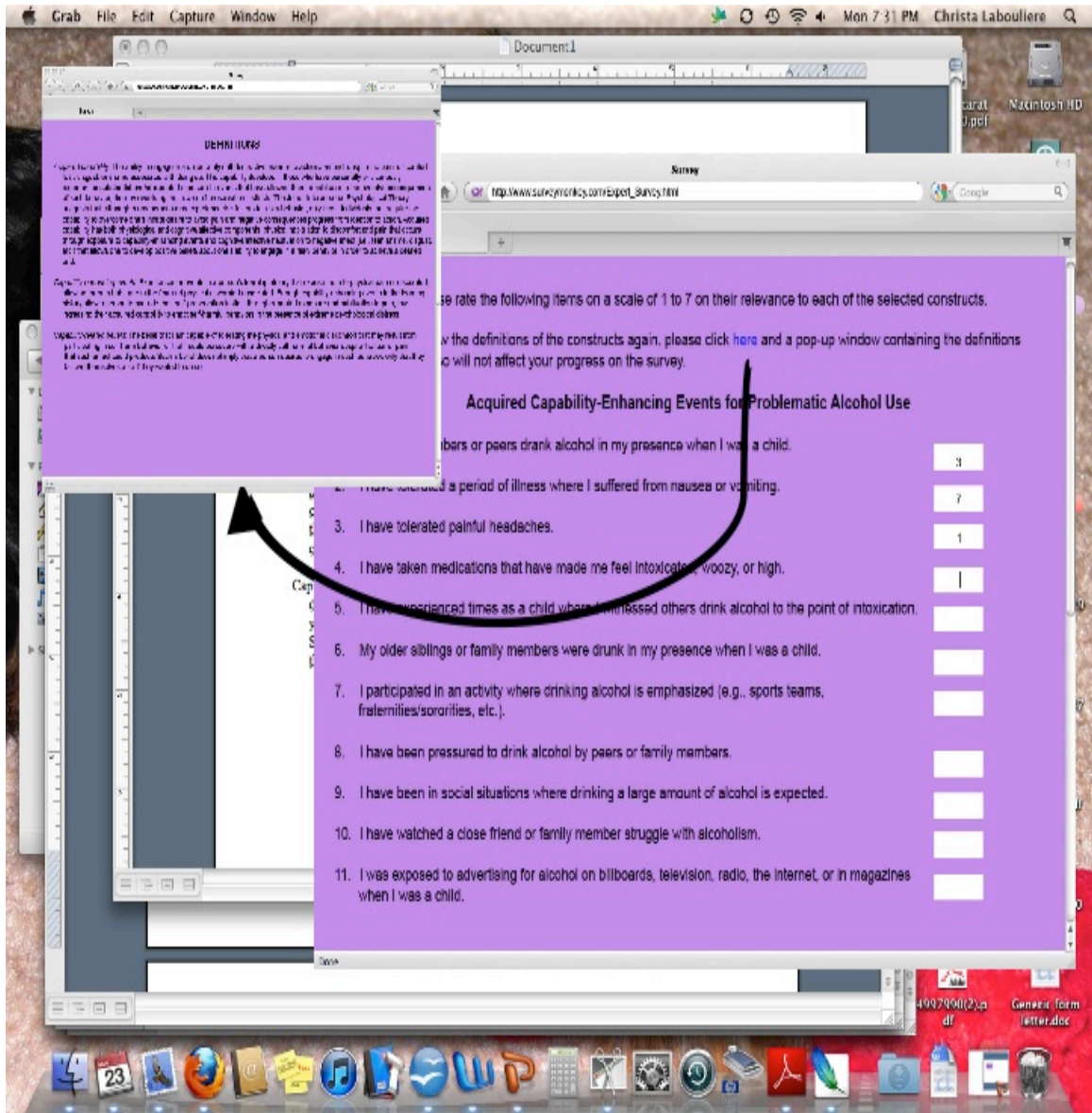


Figure 4. Online survey for experts to provide ratings of items on clarity and relevance to the construct of acquired capability, including capability-enhancing events and capability-related beliefs.

reported risk behavior. Lists of items for each construct for each domain of risk were compiled (see Appendix A), as was a page containing definitions of the constructs of interest for reference (see Appendix B).

Experts in both domains of risk were invited to the study via personalized email. All efforts were made to first approach experts who were more senior researchers with measurement development experience (i.e., tier 1 experts) in the hope of attracting the most erudite information. Invited first tier experts who did not complete the survey within two weeks received a reminder email; those who did not complete the survey within three weeks were assumed to be unwilling to participate. Experts from tiers 2 and 3 were contacted in a similar manner until the necessary  $n$  of six experts per content area was reached.

All experts invited to participate, regardless of tier, received a personalized email that introduced the study, explained the request for their participation, and provided a link to a draft version of the compiled items for their specific domain of risk (i.e., experts in disordered eating rated items on disordered eating and experts in problematic alcohol use rated items on problematic alcohol use, etc.), a demographics questionnaire, and informed consent information. Upon entering the survey, experts were brought to a page containing definitions of the constructs of interest. On each subsequent page of the survey, a link was available that created a popup window containing the definitions so that experts could review them at any time during their rating process (See Figure 4). Experts were next directed to a page bearing instructions that asked them to rate each item for relevance and clarity on a Likert scale of 1 to 7 (where higher scores imply higher levels of relevance and clarity). If an item was rated lower than 4 on relevance to

the construct, it was discarded. If an item was rated lower than 4 on clarity, experts were asked if there was a way to make the item clearer and the item was revised based on this feedback. At the end of the list, two open-ended questions (one for each construct of interest: capability-enhancing events and capability-related beliefs) allowed experts to provide additional items or areas they felt were not adequately covered by the existing items. Experts were not allowed to return to change any of their survey answers. The survey took less than fifteen minutes to complete. At the end of their participation, experts were debriefed, thanked, and entered into a raffle as a token of appreciation.

## **Results**

Upon receiving data from the experts, each of the 63 items was separately examined; descriptive statistics for each item and for the entire sample of experts are presented in Tables 2-6. Experts agreed that the vast majority of items were relevant to the constructs they were supposed to measure ( $M=5.03$ ,  $SD=1.77$ ) and that items were clear and easy to understand ( $M=6.42$ ,  $SD=1.17$ ). Overall, ratings of item relevance displayed a normal distribution (Skewness=-0.70, Kurtosis=-0.58), whereas ratings of clarity were negatively skewed and leptokurtotic (Skewness=-2.11, Kurtosis=3.86), implying a ceiling effect wherein most experts rated most items very highly. Experts consistently rated acquired capability-related beliefs items as more relevant ( $F(1,374)=58.35$ ,  $p < .001$ ) and more clear ( $F(1,327)=10.01$ ,  $p < .01$ ) than acquired capability-enhancing events items; there were no significant differences in ratings of item relevance ( $F(1,374)=0.90$ ,  $p = .34$ ) or clarity ( $F(1,327)=0.30$ ,  $p = .58$ ) across domains of risk.

Table 2

*Descriptive statistics for the relevance and clarity of the final wording of items for the Acquired Capability-Enhancing Events for Disordered Eating scale as rated by content experts.*

Item		Mean (SD)	Max / Min
1. I have experienced a period of illness where I suffered from severe gastrointestinal distress (i.e., extended nausea, vomiting, lack of appetite, diarrhea, etc.).	Relevance	5.17 (2.23)	2.00 / 7.00
	Clarity	6.00 (1.10)	5.00 / 7.00
2. I have taken medications that have made me feel nauseated or reduced my appetite (for purposes other than losing weight).	Relevance	5.33 (2.07)	2.00 / 7.00
	Clarity	6.33 (1.21)	4.00 / 7.00
3. I have experienced times where I was ridiculed for my appearance, weight, or shape.	Relevance	5.17 (2.14)	2.00 / 7.00
	Clarity	6.83 (0.41)	6.00 / 7.00
4. I have participated in an activity where a certain weight, shape, or appearance is emphasized (i.e., dance, gymnastics, figure skating, body building, cheerleading, wrestling, etc.).	Relevance	4.67 (2.34)	2.00 / 7.00
	Clarity	7.00 (0.00)	7.00 / 7.00

Table 2 (Continued)

Item		Mean (SD)	Max / Min
5. I have been put on a diet or had a diet strongly suggested to me by others for weight loss purposes.	Relevance	5.17 (1.94)	2.00 / 7.00
	Clarity	6.17 (1.33)	4.00 / 7.00
6. I was overweight as a child.*	Relevance	3.50 (2.81)	1.00 / 7.00
	Clarity	6.83 (0.41)	6.00 / 7.00
7. Important people in my life were often on a diet or struggling to alter their weight or shape.	Relevance	4.00 (2.68)	1.00 / 7.00
	Clarity	6.50 (0.84)	5.00 / 7.00
8. I have experienced times of poverty or neglect where I did not have enough to eat.	Relevance	4.83 (1.60)	3.00 / 7.00
	Clarity	6.50 (0.84)	5.00 / 7.00
9. Important people in my life encouraged me to eat less in order to change or control my appearance, weight, and/or shape.	Relevance	5.17 (2.32)	1.00 / 7.00
	Clarity	6.00 (1.27)	4.00 / 7.00
10. I grew up in a family who was not preoccupied with food, weight, shape, and/or dieting.	Relevance	3.83 (1.94)	1.00 / 6.00
	Clarity	5.33 (1.97)	2.00 / 7.00

Table 2 (Continued)

Item		Mean (SD)	Max / Min
11. I have watched a close friend or family member struggle with eating disordered behavior (i.e., self-induced vomiting, restrictive eating, etc.).	Relevance	5.00 (1.90)	2.00 / 7.00
	Clarity	6.50 (0.84)	5.00 / 7.00
12. Growing up, I felt uncomfortable because there was such a strong focus in my family or peer group on looking a certain way.	Relevance	3.83 (2.14)	1.00 / 7.00
	Clarity	5.33 (1.86)	3.00 / 7.00
13. My family or peer group often discusses or tries different dieting trends or fads (i.e., not eating carbs, eating only certain foods, counting calories, etc.).	Relevance	4.60 (1.67)	2.00 / 6.00
	Clarity	5.20 (1.79)	3.00 / 7.00
14. The home in which I grew up had many fashion and beauty magazines in it.	Relevance	4.00 (2.19)	1.00 / 7.00
	Clarity	5.33 (1.97)	3.00 / 7.00
15. When I was younger, I frequently played with dolls or action figures that had idealized body types (i.e., Barbie, G.I. Joe, etc.).	Relevance	4.33 (2.66)	1.00 / 7.00
	Clarity	6.17 (1.60)	3.00 / 7.00

*Note:* N=6. \*Denotes items dropped due to relevance scores lower than 4.00 that did not have suggestions on how to improve the item.

Table 3

*Descriptive statistics for the relevance and clarity of the final wording of items for the Acquired Capability-Related Beliefs for Disordered Eating scale as rated by content experts.*

Item		Mean (SD)	Max / Min
1. I do not need to eat as much as other people.	Relevance	5.00 (2.00)	2.00 / 7.00
	Clarity	6.50 (1.22)	4.00 / 7.00
2. I can go longer without food than most people and not feel hungry.	Relevance	5.33 (1.86)	2.00 / 7.00
	Clarity	6.67 (0.82)	5.00 / 7.00
3. I can eat a lot more than other people and not feel full.	Relevance	5.67 (1.97)	2.00 / 7.00
	Clarity	6.80 (0.45)	6.00 / 7.00
4. I am disgusted by vomiting.	Relevance	6.33 (1.03)	5.00 / 7.00
	Clarity	6.17 (2.04)	2.00 / 7.00
5. I can keep exercising, even if I am in substantial pain or injured.	Relevance	6.17 (1.33)	4.00 / 7.00
	Clarity	6.33 (1.63)	3.00 / 7.00



Table 3 (Continued)

Item		Mean (SD)	Max / Min
6. I can exercise for longer than most people.	Relevance	4.67 (2.58)	2.00 / 7.00
	Clarity	6.17 (2.04)	2.00 / 7.00
7. I have difficulty telling if I'm hungry or full.	Relevance	5.17 (2.86)	1.00 / 7.00
	Clarity	7.00 (0.00)	7.00 / 7.00
8. I need to eat at least three times throughout the day.	Relevance	4.33 (2.50)	1.00 / 7.00
	Clarity	6.50 (0.84)	5.00 / 7.00
9. I could make myself vomit if I wanted to. (Even if you have never wanted to make yourself vomit, please answer this question.)	Relevance	6.17 (2.04)	2.00 / 7.00
	Clarity	7.00 (0.00)	7.00 / 7.00
10. I could go long periods of time without eating if I wanted to. (Even if you have never wanted to restrict your food intake, please answer this question.)	Relevance	6.67 (0.52)	6.00 / 7.00
	Clarity	6.83 (0.41)	6.00 / 7.00
11. I can keep dieting even if I feel hungry.	Relevance	6.83 (0.41)	6.00 / 7.00
	Clarity	6.83 (0.41)	6.00 / 7.00

Table 3 (Continued)

Item		Mean (SD)	Max / Min
12. I do not mind having an empty stomach or feeling hungry.	Relevance	6.83 (0.41)	6.00 / 7.00
	Clarity	7.00 (0.00)	7.00 / 7.00
13. I like the ache in my muscles after I exercise strenuously.	Relevance	5.83 (1.33)	4.00 / 7.00
	Clarity	6.67 (0.82)	5.00 / 7.00
14. For inspiration, I like to look at pictures of models or athletes who are leaner or in better shape than me.	Relevance	5.00 (2.55)	1.00 / 7.00
	Clarity	6.00 (1.55)	3.00 / 7.00
15. I am more controlled about my diet and exercise than most people.	Relevance	4.83 (2.40)	1.00 / 7.00
	Clarity	6.83 (0.41)	6.00 / 7.00

*Note:* N=6.

Table 4

*Descriptive statistics for the relevance and clarity of the final wording of items for the Acquired Capability-Enhancing Events for Problematic Alcohol Use scale as rated by content experts.*

Item		Mean (SD)	Max / Min
1. My family members or peers drank alcohol in my presence when I was a child.*	Relevance <sup>a</sup>	3.20 (1.10)	2.00 / 5.00
	Clarity <sup>a</sup>	5.80 (1.79)	3.00 / 7.00
2. I have experienced a period of illness where I suffered from nausea or vomiting.	Relevance	3.83 (1.47)	2.00 / 5.00
	Clarity <sup>b</sup>	5.50 (2.38)	2.00 / 7.00
3. I have experienced painful headaches.	Relevance	3.50 (1.22)	2.00 / 5.00
	Clarity <sup>b</sup>	5.75 (2.50)	2.00 / 7.00
4. I have been prescribed and taken medications that have made me feel intoxicated, woozy, or high.	Relevance	4.83 (1.60)	2.00 / 6.00
	Clarity <sup>b</sup>	5.75 (2.50)	2.00 / 7.00
5. I have experienced times as a child where I witnessed others drink alcohol to the point of intoxication.	Relevance	4.33 (1.21)	3.00 / 6.00
	Clarity <sup>b</sup>	6.75 (0.50)	6.00 / 7.00

Table 4 (Continued)

Item		Mean (SD)	Max / Min
6. My older siblings or other family members were drunk in my presence when I was a child.	Relevance	4.33 (1.21)	3.00 / 6.00
	Clarity <sup>c</sup>	6.67 (0.58)	6.00 / 7.00
7. My family members allowed me to drink alcohol before I was of legal age.	Relevance	4.67 (2.16)	2.00 / 7.00
	Clarity <sup>b</sup>	7.00 (0.00)	7.00 / 7.00
8. I participated in an activity where drinking alcohol is emphasized (e.g., sports teams, fraternities/sororities, etc.).	Relevance	5.00 (1.27)	3.00 / 7.00
	Clarity <sup>b</sup>	6.50 (1.00)	5.00 / 7.00
9. I have been pressured to drink alcohol by peers or family members.	Relevance	4.50 (1.05)	3.00 / 6.00
	Clarity <sup>b</sup>	6.75 (0.50)	6.00 / 7.00
10. I have been in social situations where drinking a large amount of alcohol is expected.	Relevance	5.00 (0.63)	4.00 / 6.00
	Clarity <sup>b</sup>	6.25 (0.96)	5.00 / 7.00
11. I drank alcohol (more than just a sip) before the age of 15.	Relevance	4.17 (1.33)	3.00 / 6.00
	Clarity <sup>b</sup>	6.25 (1.50)	4.00 / 7.00

Table 4 (Continued)

Item		Mean (SD)	Max / Min
12. I have had a close friend or family member with alcoholism.	Relevance	3.33 (1.86)	1.00 / 6.00
	Clarity <sup>b</sup>	6.75 (0.50)	6.00 / 7.00
13. I was exposed to advertising for alcohol on billboards, television, radio, the internet, or in magazines when I was a child.	Relevance	3.17 (1.17)	2.00 / 5.00
	Clarity <sup>b</sup>	6.25 (1.50)	4.00 / 7.00
14. Underage drinking was common where I grew up.	Relevance	4.00 (1.55)	2.00 / 6.00
	Clarity <sup>b</sup>	6.25 (1.50)	4.00 / 7.00
15. Adults did not do much to deter underage drinking in my community when I was younger.*	Relevance	3.67 (1.21)	3.00 / 6.00
	Clarity <sup>b</sup>	6.00 (2.00)	3.00 / 7.00

*Note:*  $N=6$ , except as otherwise specified: <sup>a</sup> $N=5$ ; <sup>b</sup> $N=4$ ; <sup>c</sup> $N=3$ . \*Denotes items dropped due to relevance scores lower than 4.00 that did not have suggestions on how to improve the item.

Table 5

*Descriptive statistics for the relevance and clarity of the final wording of items for the Acquired Capability-Related Beliefs for Problematic Alcohol Use scale as rated by content experts.*

Item		Mean (SD)	Max / Min
1. I enjoy drinking alcohol, regardless of the consequences.	Relevance	6.17 (0.98)	5.00 / 7.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
2. After a night of drinking, I experience hangovers less often or less intensely than most people.	Relevance	6.17 (0.41)	6.00 / 7.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
3. After a night of drinking, I am less likely to feel sick than other people.	Relevance	6.00 (0.63)	5.00 / 7.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
4. I feel nauseous or get headaches if I drink too much.	Relevance	6.00 (0.89)	5.00 / 7.00
	Clarity <sup>a</sup>	6.20 (1.10)	5.00 / 7.00
5. I can drink more than most people without getting drunk.	Relevance	6.00 (0.63)	5.00 / 7.00
	Clarity <sup>a</sup>	6.80 (0.45)	6.00 / 7.00

Table 5 (Continued)

Item		Mean (SD)	Max / Min
6. Alcohol does not affect me as strongly as other people.	Relevance	5.83 (0.75)	5.00 / 7.00
	Clarity <sup>a</sup>	6.40 (0.89)	5.00 / 7.00
7. I can still do what I need to do the day after a night of heavy drinking.	Relevance	6.17 (0.98)	5.00 / 7.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
8. I like feeling “tipsy” or slightly drunk.	Relevance	4.67 (1.37)	2.00 / 6.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
9. I feel out of control when I drink.	Relevance	4.67 (1.37)	2.00 / 6.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
10. I am uncomfortable/afraid to get drunk in public or with people I don't know well.	Relevance	5.50 (0.55)	5.00 / 6.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
11. I am disgusted by vomiting.	Relevance	4.67 (1.37)	2.00 / 6.00
	Clarity <sup>a</sup>	6.80 (0.45)	6.00 / 7.00

Table 5 (Continued)

Item		Mean (SD)	Max / Min
12. I cannot function after a night of heavy drinking.	Relevance	5.67 (1.86)	2.00 / 7.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
13. I can drink more than most people without getting drunk.	Relevance	5.83 (0.41)	5.00 / 6.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
14. Being around drunk people does not bother me.	Relevance	5.33 (0.82)	4.00 / 6.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
15. I have a higher tolerance for alcohol than most people.	Relevance	6.00 (0.63)	5.00 / 7.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
16. I have difficulty telling if I'm drunk or not.	Relevance	5.33 (0.82)	4.00 / 6.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00
17. I am not afraid of the consequences of drinking too much.	Relevance	6.63 (0.82)	5.00 / 7.00
	Clarity <sup>a</sup>	6.60 (0.89)	5.00 / 7.00



Table 5 (Continued)

Item		Mean (SD)	Max / Min
18. I am less ashamed of my behavior while drunk than most people.	Relevance	5.00 (0.89)	4.00 / 6.00
	Clarity <sup>a</sup>	6.40 (1.34)	4.00 / 7.00

*Note:*  $N=6$ , except as otherwise specified: <sup>a</sup> $N=5$ ; <sup>b</sup> $N=4$ ; <sup>c</sup> $N=3$ .

Table 6

*Descriptive statistics for the relevance and clarity of all items, and the relevance and clarity of items by risk behavior domain, construct, and subscale for the Acquired Capability for Maladaptive Behaviors measure as rated by content experts.*

Scale		Mean (SD)	Max / Min	Skewness (SE)	Kurtosis (SE)
Total	Relevance	5.03 (1.77)	1.00 / 7.00	-0.70 (0.13)	-0.58 (0.25)
	Clarity	6.42 (1.17)	2.00 / 7.00	-2.12 (0.14)	3.86 (0.27)
Disordered Eating (across construct; 30 items)	Relevance	5.12 (2.08)	1.00 / 7.00	-0.73 (0.18)	-0.90 (0.36)
	Clarity	6.38 (1.21)	2.00 / 7.00	-2.04 (0.18)	3.30 (0.36)
ACEE-DE (15 items)	Relevance	4.57 (2.11)	1.00 / 7.00	-0.35 (0.26)	-1.28 (0.51)
	Clarity	6.15 (1.32)	2.00 / 7.00	-1.40 (0.26)	0.84 (0.51)
ACRB-DE (15 items)	Relevance	5.66 (1.91)	1.00 / 7.00	-1.25 (0.26)	0.25 (0.51)
	Clarity	6.62 (1.05)	2.00 / 7.00	-3.21 (0.26)	10.13 (0.51)

Table 6 (Continued)

Scale		Mean (SD)	Max / Min	Skewness (SE)	Kurtosis (SE)
Problematic Alcohol Use (across construct; 33 items)	Relevance	4.94 (1.44)	1.00 / 7.00	-0.69 (0.17)	-0.32 (0.35)
	Clarity	6.45 (1.11)	2.00 / 7.00	-2.23 (0.20)	4.82 (0.39)
ACEE-ALC (15 items)	Relevance	4.11 (1.41)	1.00 / 7.00	-0.08 (0.26)	-0.99 (0.51)
	Clarity	6.27 (1.43)	2.00 / 7.00	-1.98 (0.31)	2.86 (0.61)
ACRB-ALC (18 items)	Relevance	5.63 (1.05)	2.00 / 7.00	-1.40 (0.23)	3.44 (0.46)
	Clarity	6.58 (0.82)	4.00 / 7.00	-1.57 (0.25)	0.76 (0.50)
Acquired Capability-Enhancing Events (across risk behavior domains; 30 items)	Relevance	4.34 (1.80)	1.00 / 7.00	-0.14 (0.18)	-1.07 (0.36)
	Clarity	6.20 (1.36)	2.00 / 7.00	-1.64 (0.20)	1.62 (0.40)
Acquired Capability-Related Beliefs (across risk behavior domains; 33 items)	Relevance	5.65 (1.49)	1.00 / 7.00	-1.40 (0.17)	1.59 (0.35)
	Clarity	6.60 (0.94)	2.00 / 7.00	-2.69 (0.18)	7.76 (0.36)

Note:  $N=12$ ;  $n_{ALC}=6$ ;  $n_{DE}=6$ . ACEE-DE=Acquired Capability-Enhancing Events for Disordered Eating items; ACRB-DE=Acquired Capability-Related Beliefs for Disordered Eating items; ACEE-ALC=Acquired Capability-Enhancing Events for Problem Alcohol Use items; ACRB-ALC=Acquired Capability-Related Beliefs for Problematic Alcohol Use items.

Table 7

*New items for the Acquired Capability for Risky Behaviors survey as suggested by content experts.*

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Items
<i>Acquired Capability-Enhancing Events for Disordered Eating</i>
<ul style="list-style-type: none"><li>• I engaged in sports where I had to strenuously exercise for hours at a time or push myself to the limits and keep going despite my pain and muscle fatigue.</li><li>• When I was sick as a child, I fought my body and tried not to vomit even though I knew I would feel better once I did. <i>(reverse-scored)</i></li><li>• During childhood, there were periods in which I fasted by eating little or nothing at all for a religious or illness-related reason.</li><li>• During childhood, I was told to "wait to eat" when I asked for food even when I was very hungry.</li><li>• When I was growing up, my family frequently ate meals together. <i>(reverse-scored)</i></li><li>• Others have pushed me to eat when I wasn't hungry.</li></ul>
<i>Acquired Capability-Related Beliefs for Disordered Eating</i>
<ul style="list-style-type: none"><li>• No suggestions made</li></ul>
<i>Acquired Capability-Enhancing Events for Problematic Alcohol Use</i>
<ul style="list-style-type: none"><li>• No suggestions made</li></ul>

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Table 7 (Continued)

Items
<i>Acquired Capability-Related Beliefs for Problematic Alcohol Use</i>
<ul style="list-style-type: none"> <li>• Blackouts or memory lapses after drinking do not bother me.</li> <li>• I am concerned about conflicts I have with friends or family members over things I said or did while drunk.</li> <li>• I dislike feeling “fuzzy in the head” the day after heavy drinking.</li> </ul>

Table 8

*Total number of items retained, dropped, modified, and added by domain for the Acquired Capability for Risky Behaviors survey as suggested by content experts.*

	ALC-ACEE	ALC-ACRB	DE-ACEE	DE-ACRB	Total
Retained	13	19	14	15	60
Dropped	2	0	1	0	3
Modified	3	3	6	4	16
Added	0	3	6	0	9
Final #	13	20	20	15	68

*Note:* ACEE-DE=Acquired Capability-Enhancing Events for Disordered Eating items; ACRB-DE=Acquired Capability-Related Beliefs for Disordered Eating items; ACEE-ALC=Acquired Capability-Enhancing Events for Problem Alcohol Use items; ACRB-ALC=Acquired Capability-Related Beliefs for Problematic Alcohol Use.

## **Discussion**

Sixty-three items were rated by content experts to determine their relevance and clarity (15 for Acquired Capability-Enhancing Events for Disordered Eating, 15 for Acquired Capability-Related Beliefs for Disordered Eating, 15 for Acquired Capability-Enhancing Events for Problematic Alcohol Use, and 18 for Acquired Capability-Related Beliefs for Problematic Alcohol use). If an item was rated higher than 4 on relevance, the item was retained; alternatively, if the item was not rated higher than 4 on relevance, the item was either modified based on expert suggestions or dropped due to lack of specificity. Based on expert suggestion, sixty out of sixty-three items were retained and three items were dropped. Dropped items tended to be those items identified by experts as items that would apply to too wide a segment of the population, therefore reducing specificity. Sixteen items were modified based on expert suggestions, mostly to include slight changes in word choice or to add examples. No items were rated lower than 4 on clarity. Based on consensus of expert suggestions of areas not adequately covered, nine new items were added; these items are presented in Table 7. The total number of items retained, dropped, modified, and added by domain is presented in Table 8. The final sixty-eight items were used to construct the new “Acquired Capability for Maladaptive Behaviors” measure (see Appendix D).

Interestingly, experts rated cognitions and beliefs related to capability to engage in a problematic behavior as more relevant than events in the learning history that may predispose a person to a problematic behavior. One possibility may be that experts, predominantly trained in cognitive models of behavior, may be able to recognize the more proximal links from relevance cognitions and beliefs to subsequent behavior.

Conversely, early events that may function as prodromal or practice forms of the problematic behavior or serve as modeling experiences for the behavior may be seen as more distal and therefore less relevant. While these earlier life events are experienced by a larger segment of the population and therefore may be less specific predictors than the more proximal cognitions and beliefs that develop out of these experiences, whether prior life events lead to a "practice effect" for subsequent engagement in problematic behaviors remains an empirical question. Research on risk factors has consistently shown that these early life events may represent predisposing factors that are only activated in the face of more proximal, precipitating factors (Ellis et al., 1997; Fairburn et al., 1998; Killen et al.; 1996; Marchi & Cohen, 1990; Striegel-Moore, 2006); this line of research suggests that early life events may provide learning that affects later behavioral choices. Similarly, research in epigenetics has suggested that early life events may activate underlying genetic vulnerabilities, leading to increased propensity to engage in certain problematic behaviors later in life (Campbell, Mill, Uher, & Schmidt, 2011; Helder & Collier, 2011; Ponomarev, Wang, Zhang, Harris, & Mayfield, 2012; Shukla, Velazquez, French, Lu, Ticku, & Zakhari, 2008). This line of reasoning is entirely in concert with Joiner's theory that acquired capability for a behavior develops independently of the desire to engage in that particular behavior, but rather develops across the life span as a result of exposure to certain types of life events.

Of note, experts seemed particularly critical of the relevance of modeled and vicarious exposure to one's subsequent capability to engage in problematic behaviors. This may be because many more people are vicariously exposed to disordered eating and problematic alcohol behaviors than actually subsequently develop these behaviors.

However, just as actually-experienced events can be thought of as non-specific risk factors, vicariously-experienced or modeled behavior may provide a similar level of distal risk. The work of Bandura and countless others have repeatedly and consistently show the importance of modeling to youth's development of what is appropriate and inappropriate behavior (Bandura, 1977; 2006; Campbell & Oei, 2010; Fischer, Settles, Collins, Gunn, & Smith, 2012). Furthermore, recent contributions on the role of mirror neurons in behavioral learning have further demonstrated the critical connection between modeled behavior and subsequent behavior choices (Iacoboni, 2009; Rizzolatti & Craighero, 2004). As such, it is possible that the expert pool, composed of predominantly clinical psychologists and psychiatrists, may have emphasized the relevance of proximal factors that are more amenable to treatment, such as cognitions and beliefs, over the relevance of more distal factors, such as learning experiences in the past, that cannot be changed.

Regardless of the relative emphasis between beliefs and events, experts rated the majority of items across domains as both relevant and clear, and several used the open comment spaces to express their interest in the theory of acquired capability and its subsequent application to a measure for capability relating to problematic alcohol use and disordered eating behavior. As such, expert consensus concluded that the “Acquired Capability for Maladaptive Behaviors” measure was ready to move to the next stage of development.



## Study 2

### Method

**Participants.** The sample included 700 female undergraduate college students, recruited from the University of South Florida psychology research pool. This sample size was determined as it is adequate to meet the power requirements ( $>.80$ ) for measure development, including exploratory and confirmatory factor analysis (DeVellis, 2003; Hancock & Mueller, 2006; Nunnally, 1978), the statistics in this study that require the largest sample size.<sup>5</sup> (This sample size is also more than sufficient to conduct any other necessary analyses, such as descriptive statistics and correlations/regressions for reliability/validity testing.) Only female participants were recruited in order to better evaluate factorial stability, as factor structure and prevalence of risky behavior participation is likely to differ by gender (Brady & Randall, 1999; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002).<sup>6</sup>

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<sup>5</sup> Although methodologists disagree as to how many participants are necessary to conduct a factor analysis, there are some agreed-upon rules as to what is most accepted. The “Rule of 10” suggests that there should be at least 10 participants or cases for each item in the instruments being analyzed. As there were 68 items to be analyzed, an adequate sample size would therefore be 680 participants. This sample size also satisfies other common rules, such as having a “Subject to Variable (STV) ratio” greater than five (Bryant & Yarnold, 1995), having greater than 200 participants (the “Rule of 200,” Gorsuch, 1983), or having greater than 51 more cases than variables to support chi-square testing (the “Significance Rule,” Lawley & Maxwell, 1971). A sample size of 700 was selected as it was unknown at the time of proposal exactly how many items would be retained based on the results of data from the expert panel, but it was anticipated that 60-70 items would be retained.

<sup>6</sup> The decision to limit the sample to only female students was made as it would be difficult to recruit a large enough sample of males to test gender differences in factor structure with adequate power. However, it is clearly recognized that future research should pursue whether the factor structure of the scale will generalize to other samples.

All participants were recruited through Sona, an online recruiting and data collection program, and received course credit in psychology courses in exchange for their participation. In order to participate, individuals had to be 18 years of age or older, female, registered as either a part-time or full-time USF undergraduate student, and capable of reading and speaking English; no other exclusionary criteria were applied. Participants ranged in age from 18 to 57, with a mean age of 22 ( $SD = 5.24$ ). The sample was relatively evenly distributed across the years of college, with 15.9% freshmen, 15.6% sophomores, 32.2% juniors, 27.5% seniors, and 8.9% taking more than four years to graduate. Approximately 79% of the sample identified as being of non-Hispanic descent; 61.8% of the sample was Caucasian, 16.0% was Black or African-American, 7.1% was Asian, and the remainder identified as another racial group (8.0%) or as multiracial (6.7%).

**Measures.** Six measures were administered to participants, including a demographics measure, the newly-developed “Acquired Capability for Maladaptive Behaviors” scale, and four other scales administered for the purpose of convergent, divergent, and incremental validity testing.

**Demographics.** Information was gathered regarding the participants’ age, racial/ethnic identification, and year in school.

**Newly-developed scale.** The newly-developed “Acquired Capability for Maladaptive Behaviors” (ACMB) scale is a 68-item self-report questionnaire designed to assess both physiological and cognitive/affective components of acquired capability for engaging in disordered eating and problematic alcohol use (See Appendix D). The scale takes approximately 10 minutes to complete.

For the purposes of preliminary scale development and data analyses, two subscales of *Acquired Capability-Enhancing Events* were computed, one for each risk group. The “acquired capability-enhancing events for engaging in disordered eating” (ACEE-DE) and the “acquired capability-enhancing events for engaging in problematic alcohol use” (ACEE-Alc) subscales contained 20 and 13 items, respectively. Item responses on these subscales utilized a 7-point Likert scale, ranging from 1 (Never experienced this event) to 7 (Experienced this event very frequently). Likewise, two subscales of *Acquired Capability-Related Beliefs* were also computed, one for each risk group. The “acquired capability-related beliefs for engaging in disordered eating” (ACRB-DE) and the “acquired capability-related beliefs for engaging in problematic alcohol use” (ACRB-Alc) subscales contained 15 and 20 items, respectively. Item responses on these subscales utilized a 7-point Likert scale, ranging from 1 (Not at all like me) to 7 (Very much like me).

All items were identified by experts in Study 1 as sufficiently clear and relevant to display adequate content validity for measuring either events in the learning history that enhance one’s acquired capability to engage in disordered eating or problematic alcohol use or beliefs about the self relating to one’s acquired capability to engage in disordered eating or problematic alcohol use. As the purpose of this study was to establish reliability and validity of this new measure, these statistics and factorial structure will be discussed subsequently in the results subsection.

***Scales administered for convergent, divergent, and incremental validity testing.***

Four additional measures were used to assess the convergent, divergent, and incremental validity of the newly-developed scale.

The *Difficulties in Emotion Regulation Scale* (DERS; Gratz & Roemer, 2004) is a 41-item self-report questionnaire designed to assess clinically-relevant difficulties in emotion regulation. The scale takes approximately 5-10 minutes to complete, and uses a 5-point Likert scale, with response choices ranging from “almost never” (1) to “almost always” (5). Factor analysis suggests six distinct but related facets of emotional regulation in which difficulties may present: 1) nonacceptance of emotional responses, 2) difficulties engaging in goal-directed behavior, 3) impulse control difficulties, 4) lack of emotional awareness, 5) limited access to emotion regulation strategies, and 6) lack of emotional clarity; however, as the purpose of this study was to test associations with global affective dysregulation, only the most-commonly used total score was utilized (Gratz & Roemer, 2004). The DERS demonstrates good psychometrics, with sufficient reliability estimates overall and for subscales (reported Cronbach’s alpha ranging from .78 to .94 and Cronbach’s alpha in this sample of .96; see Table 9 in the preliminary analyses portion of the results section), and evidence of good divergent and concurrent validity in both clinical and community samples (Gratz & Roemer, 2004).

The *UPPS Impulsivity Scale* (Whiteside & Lynam, 2001) is a 59-item self-report questionnaire designed via a factor-analytic method including well-validated impulsivity scales. The scale takes approximately 10 minutes to complete, and uses a 4-point Likert scale, with response choices ranging from “agree strongly” (1) to “disagree strongly” (4). Factor analysis suggests five distinct but related facets of impulsivity: 1) negative urgency, 2) positive urgency, 3) lack of premeditation, 4) lack of perseverance, and 5) sensation-seeking; however, as the purpose of this study was to test associations with sensation-seeking, only the score from that subscale was utilized (Whiteside & Lynam,

2001). The UPPS demonstrates good psychometrics, with sufficient reliability estimates overall and for subscales (reported Cronbach's alpha of .85 and Cronbach's alpha in this sample of .87; see Table 9 in the preliminary analyses portion of the results section), and evidence of good divergent and concurrent validity in both clinical and community samples (Whiteside & Lynam, 2001; Whiteside, Lynam, Miller, & Reynolds, 2005).

The *Eating Disorders Examination Questionnaire* (EDE-Q; Fairburn & Beglin, 1994) is a 41-item self-report questionnaire designed to assess the psychopathology associated with disordered eating. The scale takes approximately 5-10 minutes to complete, and each item is scored 0-6, where a higher number reflects a higher frequency of disordered eating behaviors and concerns. The measure retains the format of the Eating Disorder Examination Interview on which it was based, and assesses four subscales over the past 28 days, including: 1) restraint, 2) eating concern, 3) shape concern, and 4) weight concern; however, for the purpose of this study, only the most-commonly used global score will be utilized, wherein a score of 4.0 or more suggests clinically significant disordered eating (Carter, Stewart, & Fairburn, 2001; Luce, Crowther, & Pole, 2008). The EDE-Q demonstrates good psychometrics, with sufficient reliability estimates for subscales (reported Cronbach's alpha ranging from .68 to .89 and Cronbach's alpha in this sample of .94; see Table 9 in the preliminary analyses portion of the results section), and evidence of good divergent and concurrent validity in both clinical and community samples (Black & Wilson, 1996; Carter, Aime, & Mills, 2001; Fairburn & Beglin, 1994; Grilo, Masheb, & Wilson, 2001; Kalarchian, Wilson, Brolin, & Bradley, 2000; Luce & Crowther, 1999; Passi, Bryson, & Lock, 2003; Rizvi, Peterson, Crow, & Agras, 2000; Wilfley, Schwartz, Spurrell, & Fairburn, 1997).

The *Alcohol Use Disorders Identification Test* (AUDIT; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) is a 10-item self-report questionnaire designed to assess the domains of alcohol consumption, drinking behavior, and alcohol-related problems. The scale takes less than five minutes to complete, and each item is scored 0-4, based either on a frequency rating or bimodal (yes/no) response, where a higher number reflects a higher likelihood of problematic alcohol use. Factor analysis suggests four subscales, including: 1) alcohol consumption, 2) drinking behavior (dependence), 3) adverse psychological reactions to drinking, and 4) alcohol-related problems; however, for the purpose of this study, only the most-commonly used total score will be utilized, wherein a score of 11 or more suggests problematic drinking in a college population (Fleming, Barry, & McDonald, 1991). The AUDIT demonstrates good psychometrics, with sufficient reliability estimates for subscales (reported Cronbach's alpha ranging from .65 to .93 and Cronbach's alpha in this sample of .84; see Table 9 in the preliminary analyses portion of the results section), and evidence of good divergent and concurrent validity in both clinical and community samples both domestically and internationally (Allen, Litten, Fertig, & Babor, 1997; Reinert, 2002; Saunders et al., 1993).

**Procedure.** Participants were recruited through SONA, the online recruiting and data collection software for the University of South Florida (USF) research subject pool. The study was posted online and made available to all participants who met inclusionary criteria. After accessing the online survey, informed consent information was presented and informed consent was obtained electronically. Participants completed all measures in random order, taking approximately 30-45 minutes depending on the students' responses, and students were awarded one extra credit point for each hour of participation.

Participants were not able to return to earlier portions of the online survey to alter their responses. At the conclusion of the study, a debriefing page was presented with information regarding the purpose of the study and contact information for the principal investigator. Information about local mental health services was also provided, in the event that participants were interested in seeking services for themselves or others. All data was subsequently de-identified, assigned a random code, and stored on secure password-protected electronic servers.

## **Results**

**Preliminary analyses and descriptive statistics.** Seven hundred female undergraduates completed a battery of questionnaires assessing problematic alcohol use and disordered eating behavior in the past year, acquired capability for disordered eating and problematic alcohol use, affective dysregulation, and sensation seeking. Upon completion of data entry, subtest scores were calculated from the individual items of measures; missing data was minimal (>96% complete data rate across all measures), and was addressed using multiple imputation<sup>7</sup>. Descriptive statistics were run on all demographic variables and subtest scores to obtain means or frequencies, standard deviations, and ranges; coefficient alphas for all established subscales were also calculated to ascertain that the measures had adequate consistency in this sample. (Descriptive statistics for all established measures will be presented in the preliminary

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<sup>7</sup> Multiple imputation models are based on full datasets and use multiple iterations to determine the least biased value to impute in place of missing data. Multiple imputation models are considered less biased than single imputation methods, such as imputation of a mean or sum score, and are indicated for samples with more than a few hundred persons (Raudenbush & Bryk, 2002). The multiple imputation model used in this dataset was fully conditional specification using Markov Chain Monte Carlo method (MCMC) via standard linear regression, using SPSS v20.

analyses and descriptive statistics subsection, whereas descriptive and reliability statistics for the newly-developed "Acquired Capability for Maladaptive Behaviors" scale will be discussed under hypothesis testing, as they are the focus of this study.) All data were also screened for linearity, normality, and homoscedasticity (although the statistics selected for subsequent hypothesis testing analyses are robust enough at this sample size that normality and homoscedasticity are not critical assumptions; Bryant & Yarnold, 1995; Garson, 2007). Additionally, the distributions of variables were examined to determine the presence of floor or ceiling effects.<sup>8</sup> The results of these analyses are presented throughout the remainder of this section (see Table 9); scores predominantly demonstrated high internal consistency, were normally distributed, and showed minimal range restriction.

Descriptive statistics, internal consistency, and univariate normality parameters for the *DERS*, *UPPS*, *EDE-Q*, and *AUDIT* are presented in Table 9. All measures demonstrated high internal consistency. Scores for the *DERS*, *UPPS*, *EDE-Q*, and *AUDIT*

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<sup>8</sup> In order to be considered a floor effect, the distribution had to be positively skewed (toward zero), evidence some degree of range restriction at the higher end of the distribution, and have a mean lower than results found in other samples. In order to be considered a ceiling effect, the distribution had to be negatively skewed, evidence some degree of range restriction at the lower end of the distribution, and have a mean higher than results found in other samples. Although some subscales used in this study showed non-normality and range restriction, if they were not significantly different from validation norms, these distributions were not considered to have a floor or ceiling effect; this is an artifact of the reality that several of the variables measured are not normally distributed in the population and are therefore unlikely to utilize the entirety of the range available in the scale.



Table 9

*Descriptive statistics and statistical assumption information for the scales administered for convergent, divergent, and incremental validity testing.*

Subscales	Mean (SD)	Min / Max	Skewness	Kurtosis	$\alpha$
DERS: Total Affective Dysregulation	2.20 (0.67)	1.00 / 4.36	0.51	-0.19	.96
UPPS: Sensation-Seeking	2.68 (0.61)	1.00 / 4.00	-0.23	-0.22	.87
EDE-Q: Global Disordered Eating	1.58 (1.38)	0.00 / 5.80	0.82	-0.10	.94
AUDIT: Total Problematic Alcohol Use	5.16 (5.29)	0.00 / 29.00	1.35	1.85	.84

Note:  $N=700$ . DERS=Difficulties in Emotion Regulation Scale; UPPS=The Urgency, (Lack of) Premeditation, (Lack of)

Perseverance, Sensation-Seeking Impulsivity Scale; EDE-Q=Eating Disorder Examination-Questionnaire; AUDIT=Alcohol Use

Disorder Identification Test. Possible scale range for the DERS was 1-5, UPPS was 1-4, EDE-Q was 0-6, and AUDIT was 0-40. No

scales exceeded the skewness or kurtosis critical values of 2.0, suggesting that all scales showed reasonable degrees of normality.

Additionally, no scales fell below the critical alpha value of 0.70, suggesting that all scales showed reasonable levels of reliability.

were all normally distributed. The *DEERS*, *EDE-Q*, and *AUDIT* showed small degrees of range restriction, wherein very high scores were less likely to be represented (as would be expected in a nonclinical sample); no evidence of range restriction was present for the *UPPS*. No significant differences between scores reported in this sample and other college samples were evident on the *DEERS* (Gratz & Roemer, 2004;  $t(699)=0.53, p = .60, d=0.03$ ), whereas scores for the *UPPS* (Cyders, Smith, Spillane, Fischer, Annus, & Peterson, 2007;  $t(699)=3.19, p < .01, d=0.25$ ),<sup>9</sup> *EDE-Q* (Luce et al., 2008;  $t(699)=2.24, p < .05, d=0.11$ ), and *AUDIT* (Kokotailo, Egan, Gangnon, Brown, Mundt, & Fleming, 2004;  $t(699)=6.05, p < .001, d=0.49$ ) were significantly lower than those reported in other college samples, suggesting that participants may have lower rates of these issues than college students at other universities or may have underreported their current symptoms.

**Hypothesis testing.** To satisfy aim 1, a new measure (the “Acquired Capability for Maladaptive Behaviors” scale) was created in Study 1 to assess the construct of acquired capability for both disordered eating and problematic alcohol use, including both physiological and cognitive/affective components (i.e., capability-enhancing events and capability-related beliefs), based on items derived from a thorough review of the literature and expert consensus. Descriptive statistics for the various items of the “Acquired Capability for Maladaptive Behaviors” scale are presented in Table 10.

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<sup>9</sup> As the effect size associated with this difference is rather small (Cohen, 1988), this may be more representative of this study's large sample size than an actually clinically-significant difference between samples.

Table 10

*Descriptive statistics and statistical assumption information for the items of the "Acquired Capability for Maladaptive Behaviors" scale.*

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
1: I have experienced a period of illness where I suffered from severe gastrointestinal distress (e.g., extended nausea, vomiting, lack of appetite, diarrhea, etc.).	2.85 (1.84)	1 / 7	0.79	-0.33
2: I have taken medications that have made me feel nauseated or reduced my appetite (for purposes other than losing weight).	2.50 (1.69)	1 / 7	1.07	0.38
3: I have experienced times where I was ridiculed for my appearance, weight, or shape.	3.29 (1.89)	1 / 7	0.54	-0.66
4: I have participated in an activity where a certain weight, shape, or appearance is emphasized (i.e., dance, gymnastics, figure skating, body building, cheerleading, wrestling, etc.).	3.59 (2.26)	1 / 7	0.34	-1.31

Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
5: I have been put on a diet or had a diet strongly suggested to me by others for weight loss purposes.	2.22 (1.75)	1 / 7	1.45	1.15
6: Important people in my life were often on a diet or struggling to alter their weight or shape.	3.29 (1.91)	1 / 7	0.62	-0.63
7: I have experienced times of poverty or neglect where I did not have enough to eat.*	1.66 (1.33)	1 / 7	2.35	5.32
8: Important people in my life encouraged me to eat less in order to change or control my appearance, weight, and/or shape.	2.46 (1.81)	1 / 7	1.17	0.40
9: I grew up in a family that was not preoccupied with food, weight, shape, and/or dieting.	3.46 (2.35)	1 / 7	0.42	-1.37
10: I have watched a close friend or family member struggle with eating disordered behavior (i.e., self-induced vomiting, restrictive eating, etc.).	2.24 (1.65)	1 / 7	1.46	1.43

Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
11: Growing up, I felt uncomfortable because there was such a strong focus in my family or peer group on looking a certain way.	2.54 (1.90)	1 / 7	1.10	0.10
12: My family or peer group often discussed or tried different dieting trends or fads (i.e., not eating carbs, eating only certain foods, counting calories, etc.).	3.12 (2.00)	1 / 7	0.63	-0.75
13: The home in which I grew up had many fashion and beauty magazines in it.	2.54 (1.77)	1 / 7	1.15	0.48
14: When I was younger, I played with dolls or action figures that had idealized body types (i.e., Barbie, G.I. Joe, etc.).	5.07 (2.08)	1 / 7	-0.60	-1.05
15: I engaged in sports where I had to strenuously exercise for hours at a time or push myself to the limits and keep going despite my pain and muscle fatigue.	3.76 (2.28)	1 / 7	0.24	-1.41

Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
16: When I was sick as a child, I fought my body and tried not to vomit even though I knew I would feel better once I did.	2.54 (1.85)	1 / 7	1.03	0.04
17: During childhood, there were periods in which I fasted by eating little or nothing at all for a religious or illness-related reason.	2.13 (1.61)	1 / 7	1.55	1.77
18: During childhood, I was told to wait to eat when I asked for food even when I was very hungry.	2.22 (1.64)	1 / 7	1.29	0.87
19: When I was growing up, my family frequently ate meals together.	5.63 (1.88)	1 / 7	-1.06	-0.22
20: Others have pushed me to eat when I wasn't hungry.	3.20 (1.91)	1 / 7	0.57	-0.68
21: I have experienced a period of illness where I suffered from nausea or vomiting.	3.40 (1.82)	1 / 7	0.51	-0.55
22: I have experienced painful headaches.	4.41 (1.99)	1 / 7	-0.09	-1.20

Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
23: I have been prescribed and taken medications that have made me feel intoxicated, woozy, or high.	2.43 (1.69)	1 / 7	1.26	0.89
24: I have experienced times as a child where I witnessed others drink alcohol to the point of intoxication.	3.24 (2.16)	1 / 7	0.53	-1.07
25: My older siblings or family members were drunk in my presence when I was a child.	2.81 (2.06)	1 / 7	0.86	-0.53
26: My family members allowed me to drink alcohol before I was of legal age.	2.78 (1.87)	1 / 7	0.89	-0.20
27: I participated in an activity where drinking alcohol is emphasized (e.g., sports teams, fraternities/sororities, etc.).	2.62 (2.06)	1 / 7	1.05	-0.25
28: I have been pressured to drink alcohol by peers or family members.	2.54 (1.82)	1 / 7	1.07	0.18

Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
29: I have been in social situations where drinking a large amount of alcohol is expected.	3.56 (2.10)	1 / 7	0.35	-1.12
30: I drank alcohol (more than just a sip) before the age of 15.	2.11 (1.59)	1 / 7	1.50	1.52
31: I have had a close friend or family member with alcoholism.	2.53 (1.82)	1 / 7	1.25	0.65
32: I was exposed to advertising for alcohol on billboards, television, radio, the internet, or in magazines when I was a child.	4.11 (2.19)	1 / 7	0.03	-1.35
33: Underage drinking was common where I grew up.	3.83 (2.24)	1 / 7	0.18	-1.38
34: I do not need to eat as much as other people.	3.48 (1.76)	1 / 7	0.25	-0.62
35: I can go longer without food than most people and not feel hungry.	3.17 (1.83)	1 / 7	0.43	-0.82
36: I can eat a lot more than other people and not feel full.	3.22 (1.76)	1 / 7	0.41	-0.71
37: I am disgusted by vomiting.	4.77 (2.05)	1 / 7	-0.42	-1.15



Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
38: I can keep exercising, even if I am in substantial pain or injured.	2.84 (1.71)	1 / 7	0.63	-0.59
39: I can exercise for longer than most people.	3.00 (1.79)	1 / 7	0.57	-0.66
40: I have difficulty telling if I'm hungry or full.	2.78 (1.72)	1 / 7	0.73	-0.41
41: I need to eat at least three times throughout the day.	4.54 (2.09)	1 / 7	-0.27	-1.23
42: I could make myself vomit if I wanted to. (Even if you have never wanted to make yourself vomit, please answer this question.)	3.05 (2.19)	1 / 7	0.61	-1.12
43: I could go long periods of time without eating if I wanted to. (Even if you have never wanted to restrict your food intake, please answer this question.)	3.73 (2.03)	1 / 7	0.12	-1.19
44: I can keep dieting even if I feel hungry.	2.99 (1.80)	1 / 7	0.56	-0.67
45: I do not mind having an empty stomach or feeling hungry.	2.64 (1.77)	1 / 7	0.83	-0.35

Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
46: I like the ache in my muscles after I exercise strenuously.	3.97 (2.00)	1 / 7	-0.06	-1.17
47: For inspiration, I like to look at pictures of models or athletes who are leaner or in better shape than me.	3.11 (2.03)	1 / 7	0.52	-0.99
48: I am more controlled about my diet and exercise than most people.	2.89 (1.68)	1 / 7	0.62	-0.40
49: I enjoy drinking, regardless of the consequences.	2.86 (1.87)	1 / 7	0.61	-0.82
50: After a night of drinking, I experience hangovers less often or less intensely than most people.	3.24 (2.14)	1 / 7	0.42	-1.24
51: After a night of drinking, I am less likely to feel sick than other people.	3.27 (2.16)	1 / 7	0.43	-1.23
52: I feel nauseous or get headaches if I drink too much.	3.85 (2.15)	1 / 7	0.07	-1.32
53: I can drink more than most people without getting drunk.	2.53 (1.74)	1 / 7	0.94	-0.15

Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
54: Alcohol does not affect me as strongly as other people.	2.56 (1.76)	1 / 7	0.94	-0.18
55: I can still do what I need to do the day after a night of drinking.	3.82 (2.09)	1 / 7	0.01	-1.24
56: I like feeling "tipsy" or slightly drunk.	3.83 (2.06)	1 / 7	-0.04	-1.24
57: I feel out of control when I drink.	2.54 (1.65)	1 / 7	1.05	0.45
58: I am uncomfortable/afraid to get drunk in public or with people I don't know well.	4.12 (2.25)	1 / 7	-0.06	-1.42
59: I cannot function after a night of heavy drinking.	3.14 (1.95)	1 / 7	0.64	-0.68
60: I can drink more than most people without getting drunk.	2.50 (1.75)	1 / 7	0.99	-0.05
61: Being around drunk people does not bother me.	3.58 (1.88)	1 / 7	0.17	-0.97
62: I have a higher tolerance for alcohol than most people.	2.59 (1.77)	1 / 7	0.87	-0.28
63: I have difficulty telling if I'm drunk or not.	2.23 (1.46)	1 / 7	1.11	0.60
64: I am not afraid of the consequences of drinking too much.	2.41 (1.75)	1 / 7	1.14	0.33

Table 10 (Continued)

Items	Mean (SD)	Min / Max	Skewness	Kurtosis
65: I am less ashamed of my behavior while drunk than most people.	2.60 (1.71)	1 / 7	0.84	-0.22
66: Blackouts or memory lapses after drinking do not bother me.*	1.83 (1.43)	1 / 7	1.83	2.75
67: I am concerned about conflicts I have with friends or family members over things I said or did while drunk.	3.19 (2.13)	1 / 7	0.48	-1.13
68: I dislike feeling "fuzzy in the head" the day after heavy drinking.	4.54 (2.19)	1 / 7	-0.39	-1.21

*Note:*  $N=700$ . Possible scale range was 1-7. \* Denotes an item with a significant degree of nonnormality. Only two items exceeded the skewness or kurtosis critical values of 2.0, suggesting that most items showed reasonable degrees of normality.

Of all the 68 items, only items 7 and 66 were not normally distributed; both were somewhat positively skewed (meaning that the mean of the distribution was skewed closer to zero and had a longer right tail than would be expected under a normal distribution), and leptokurtotic (meaning that the distribution had a sharper peak and shorter, fatter tails, a situation that occurs when there is a higher probability than a normally distributed variable of values around the mean and extreme values in the tails). In general, items were normally distributed and showed no evidence of range restriction. As such, both exploratory and confirmatory factor analysis were conducted and internal consistency of subscales was explored in order to determine the reliability of this newly-created measure.

Hypotheses 1 and 2 required the use of exploratory factor analysis to determine the factor structure of this new measure. It was hypothesized: (H1) that this measure would contain four lower-order factors (capability-enhancing events for problematic alcohol use, capability-related beliefs for problematic alcohol use, capability-enhancing events for disordered eating, and capability-related beliefs for disordered eating), and (H2) that items will show greater magnitude of associations with the factor on which they are supposed to load than on the remaining three factors. Before proceeding to factor analysis, all data were screened for linearity, normality, and homoscedasticity (although the statistics selected are robust enough at this sample size that normality and homoscedasticity are not critical assumptions; Bryant & Yarnold, 1995; Garson, 2007). Next, an exploratory principal axis factor analysis of all item scores was conducted to determine the least number of factors that accounted for the common (not unique) variance in this particular set of variables. In this manner, it was determined if the myriad

items assessing acquired capability actually represented a smaller number of factors that typically hang together.

Although principal component analysis is the most commonly used extraction method for factor analysis in the social sciences, this procedure determines the number of factors that account for the most total variance (both unique and common) in a set of variables, and is therefore only properly used when data reduction into a typology of variables is desired (Costello & Osborne, 2005). This form of factor analysis is inappropriate for situations when one hopes to reveal latent variables that cause manifest variables to covary (Costello & Osborne, 2005). Alternatively, principal axis factor analysis only analyzes shared variance, thereby yielding the same solution as most principal-component analyses without inflating estimates of variance accounted (Costello & Osborne, 2005; Fabrigar, Wegener, MacCallum, & Strahan, 1999; Garson, 2007). As such, principal axis factor analysis was used in these analyses, and exploratory factor analysis was utilized since the beginning stage of measurement development is inherently exploratory (and can later be confirmed in subsequent subsamples and with confirmatory factor analysis).

The number of factors retained was determined using parallel analysis. Although the default in most statistical programs and the most common method of selection in the social sciences is to retain all factors with eigenvalues greater than 1.0 (i.e., the Kaiser criterion), there is broad consensus in the literature that this is one of the least accurate methods of factor selection (Velicer & Jackson, 1990). As an alternative to the Kaiser criterion, parallel analysis compares the obtained eigenvalues for any given number of factors and compares them to those eigenvalues that would be expected from random

data. The number of factors selected will be that with eigenvalues greater than those expected by chance from random data (Costello & Osbourne, 2005; Fabrigar, Wegener, MacCallum, & Strahan, 1999). However, as parallel analyses of adjusted correlation matrices tend to indicate more factors than warranted (Buja & Eyuboglu, 1992) since the eigenvalues for trivial negligible factors in the real data commonly surpass corresponding random data eigenvalues for the same roots, the eigenvalues from parallel analyses were used to determine the real data eigenvalues that are beyond chance and additional procedures were used to trim trivial factors. As such, scree plots and factor interpretability were also examined to assist with parallel analysis factor selection.

Initially, the number of factors to be retained was not specified, allowing SPSS to determine the appropriate number of factors using the default setting of the Kaiser criterion (eigenvalues  $> 1.0$ ). During this step, eigenvalues and a scree plot were calculated, and these values were compared to the values generated by parallel analysis. Using the Kaiser criterion suggested 17 factors, examination of the scree plot suggested four factors, and parallel analysis suggested ten factors. Since the number of factors selected by various methods differed, a series of factor analyses testing seventeen, four, and ten factor solutions were conducted, specifying possible numbers of factors suggested by the Kaiser criterion, scree plot, and parallel analysis to determine the number of factors that was most readily interpretable. Eigenvalues, proportion of variance, and cumulative variance accounted for by different factor solutions is reported in Table 11. Once factor loadings were examined, the seventeen-, ten-, and four-factor solutions all reduced to the same interpretable four-factor solution (i.e., all items had higher loadings on one of the first four factors than they did on the fifth through

seventeenth factors. As items were assigned to the factor on which they loaded most highly and items always loaded most highly on one of the first four factors, the higher factors were dropped because they contained no items; Costello & Osbourne, 2005; Fava & Velicer, 1992; Velicer & Jackson, 1990).

Therefore, a four-factor solution was selected, and communality estimates were calculated. Communality is the sum of the loadings of a variable on all extracted factors, or the proportion of variance in that variable that can be accounted for by all extracted factors (Rietveld & Van Hout, 1993); when communality estimates are high (closer to 1.0 than to 0.0), the factor analysis is considered reliable, as the extracted factors account for a large proportion of the variable's variances. Communality estimates for this solution ranged from .183 to .845. The four factors together accounted for approximately 34% of the total variance in the original 68 items (see Table 11) and showed intercorrelations (see Table 12), validating the choice of an oblique rotation.

The rotation method used to simplify and clarify the data structure was direct oblimin, an oblique method rather than an orthogonal method. Orthogonal methods produce factors that are uncorrelated, whereas oblique methods allow the factors to correlate. Although it is conventional for social scientists to utilize orthogonal rotations (usually varimax) to determine interpretable results, this is actually a flawed design, as some correlation between factors is to be expected in the social sciences where nearly



Table 11

*Eigenvalues, proportion of variance, and cumulative variance accounted for by different factor solutions suggested by the Kaiser criterion, examination of the scree plot, parallel analyses, and interpretability.*

# of Factors	Eigenvalues	Proportion of Variance	Cumulative Variance
1	12.24	17.98	17.98
2	4.78	7.02	25.00
3	3.53	5.19	30.19
4	2.81	4.13	34.32
5	2.42	3.56	37.87
6	2.38	3.50	41.38
7	1.96	2.88	44.26
8	1.82	2.68	46.94
9	1.62	2.39	49.32
10	1.49	2.19	51.51
11	1.34	1.96	53.48
12	1.28	1.89	55.36
13	1.22	1.80	57.16
14	1.20	1.77	58.93
15	1.08	1.59	60.52

Table 11 (Continued)

# of Factors	Eigenvalues	Proportion of Variance	Cumulative Variance
16	1.05	1.54	62.06
17	1.01	1.48	63.54

*Note:* Seven hundred cases with 68 variables were factor analyzed. Seventeen factors were suggested by the Kaiser criterion, four factors were suggested by examination of the scree plot, and ten factors were suggested by parallel analysis. Once factor loadings were examined, the seventeen-, four-, and ten-factor solutions all reduced to the same interpretable four-factor solution.

Table 12

*Intercorrelations among factors.*

Factors	1	2	3	4
1: Capability-enhancing events for disordered eating	1.00			
2: Capability-related beliefs for problematic alcohol use	0.71***	1.00		
3: Capability-related beliefs for disordered eating	0.32***	0.24***	1.00	
4: Capability-enhancing events for problematic alcohol use	0.37***	0.51***	0.29***	1.00

*Note:*  $N=700$ . \*\*\*  $p < .001$

everything correlates to some (low-level) degree. Additionally, if factors are uncorrelated, oblique rotations will reproduce orthogonal results; the reverse is not true. As such, using orthogonal rotations results in the loss of valuable information if the factors are correlated, while oblique rotations provide more accurate and reproducible depictions of social science data (Costello & Osborne, 2005). As all methods of oblique rotation tend to produce the same results (Fabrigar et al., 1999), the default delta setting (0) for direct oblimin rotations was used. Interpretation of orthogonal and oblique methods are essentially the same, except that oblique rotations generate a factor correlation matrix that reveals the correlations between factors in addition to the pattern matrix of factor loadings that is generated by orthogonal rotations. The factor structure matrix represents the correlations between the variables and the factors, whereas the factor pattern matrix represents linear combinations of the variables; these matrices are presented in Table 13.

The pattern matrix of the four-factor solution was examined to determine which items were associated with each factor (See Table 13). Subscale score items were selected for a factor if they had a minimum loading of .32 (Tabachnick & Fidell, 2001), which represents approximately 10% overlapping variance with the other items in that factor. No factors were kept with fewer than three items, as these factors are considered weak and unstable (Costello & Osborne, 2005; Kim & Mueller, 1978). Fifty-three items had a pattern coefficient greater than 0.32 on at least one factor, and six items had a pattern coefficient greater than 0.32 on more than one factor. Fourteen items did not load on any factor and therefore were dropped (See Table 14). Examination of the structure

Table 13

*Pattern and structure coefficients of the four-factor solution to the factor analysis of the items of the Acquired Capability for Maladaptive Behaviors survey.*

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
5. I have been put on a diet or had a diet strongly suggested to me by others for weight loss purposes.	0.73*	0.69*						
8. Important people in my life encouraged me to eat less in order to change or control my appearance, weight, and/or shape.	0.71*	0.67*						
12. My family or peer group often discussed or tried different dieting trends or fads (i.e., not eating carbs, eating only certain foods, counting calories, etc.).	0.67*	0.71*						

Table 13 (Continued)

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
11. Growing up, I felt uncomfortable because there was such a strong focus in my family or peer group on looking a certain way.	0.67*	0.68*						
3. I have experienced times where I was ridiculed for my appearance, weight, or shape.	0.62*	0.64*						
6. Important people in my life were often on a diet or struggling to alter their weight or shape.	0.62*	0.64*						
10. I have watched a close friend or family member struggle with eating disordered behavior (i.e., self-induced vomiting, restrictive eating, etc.).	0.53*	0.57*						

Table 13 (Continued)

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
2. I have taken medications that have made me feel nauseated or reduced my appetite (for purposes other than losing weight).	0.45*	0.52*						0.39
17. During childhood, there were periods in which I fasted by eating little or nothing at all for a religious or illness-related reason.	0.42*	0.40*						
18. During childhood, I was told to wait to eat when I asked for food even when I was very hungry.	0.42*	0.43*						
7. I have experienced times of poverty or neglect where I did not have enough to eat.	0.40*	0.40*						

Table 13 (Continued)

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
1. I have experienced a period of illness where I suffered from severe gastrointestinal distress (e.g., extended nausea, vomiting, lack of appetite, diarrhea, etc.).	0.38*	0.44*						0.37
31. I have had a close friend or family member with alcoholism.	0.35*	0.40*						
20. Others have pushed me to eat when I wasn't hungry.	0.34*	0.42*						
40. I have difficulty telling if I'm hungry or full.	0.34*	0.39*						
62. I have a higher tolerance for alcohol than most people.			-0.82 <sup>‡</sup>	-0.81 <sup>‡</sup>				
53. I can drink more than most people without getting drunk.		0.33	-0.82 <sup>‡</sup>	-0.79 <sup>‡</sup>				
54. Alcohol does not affect me as strongly as other people.			-0.77 <sup>‡</sup>	-0.76 <sup>‡</sup>				
50. After a night of drinking, I experience hangovers less often or less intensely than most people.			-0.67 <sup>‡</sup>	-0.67 <sup>‡</sup>				

Table 13 (Continued)

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
51. After a night of drinking, I am less likely to feel sick than other people.			-0.65*	-0.64*				
49. I enjoy drinking, regardless of the consequences.			-0.63*	-0.68*				0.35
55. I can still do what I need to do the day after a night of drinking.			-0.62*	-0.62*				
56. I like feeling "tipsy" or slightly drunk.			-0.54*	-0.59*				0.47
61. Being around drunk people does not bother me.			-0.49*	-0.51*				
65. I am less ashamed of my behavior while drunk than most people.			-0.43*	-0.51*				
66. Blackouts or memory lapses after drinking do not bother me.			-0.40*	-0.43*				
64. I am not afraid of the consequences of drinking too much.			-0.35*	-0.38*				



Table 13 (Continued)

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
63. I have difficulty telling if I'm drunk or not.			-0.35*	-0.41*				
45. I do not mind having an empty stomach or feeling hungry.		0.31			0.66*	0.70*		
44. I can keep dieting even if I feel hungry.		0.35			0.66*	0.71*		
35. I can go longer without food than most people and not feel hungry.					0.59*	0.58*		
43. I could go long periods of time without eating if I wanted to. (Even if you have never wanted to restrict your food intake, please answer this question.)					0.59*	0.63*		
48. I am more controlled about my diet and exercise than most people.					0.51*	0.50*		
38. I can keep exercising, even if I am in substantial pain or injured.					0.50*	0.53*		

Table 13 (Continued)

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
34. I do not need to eat as much as other people.					0.47*	0.43*		
46. I like the ache in my muscles after I exercise strenuously.					0.45*	0.46*		
39. I can exercise for longer than most people.					0.43*	0.43*		
47. For inspiration, I like to look at pictures of models or athletes who are leaner or in better shape than me.					0.38*	0.43*		
41. I need to eat at least three times throughout the day.					-0.33*	-0.32*		
29. I have been in social situations where drinking a large amount of alcohol is expected.		0.43					0.50*	0.62*
52. I feel nauseous or get headaches if I drink too much.							0.50*	0.50*
33. Underage drinking was common where I grew up.			0.31		-0.32		0.44*	0.52*
68. I dislike feeling "fuzzy in the head" the day after heavy drinking.							0.40*	0.40*

Table 13 (Continued)

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
21. I have experienced a period of illness where I suffered from nausea or vomiting.	0.33	0.43					0.40*	0.48*
27. I participated in an activity where drinking alcohol is emphasized (e.g., sports teams, fraternities/sororities, etc.).		0.34		-0.41			0.40*	0.50*
23. I have been prescribed and taken medications that have made me feel intoxicated, woozy, or high.	0.39	0.49					0.39*	0.49*
28. I have been pressured to drink alcohol by peers or family members.	0.32	0.46		-0.31			0.39*	0.50*
25. My older siblings or family members were drunk in my presence when I was a child.	0.32	0.42					0.39*	0.48*
22. I have experienced painful headaches.		0.32					0.38*	0.44*

Table 13 (Continued)

Item	Factor 1		Factor 2		Factor 3		Factor 4	
	P	S	P	S	P	S	P	S
24. I have experienced times as a child where I witnessed others drink alcohol to the point of intoxication.	0.33	0.43					0.38*	0.48*
26. My family members allowed me to drink alcohol before I was of legal age.		0.33					0.37*	0.47*
32. I was exposed to advertising for alcohol on billboards, television, radio, the internet, or in magazines when I was a child.		0.35					0.37*	0.44*
59. I cannot function after a night of heavy drinking.							0.34*	0.31*

*Note:* P=Pattern coefficients. S=Structure coefficients. The sixteen items that did not load on any factor are presented in Table 13.

Loadings less than 0.32 are excluded, as they are unstable. \* denotes the highest loading for that item.

Table 14

*Items that did not load on any factor of the four-factor solution of the items of the Acquired Capability for Maladaptive Behaviors survey.*

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Items

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4. I have participated in an activity where a certain weight, shape, or appearance is emphasized (i.e., dance, gymnastics, figure skating, body building, cheerleading, wrestling, etc.).
9. I grew up in a family that was not preoccupied with food, weight, shape, and/or dieting.
13. The home in which I grew up had many fashion and beauty magazines in it.
14. When I was younger, I played with dolls or action figures that had idealized body types (i.e., Barbie, G.I. Joe, etc.).
15. I engaged in sports where I had to strenuously exercise for hours at a time or push myself to the limits and keep going despite my pain and muscle fatigue.
16. When I was sick as a child, I fought my body and tried not to vomit even though I knew I would feel better once I did.
19. When I was growing up, my family frequently ate meals together.
30. I drank alcohol (more than just a sip) before the age of 15.
36. I can eat a lot more than other people and not feel full.

Table 14 (Continued)

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Items
37. I am disgusted by vomiting.
42. I could make myself vomit if I wanted to. (Even if you have never wanted to make yourself vomit, please answer this question.)
57. I feel out of control when I drink.
58. I am uncomfortable/afraid to get drunk in public or with people I don't know well.
67. I am concerned about conflicts I have with friends or family members over things I said or did while drunk.

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matrix supported the decisions made by the pattern matrix; each item showed a high correlation with the factor with which it was associated.

Although it is theoretically possible that a single item might confer acquired capability to multiple areas of risk, the decision was made to limit item cross-loadings across factors. Although a single life event or belief may, in actuality, contribute to the acquired capability of both disordered eating and problematic alcohol use, this item would not be a good differentiator between behaviors and would be considered a common, not specific, risk factor. As the goal of this study was to create a measure of acquired capability risk specific to certain maladaptive behaviors, and the goal of measurement development more broadly typically is to produce items that only load highly on the factor they are intended to assess (Anderson and Gerbing, 1988; DeVellis, 2003), items were not allowed to cross-load, improving interpretability of construct and reducing measurement error.

To clarify factor structure and confirm item assignment to factors as suggested by the EFA, a series of four one-factor confirmatory factor analyses were conducted. Items with factor loadings higher than .32 on the exploratory factor analysis were submitted to a one-factor confirmatory factor analysis to confirm the strength of their loadings by examining path coefficients and model fit. Confirmatory factor analyses were conducted using Proc Calis with maximum likelihood estimation in SAS version 9.3. Estimation procedures such as maximum likelihood minimize discrepancies between the covariance matrix of the proposed model and actual patterns in the data, and fit indices are then used to determine if the discrepancy between the proposed model and actual data is sufficiently small (Boomsma, 2000). Overall model fit was determined using the  $\chi^2$ , CFI,

RMSEA, and SRMSR fit statistics. The  $\chi^2$  fit index is an absolute fit index, meaning it assesses how well the proposed model reproduces the sample covariance matrix, implying a comparison to the best possible model. The  $\chi^2$  fit index is one of the most commonly used fit indices to formally test for model misspecification, but has some difficulties, most notably that a rejection of the null hypothesis implies that the model is incorrect, but not necessarily in a manner where the difference between the proposed model and the true data is of practical importance. As the  $\chi^2$  is heavily influenced by sample size and the sample in this study was large, the unadjusted  $\chi^2$  was reported in addition to other fit indices more sensitive to specification and less sensitive to sample size (Boomsma, 2000; Ferron, 2008)<sup>10</sup>. The Standardized Root Mean-Square Residual (SRMSR) is one such absolute fit index (where a value less than .08 indicates good model fit; Hu & Bentler, 1998), as is the Root Mean Square Error of Approximation (RMSEA), which adjusts for model parsimony using the degrees of freedom (and where is good model fit is represented by a value less than .08; Hu & Bentler, 1998; MacCallum, Browne, & Sugawara, 1996). Lastly, the Comparative Fit Index (CFI) is an incremental fit index, meaning it assesses how well the proposed model reproduces the sample covariance matrix relative to how well a baseline model (usually a null model in which all variables are not related) reproduces the sample covariance matrix (good model

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<sup>10</sup> Degrees of freedom for the unadjusted  $\chi^2$  fit indices for all models are also included in Table 15 so that the relative chi-square can also be calculated. The relative chi-square ( $\chi^2/df$ ) is an alternative to the traditional (or unadjusted) chi-square tests that attempts to account for the chi-square index's sensitivity to sample size. A conservative estimate of good model fit based on the relative chi-square is a ratio between 2-to-1 and 3-to-1 or less (Byrne, 1989; Carmines & McIver, 1981). Although the relative chi-square is frequently used in the field, some statisticians criticize its use (Wheaton, 1987), stating that the chi-square index is more properly used as a dichotomous indicator of model misspecification, reported alongside other absolute and incremental fit indices more sensitive to specification. As such, unadjusted chi-square (with *df* included so that relative chi-square can be calculated if desired), SRMSR, RMSEA, and CFI fit indices were selected and reported in Table 15.



fit is represented by a value greater than .95; Boomsma, 2000; Ferron, 2008; Hu & Bentler, 1998). Since absolute fit indices can still appear strong even when there are no relationships among the variables, it is suggested that incremental fit indices be reported in addition to absolute fit indices, since incremental fit indices will look poor when the proposed model does not show marked improvement over the baseline model (Boomsma, 2000; Ferron, 2008). The  $\chi^2$  was used to formally test for model specification, and other absolute and incremental fit indices that are less influenced by sample size than the  $\chi^2$  were also calculated; the SRMSR and RMSEA were reported as stand-alone or absolute fit indices (where the SRMSR does not adjust for model parsimony and the RMSEA does) and the CFI as an incremental fit index.

Fit indices for the one factor confirmatory factor analyses are presented in Table 15. One factor confirmatory factor analyses were only run once for factors 2 and 3, as they had no cross-loading items; alternatively, one factor confirmatory factor analyses were run twice for factors 1 and 4, once including cross-loading items and once excluding cross-loading items. Model A represented a model testing all items suggested to load on factor 1 by the exploratory factor analysis, including cross-loading items. Fit was poor for Model A for all fit statistics (see Table 15), suggesting that a model including cross-loadings items on factor 1 showed a significant degree of misspecification. Model B represented a model testing all items suggested to load on factor 1 by the exploratory factor analysis, excluding cross-loading items. Model B showed good fit on the SRMSR statistic and borderline fit for the RMSEA and CFI statistics (see Table 15), still suggesting some degree of model misspecification.

Table 15

*Fit indices for the one factor confirmatory factor analyses of each factor suggested by the exploratory factor analysis of the "Acquired Capability for Maladaptive Behavior" scale.*

Model	$\chi^2$ (N=700)	SRMSR	RMSEA	CFI
Model A: Factor 1 including cross-loading items	1974.20 <sup>a</sup>	0.09	0.12	0.64
<b>Model B: Factor 1 excluding cross loading items</b>	<b>549.11<sup>b</sup></b>	<b>0.06</b>	<b>0.10</b>	<b>0.84</b>
<b>Model C: Factor 2</b>	<b>1597.26<sup>c</sup></b>	<b>0.13</b>	<b>0.18</b>	<b>0.72</b>
<b>Model D: Factor 3</b>	<b>1197.43<sup>d</sup></b>	<b>0.14</b>	<b>0.20</b>	<b>0.77</b>
Model E: Factor 4 including cross-loading items	1082.34 <sup>e</sup>	0.09	0.13	0.68
<b>Model F: Factor 4 excluding cross-loading items</b>	<b>759.13<sup>f</sup></b>	<b>0.08</b>	<b>0.15</b>	<b>0.74</b>

Note:  $N=700$ . Final selected models denoted in bold. <sup>a</sup> $df=170$ ,  $p < .001$ ; <sup>b</sup> $df=65$ ,  $p < .001$ ; <sup>c</sup> $df=77$ ,  $p < .001$ ; <sup>d</sup> $df=44$ ,  $p < .001$ ; <sup>e</sup> $df=90$ ,  $p < .001$ ; <sup>f</sup> $df=44$ ,  $p < .0001$ . Models excluding cross-loading items demonstrated significantly better fit (Factor 1:  $\Delta\chi^2_{(105)}=1425.098$ ,  $p < .001$ ; Factor 4:  $\Delta\chi^2_{(46)}=323.215$ ,  $p < .001$ )

However, Model B demonstrated significantly better fit than Model A ( $\Delta\chi^2_{(105)}=1425.09$ ,  $p < .001$ ), supporting the decision to disallow cross-loading. Model C represented a model testing all items suggested to load on factor 2 by the exploratory factor analysis. Fit for Model C showed borderline fit on the RMSEA and SRMSR statistics and poor fit on the CFI statistic, suggesting some degree of model misspecification.<sup>10</sup> Likewise, Model D represented a model testing all items suggested to load on factor 3 by the exploratory factor analysis. Fit for model D also showed some degree of model misspecification, with borderline fit for the SRMSR statistic and poor fit for the RMSEA and CFI statistic. Model E represented a model testing all items suggested to load on factor 4 by the exploratory factor analysis, including cross-loading items. Fit for Model E was borderline for the SRMSR and RMSEA statistics and poor for the CFI statistic (see Table 15), suggesting that a model including cross-loadings items on factor 4 showed a significant degree of misspecification. The final model, Model F, represented a model testing all items suggested to load on factor 4 by the exploratory factor analysis, excluding cross-loading items. Model F showed good fit on the SRMSR statistic, borderline fit for the RMSEA statistic, and poor fit for CFI statistics (see Table 15), still suggesting some degree of model misspecification. However, Model F demonstrated significantly better fit than Model E ( $\Delta\chi^2_{(46)}=323.21$ ,  $p < .001$ ), supporting the decision to disallow cross-loading. Examination of modification indices for all models suggested that the misspecification noted may be due to some pairs of items that assessed similar content having error variance more correlated than would expected based solely on these items' relationship to their latent factor.

Standardized path coefficients for one factor CFAs are presented in Figures 5-8. Examination of the standardized path coefficient for the final one factor models, Models B, C, D, and F (presented in figures 5-8) revealed mostly moderate to high loadings of all variables on their respective factors (Factor 1: standardized coefficients ranging from .34 to .78 and  $R^2$  ranging from .11 to .61; Factor 2: standardized coefficients ranging from .27 to .93 and  $R^2$  ranging from .07 to .87; Factor 3: standardized coefficients ranging from .40 to .93 and  $R^2$  ranging from .16 to .87; Factor 4: standardized coefficients ranging from .20 to .76 and  $R^2$  ranging from .04 to .58). All paths were statistically significant at the  $p < .001$  level. Items with path coefficients lower than .40 in the one-factor confirmatory factor analyses were discarded from the final scale to improve factor stability (as recommended by Anderson and Gerbing, 1988 and Ferron, 2008). Similarly, items with path coefficients greater than .40 on multiple one-factor confirmatory factor analyses were discarded to improve factor interpretability (Anderson and Gerbing, 1988), a decision supported by better model fit for both factors 1 and 4 when cross-loading items were not included. Item analysis further confirmed the decision to drop-cross loading items and items with coefficients less than 0.4 in the one factor CFAs, as addition of any of the cross-loading items did not result in substantial increases in Cronbach's alpha and removal of the dropped items did not result in significant decrements in Cronbach's alpha (for more on alpha reliability of subscales, see hypothesis 4).

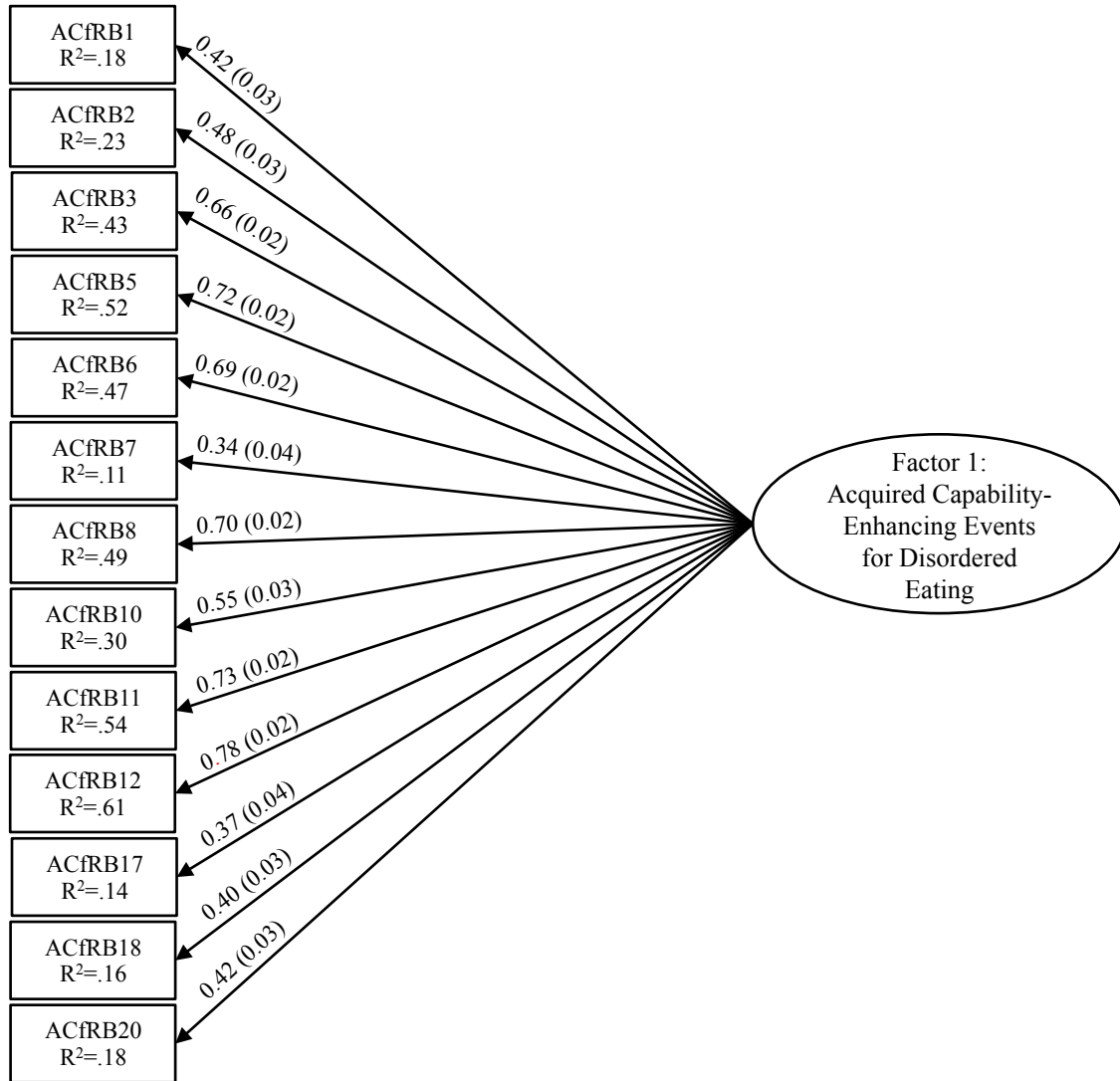


Figure 5. Standardized path estimates for the one-factor confirmatory factor analysis of factor 1 of the "Acquired Capability for Maladaptive Behaviors" scale. All paths are statistically significant at the  $p < .001$  level.

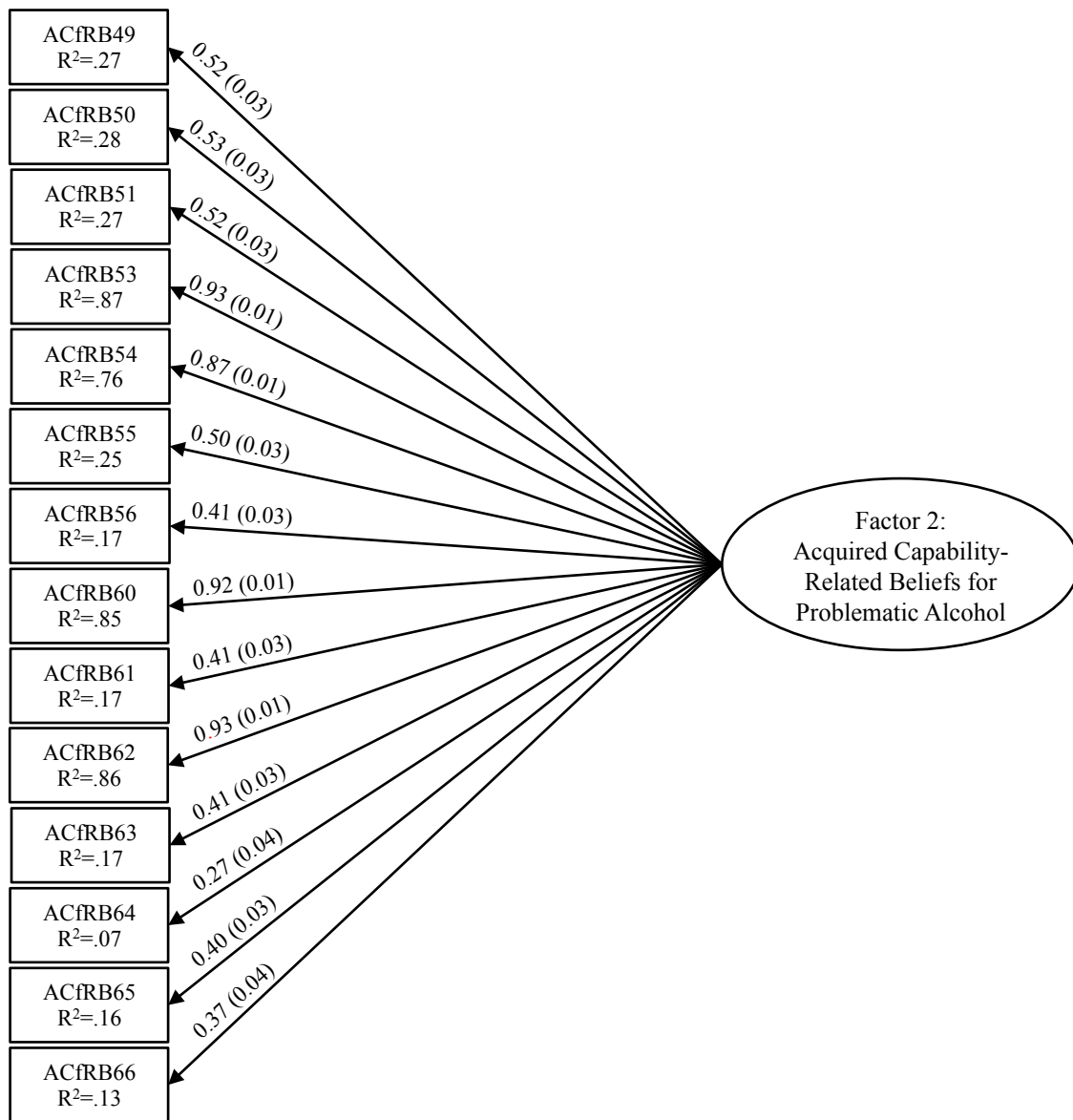


Figure 6. Standardized path estimates for the one-factor confirmatory factor analysis of factor 2 of the "Acquired Capability for Maladaptive Behaviors" scale. All paths are statistically significant at the  $p < .001$  level.

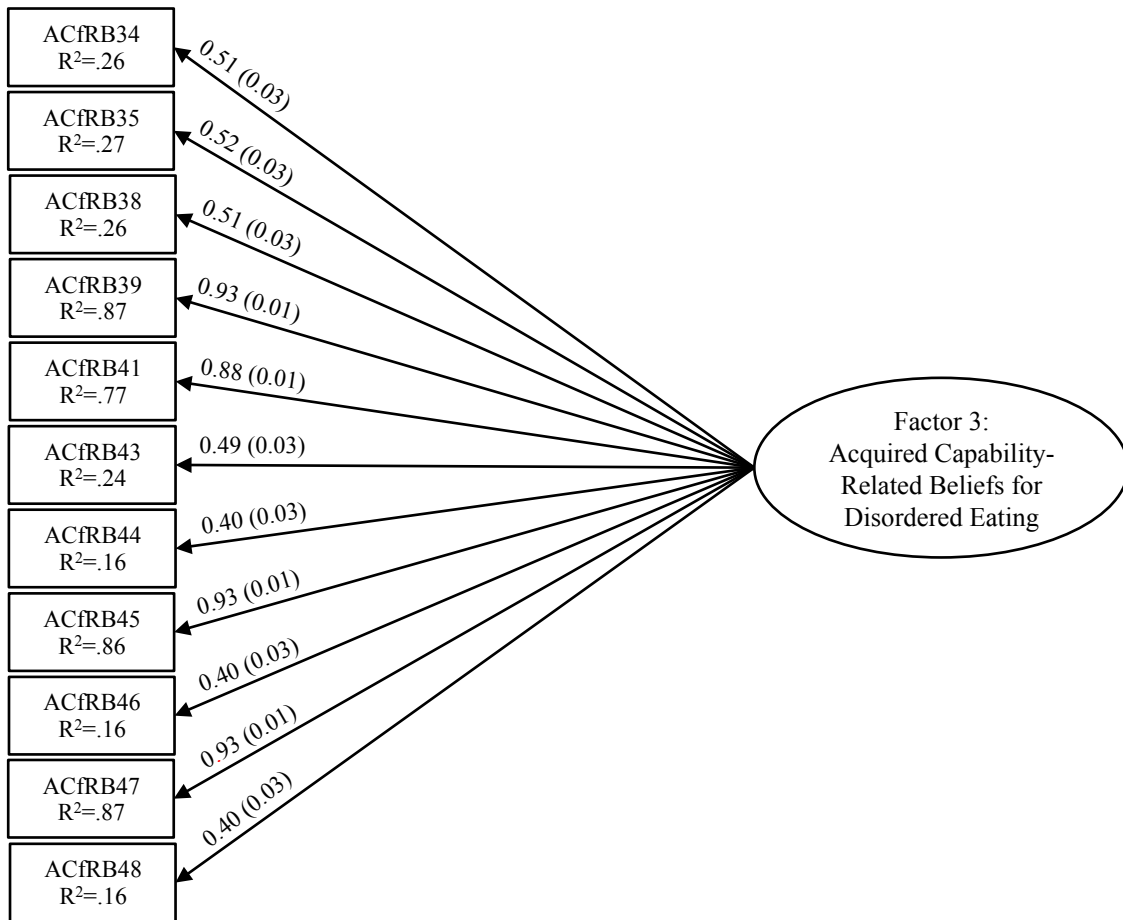


Figure 7. Standardized path estimates for the one-factor confirmatory factor analysis of factor 3 of the "Acquired Capability for Maladaptive Behaviors" scale. All paths are statistically significant at the  $p < .001$  level.

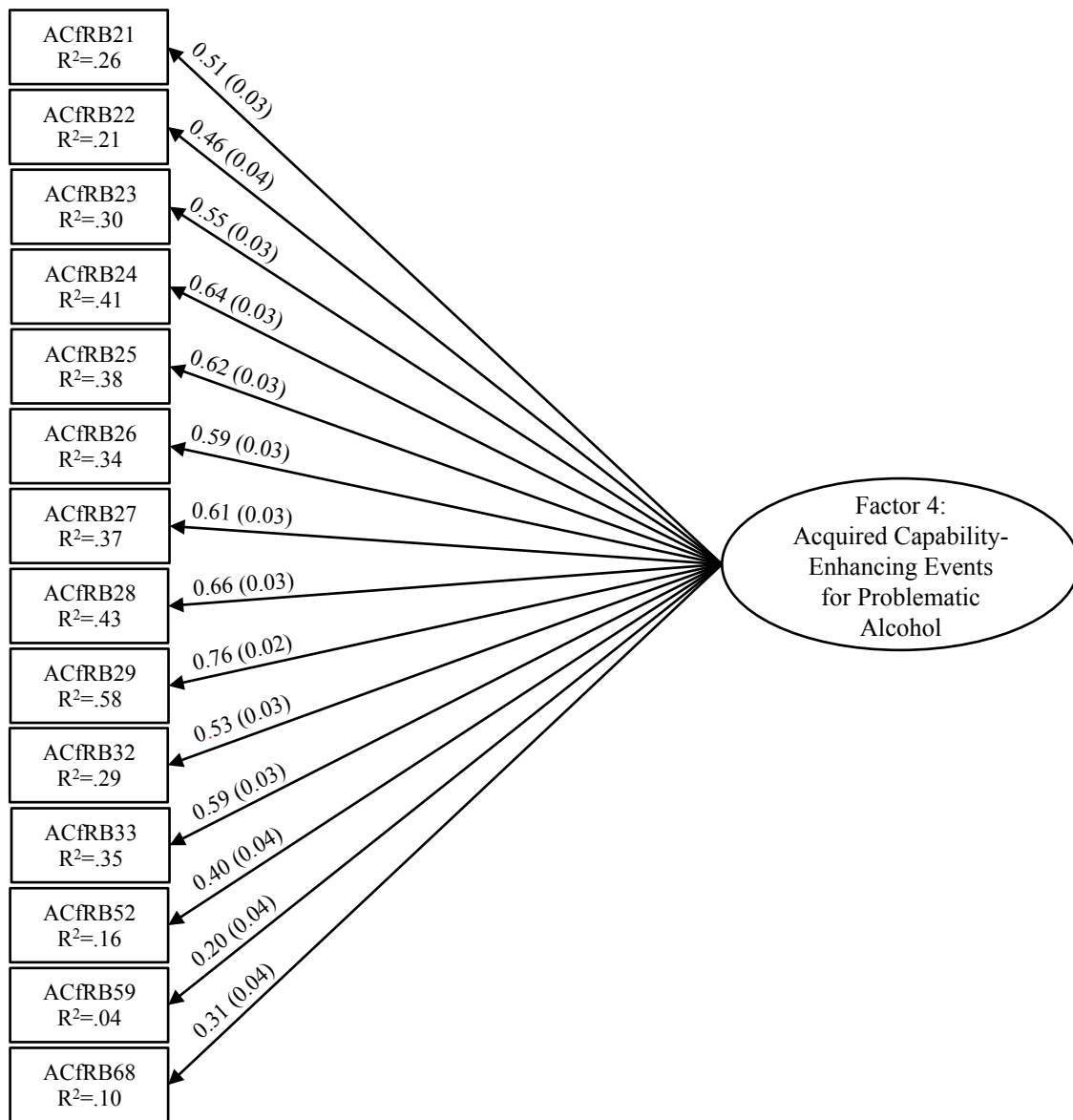


Figure 8. Standardized path estimates for the one-factor confirmatory factor analysis of factor 4 of the "Acquired Capability for Maladaptive Behaviors" scale. All paths are statistically significant at the  $p < .001$  level.



A team of three research assistants previously unrelated to the project assigned labels based on theory and face validity to the factors suggested by the exploratory factor analysis and supported by the one factor confirmatory factor analyses. Research assistants were undergraduate- or postbaccalaureate-level students who were selected because they passed an oral ethics examination and were familiar with Joiner's acquired capability theory through independent study and at least one year of participation in research laboratory activities. Each research assistant independently selected labels for the factors based on a review of the items assigned to each factor. After each research assistant produced this descriptive label for each factor, final labels were selected based on discussion of the descriptive labels produced and group consensus.

The first factor contained eleven items assessing capability-enhancing events for disordered eating (average loading of .57 on the exploratory factor analysis and .60 on the confirmatory factor analysis). The second factor contained eleven items assessing beliefs about one's capability to habituate to the effects of alcohol (average loading of -.65 on the exploratory factor analysis and .63 on the confirmatory factor analysis). The third factor contained eleven items assessing beliefs about one's capability to habituate to the effects of disordered eating (average loading of .45 on the exploratory factor analysis and .63 on the confirmatory factor analysis). The fourth factor contained seven items assessing capability-enhancing events for problematic alcohol use (average loading of .42 on the exploratory factor analysis and .56 on the confirmatory factor analysis).

Fourteen items did not load on any factor during the exploratory factor analysis and were therefore removed from subsequent analyses (seven from the capability-enhancing events for disordered eating subscale, one from the capability-enhancing

events for problematic alcohol use subscale, three from the capability-related beliefs for disordered eating subscale, and three from the capability-related beliefs for problematic alcohol use subscale). Seven items did not have path coefficients greater than .40 on a one factor confirmatory factor analysis of their factor suggested by the exploratory factor analysis, and were also removed from subsequent analyses (two from the capability-enhancing events for disordered eating subscale, none from the capability-enhancing events for problematic alcohol use subscale, one from the capability-related beliefs for disordered eating subscale, and four from the capability-related beliefs for problematic alcohol use subscale). Finally, seven items were dropped from the scale for cross-loading above .32 on the exploratory factor analysis and above .40 on the confirmatory factor analysis on both factors 1 and 4. The final factor structure for the "Acquired Capability for Maladaptive Behaviors" scale contained a total of 40 items, 11 items on factor 1 (capability-enhancing events for disordered eating), 11 items on factor 2 (capability-related beliefs for problematic alcohol use), 11 on factor 3 (capability-related beliefs for disordered eating), and 7 on factor 4 (capability-enhancing events for problematic alcohol use).

As such, hypothesis 1 was supported, in that the "Acquired Capability for Maladaptive Behaviors" scale did have four lower-order factors corresponding to capability-enhancing events for problematic alcohol use, capability-related beliefs for problematic alcohol use, capability-enhancing events for disordered eating, and capability-related beliefs for disordered eating, as determined by exploratory factor analysis. Hypothesis 2 was only partially supported, in that only 80.9% of items showed greater magnitude of associations with the factor on which they were supposed to load

than on the remaining three factors. Approximately 20.6% of items were dropped because they did not load on any factor during the EFA, an additional 10.3% were dropped because they did not demonstrate adequate path coefficients during follow-up CFAs, and a final 8.8% were dropped because they cross-loaded on more than one factor during both the EFA and follow-up CFAs.

Next, this finalized four-factor structure was subjected to a confirmatory factor analysis, as it was hypothesized (H3) that confirmatory factor analysis using full maximum likelihood estimation would substantiate the four-factor solution delineated by exploratory factor analysis and follow-up one factor confirmatory factor analyses. The  $\chi^2$ , SRMSR, RMSEA, and CFI fit statistics for seven models tests are presented in Table 16. Model 1 represented a baseline four-factor model (acquired capability-enhancing events for disordered eating, acquired capability-related beliefs for problematic alcohol use, acquired capability-related beliefs for disordered eating, and acquired capability-enhancing events for problematic alcohol use) delineated by the exploratory factor analysis (with no items cross-loading). Fit for Model 1 was borderline for the SRMSR and RMSEA indices and poor for the CFI statistic (see Table 16), suggesting that the four factor model without cross-loadings showed some degree of misspecification.

Modification indices for Model 1 were examined, and it was determined that error parameters for four pairs of items appeared to covary more than would be expected based on their relationships with their respective factors. Although correlated error variances can sometimes imply the presence of an additional factor or systematic error present in the data, correlation between pairs of error variances also frequently occurs when multiple items inquire about similar content but with slightly different phrasing. In these

cases, so long as there is a theoretical rationale for association between the items' error terms ("meaningfulness rule") and all pairs for which that reason applies are also correlated ("generality rule"), then allowing error variances to covary is acceptable and indicated (Kenny & Milan, 2011). An examination of these pairs (items 5 & 8, 34 & 35, 38 & 39, and 50 & 51) determined that correlation of error terms would be indicated based on these specifications (i.e., pairs of items assessing the same content but using different phrasology would be expected to correlate higher with each other than would be expected based on their association with their factor; ex. Item 34: "I do not need to eat as much as other people" and Item 35: "I can go longer without food than most people and not feel hungry"). Model 2 represented the four-factor model, allowing errors to correlate as suggested by the modification indices. Model fit was adequate to good for all fit statistics. Model 2 also showed significant improvement over Model 1 ( $\Delta\chi^2_{(4)}=1736.92, p < .001$ ), suggesting that a four-factor model allowing correlated error variances showed the most accurate fit to the data of the models testing lower-order factor structure.

Additionally, models testing for the presence of higher-order factors were run. Model 3 represented a bifactor model with the same four lower-order factors as Model 2, but including a general factor (acquired capability for maladaptive behaviors). Model 3 showed good fit on the RMSEA and SMRSR fit statistics and adequate fit on the chi-square and CFI fit statistics. However, despite having adequate model fit, model 3 showed significant decrements in fit when compared to Model 2 ( $\Delta\chi^2_{(44)}=591.95, p < .001$ ), suggesting that a model with the addition of a general factor was not a better solution to the data than the more parsimonious model with only lower-order factors. Similarly, model 4 represented a hierarchical model with the same four lower-order

Table 16

*Fit indices for the confirmatory factor analysis of the "Acquired Capability for Maladaptive Behavior" scale.*

Model	$\chi^2$ (N=700)	SRMSR	RMSEA	CFI
Model 1: Four lower-order factors; no higher order factors	3793.60 <sup>a</sup>	0.081	0.082	0.732
<b>Model 2: Model 1 plus errors correlated per modification indices</b>	2056.68 <sup>c</sup>	0.06	0.06	0.88
Model 3: Bifactor model with four lower-order factors and one general factor	2648.63 <sup>b</sup>	0.08	0.07	0.83
Model 4: Hierarchical model with four lower-order factors and one general factor	2666.61 <sup>d</sup>	0.08	0.07	0.83
Model 5: Bifactor model with two lower-order factors and one general factor	2903.02 <sup>e</sup>	0.07	0.07	0.81
Model 6: Two factors	4377.61 <sup>f</sup>	0.11	0.09	0.68
Model 7: One factor	6198.80 <sup>g</sup>	0.14	0.11	0.52

Note: N=700. Final selected model denoted in bold. <sup>a</sup>df=734,  $p < .001$ ; <sup>b</sup>df=730,  $p < .001$ ; <sup>c</sup>df=686,  $p < .001$ ; <sup>d</sup>df=731,  $p < .001$ ;

<sup>e</sup>df=694,  $p < .001$ ; <sup>f</sup>df=735,  $p < .001$ ; <sup>g</sup>df=736,  $p < .001$ .

factors as Model 2 and a general higher-order factor (acquired capability for maladaptive behaviors). Despite also having adequate model fit, model 4 showed slight but significant decrement in model fit in comparison to model 2 ( $\Delta\chi^2_{(45)}=609.93, p < .001$ ), suggesting that the presence of a hierarchical factor structure with a higher-order general factor was not a better fit to the data than the more parsimonious model with only lower-order factors. As neither the bifactor structure of model 3 nor the hierarchical factor structure of model 4 was a significantly better fit than the more parsimonious model with only lower-order factors, Model 2 was selected for all further comparisons.

To determine whether the level of complexity inherent in model 2 was necessary, two more parsimonious models were tested to determine if Model 2 showed improvement in fit over more simplified models. Model 5 represented a bifactor two-factor model (acquired capability for disordered eating and acquired capability for problematic alcohol use) with a general factor (acquired capability for maladaptive behaviors), Model 6 represented a two factor model (acquired capability for disordered eating and acquired capability for problematic alcohol use with no over-arching factor) without a general factor, and Model 7 represented a one factor model wherein all items loaded on the same general factor (acquired capability for maladaptive behaviors). Models 5-7 showed dramatic decrements in fit from Model 2 (Model 5:  $\Delta\chi^2_{(8)}=846.34, p < .001$ ; Model 6:  $\Delta\chi^2_{(49)}=2320.93, p < .001$ ; Model 7:  $\Delta\chi^2_{(55)}=4395.91, p < .001$ ), suggesting that a solution with only four lower-order factors was the most suitable fit to the data.

Since Model 2 had significantly better fit than Models 1-2 and Models 4-7, Model 2 was selected as the final model. Examination of the standardized path coefficient for the final model (presented in figure 9) revealed mostly moderate to high loadings of all

variables on their respective factors (standardized coefficients ranging from .31 to .94 and  $R^2$  ranging from .08 to .88) with all paths being statistically significant at the  $p < .001$  level.

As such, hypothesis 3 was fully supported, in that confirmatory factor analysis substantiated the four-factor solution suggested by exploratory factor analysis and found this four factor model to have adequate fit. Competing hypothetical factor structures with the addition of higher-order or general factors did not significantly contribute to model fit. Examination of alternative, more parsimonious factor solutions (such as two-factor solution with a general factor, a two-factor solution, and a one factor solution) showed substantial significant decrements in model fit, suggesting that the four-factor solution (with no higher order factors) suggested by the exploratory factor analysis is the most adequate description of the data.

Therefore, since the four-factor solution was supported by both exploratory and confirmatory factor analysis, this solution was selected as the final factor structure, and items corresponding to those factors were subsequently treated as measure subscales. Descriptive statistics for these subscales are presented in Table 17. In general, all subscales were normally distributed and showed minimal range restriction. Cronbach's alpha was computed for each subscale to determine adequate internal consistency, as it was hypothesized (H4) that the final four factors (capability-enhancing events for problematic alcohol use, capability-related beliefs for problematic alcohol use, capability-enhancing events for disordered eating, and capability-related beliefs for disordered eating) would show acceptable internal consistency (Cronbach's alpha of .70 or

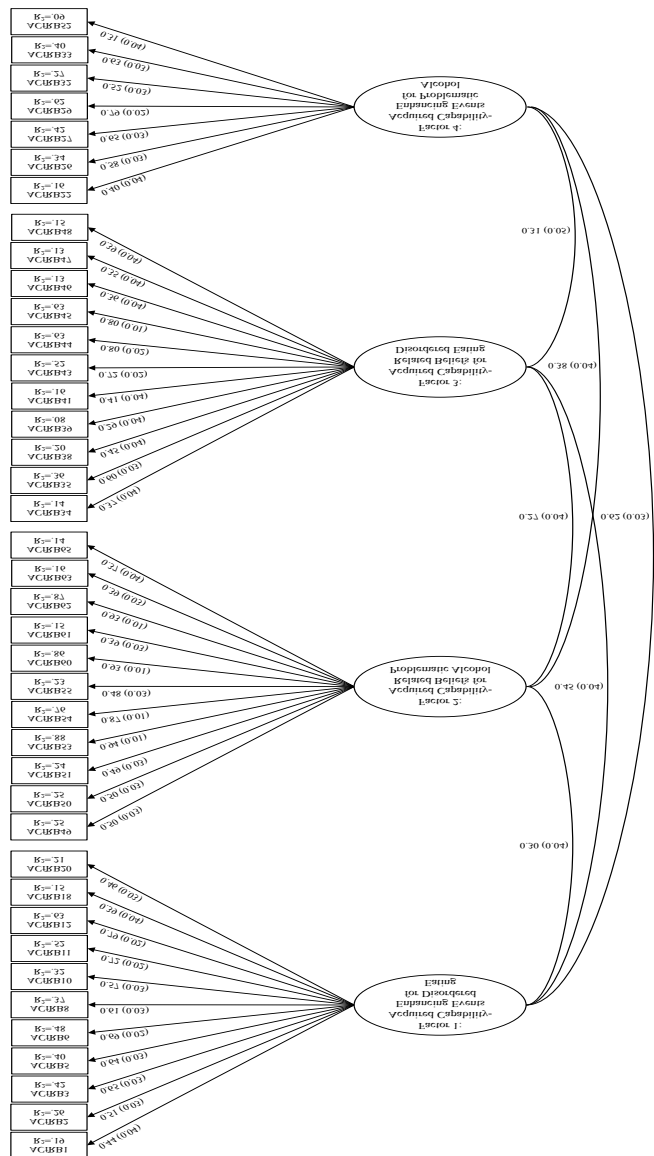


Figure 9. Standardized path estimates for the confirmatory factor analysis of the four-factor model of the "Acquired Capability for Maladaptive Behaviors" scale. All paths are statistically significant at the  $p < .001$  level. Model fit is adequate to good:  $\chi^2_{(730)} = 2056.68$ ,  $p < .0001$ ; SRMSR = 0.06; RMSEA = 0.06; CFI = 0.88. Covariance estimates for correlated error variances included in model but not depicted are: Items 5 & 8 (0.22), 34 & 35 (0.38), 38 & 39 (0.57), and 50 & 51 (0.55). (See supplemental file for larger version of image.)



greater).<sup>11</sup> This hypothesis was fully supported (see Table 17), implying that the four subscales of the "Acquired Capability for Maladaptive Behaviors" demonstrated adequate reliability.

Next, to satisfy aim 2, the process of establishing convergent, divergent, and incremental validity for the "Acquired Capability for Maladaptive Behaviors" scale was begun. Hypotheses 5 and 6 required the use of correlations to examine the pattern of associations between the newly-created measures and self-reported behavior. It was hypothesized (H5) that acquired capability-enhancing events and acquired capability-related beliefs for disordered eating would show large positive associations with self-reports of disordered eating (i.e.,  $r_s > .50$ ), and lower, minimal associations with self-reports of problematic alcohol use (i.e.,  $r_s < .20$ ), and that (H6) acquired capability-enhancing events and acquired capability-related beliefs for problematic alcohol use would show large positive associations with self-reports of problematic alcohol use (i.e.,  $r_s > .50$ ), and lower, minimal associations with self-reports of disordered eating (i.e.,  $r_s < .20$ ).<sup>12</sup> One-tailed Pearson product-moment correlations (alpha set at .05 with adjusted Bonferroni corrections as appropriate) were used to determine if the newly-developed

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<sup>11</sup> Internal consistency for a higher-order or general factor (acquired capability for maladaptive behaviors) was not calculated, as the confirmatory factor analysis did not support the inclusion of a higher-order or general factor.

<sup>12</sup> Magnitudes of predicted associations were chosen based on established practices in the field (DeVellis, 2003; Nunnally, 1978).

Table 17

*Descriptive statistics and statistical assumption information for the subscales of the final four-factor "Acquired Capability for Maladaptive Behaviors" scale.*

Subscales	Mean (SD)	Min / Max	Skewness	Kurtosis	$\alpha$
Acquired Capability-Enhancing Events for Disordered Eating	2.72 (1.18)	1.00 / 7.00	0.82	0.33	0.86
Acquired Capability-Related Beliefs for Problematic Alcohol Use	2.83 (1.32)	1.00 / 7.00	0.34	-0.68	0.90
Acquired Capability-Related Beliefs for Disordered Eating	3.21 (1.08)	1.00 / 6.82	0.43	0.11	0.80
Acquired Capability-Enhancing Events for Problematic Alcohol Use	3.70 (1.20)	1.00 / 7.00	0.42	-0.22	0.76

Note:  $N=700$ . Possible scale range for all subscales was 1-7. No subscales exceeded the skewness or kurtosis critical values of 2.0, suggesting that all subscales showed reasonable degrees of normality. Additionally, no subscales fell below the critical alpha value of 0.70, suggesting that all subscales showed reasonable levels of reliability.

behaviorally-specific subscales showed sufficient construct validity.<sup>13</sup> The results of these analyses are presented in Table 18.

Convergent validity was suggested for all subscales by demonstrating highly significant positive correlations between each behaviorally-specific subscale and self-reports of participation in that risky behavior in the last year. All subscales met the stringent threshold of  $r > .50$ , except for acquired capability-related beliefs for disordered eating which fell slightly short at  $r = .43$ . Likewise, divergent validity was suggested by demonstrating low and/or nonsignificant correlations between each behaviorally-specific subscale and self-reports of participation in the alternate risky behavior group. All subscales met the stringent threshold of  $r < .20$ , except for acquired capability-enhancing events for disordered eating which fell slightly short at  $r = .23$ .

Thus, hypothesis 5 was partially supported, in that the acquired capability for disordered eating subscales demonstrated high significant correlations with self-report of disordered eating behavior in the past year (as assessed by the EDE-Q) and low correlations with self-report of problematic alcohol use in the past year (as assessed by the AUDIT). The hypothesis was only partially supported because the acquired capability-enhancing events subscale did not exceed the divergent validity threshold of  $r < .20$  and the acquired capability-related beliefs subscale fell short of the convergent

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<sup>13</sup> It is recognized that convergent and divergent validity cannot be fully established merely by examining the pattern of correlations between a newly-created measure and other gold standards (such as behavior). As such, the following analyses were proposed with the recognition that such measures of validity are preliminary and will need to continue to be validated in additional samples and with other research designs (e.g., prospective longitudinal studies, experimental studies) in the future before full confidence of validity can be established. However, exploration of the patterns of associations between the newly-created measures and relevant other variables (i.e., the risky behavior of interest, other variables associated with the behavior of interest by the literature) is a necessary first step of establishing preliminary construct validity.

Table 18

*Patterns of association to determine convergent and divergent validity, as assessed by Pearson product moment correlations between the subscales of the newly-developed "Acquired Capability for Maladaptive Behaviors Scale" and self-report of problematic behavior in the past year*

Subscales	EDE-Q	AUDIT
Acquired Capability-Enhancing Events for Disordered Eating	0.56***	0.23***
Acquired Capability-Related Beliefs for Problematic Alcohol Use	0.15***	0.52***
Acquired Capability-Related Beliefs for Disordered Eating	0.43***	0.17***
Acquired Capability-Enhancing Events for Problematic Alcohol Use	0.18***	0.59***

*Note: N=700. EDE-Q=Eating Disorder Examination-Questionnaire; AUDIT=Alcohol Use Disorder Identification Test. \*\*\*  $p < .001$*

validity threshold of  $r > .50$ . However, all associations came reasonably close to the stringent cut-off values and were in the expected directions. Hypothesis 6 was fully supported, in that the acquired capability for problematic alcohol use subscales demonstrated high significant correlations with self-report of problematic alcohol use in the past year (as assessed by the AUDIT) and low correlations with self-report of disordered eating in the past year (as assessed by the EDE-Q). Both subscales met stringent threshold for both convergent and divergent validity in the expected directions. Across all four subscales, three out of four met stringent threshold values for convergent and divergent validity; patterns of association for subscales that did not reach stringent threshold were nevertheless of sufficient magnitude in the expected directions, suggesting some degree of convergent and divergent validity.

Finally, a series of hierarchical regression analyses was conducted (in which other common risk factors are entered first) in order to demonstrate incremental validity. Incremental validity would be suggested by demonstrating that acquired capability-enhancing events and acquired capability-related beliefs for a specific risk behavior continued to show a significant positive association with that specific risk behavior, even when other relevant common risk factors, such as sensation seeking and affective dysregulation, were controlled for. It was hypothesized that (H7) acquired capability-enhancing events and acquired capability-related beliefs for disordered eating would continue to show a positive association with self-reported disordered eating behavior and that (H8) acquired capability-enhancing events and acquired capability-related beliefs for problematic alcohol use would continue to show a positive association with self-reported

problematic alcohol use behavior, even when sensation seeking and affective dysregulation were controlled.

Hierarchical regression analyses were conducted so that common risk factors were entered in the first block, followed by the newly-created behaviorally specific subscales, with self-reported risk behavior as dependent variables. Before the hierarchical multiple regression analyses were performed, independent variables were examined for collinearity; results of the variance inflation factor (VIF) were all less than 2.0 and collinearity tolerance were all greater than .80, suggesting that all estimated  $\beta$ s are well-established in the regression models. All tests of significance had alpha set at .05 (with adjusted Bonferroni corrections as appropriate). The results of these analyses are presented in Tables 19 and 20.

To examine the unique contribution of acquired capability-enhancing events and acquired capability-related beliefs over and above other common risk factors in the explanation of disordered eating symptoms, a hierarchical multiple regression was performed. Variables that were hypothesized to explain disordered eating were entered in two steps. In step 1, the common risk factors of sensation-seeking (as measured by the UPPS Impulsivity subscale score) and affective dysregulation (as measured by the DERS total score) were regressed on disordered eating symptoms, as measured by EDE-Q scores, and, in step 2, the acquired capability-enhancing events and acquired capability-related beliefs for disordered eating subscales were entered into the step 1 equation. The results of step 1 indicated that the first model (including only sensation seeking and affective dysregulation) was statistically significant, but accounted for only 14.2% of the variance in disordered eating ( $F_{(2,698)}=57.49, p < .001, R^2=.14, \text{Adjusted-}R^2=.14$ ). In this model,

affective dysregulation ( $\beta=.38, p < .001$ ) was significantly positively associated with disordered eating symptoms, whereas sensation seeking showed no association ( $\beta=-0.02, p = .56$ ). In step 2, the acquired capability-enhancing events and acquired capability-related beliefs for disordered eating subscales were entered into the regression equation. This model (including sensation seeking, affective dysregulation, acquired capability-enhancing events, and acquired capability-related beliefs) was statistically significant and accounted for 41.8% of the variance in disordered eating ( $F_{(4,696)}=124.60, p < .001, R^2=.42, \text{Adjusted-}R^2=.42$ ). Furthermore, the model showed a significant increase in variance accounted for of 27.7% ( $\Delta R^2=.28, p < .001$ ), suggesting a superior model fit when acquired capability variables were added ( $F_{(2,696)}=165.13, p < .001$ ). Sensation seeking ( $\beta=-0.09, p < .01$ ) and affective dysregulation ( $\beta=.18, p < .001$ ) both remained significant in this model, but comparison of beta weights, partial correlation coefficients, and squared semi-partial correlation coefficients<sup>14</sup> suggested that acquired capability-

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<sup>14</sup> Per Kendall & Stuart (1973), Johnson & LeBreton (2004), Kenny (2011), and Schroeder, Sjoquist, & Stephan (1986), standardized beta weights ( $\beta$ ), partial correlations, and the squared semi-partial correlation all provide slightly different indicators of an independent variable's (IV) influence on the dependent variable (DV) in a multiple regression model. *Standardized beta weights* represent how many standard deviations the DV will change per standard deviation change of that particular IV; as these coefficients are standardized and therefore on the same scale, they can be compared to each other directly as an indicator of relative influence (i.e., relative contributions of that particular IV to the variance accounted for in the DV by the model, when other IVs are held constant). *Partial correlations* also provide an indication of relative influence, in that they measure the degree of association between a DV and an IV, while controlling for the effects of other IVs by correlating the residuals from a linear regression of the IV with the controlled IVs and the DV with the controlled IVs. The *semi-partial correlation* (or *part correlation*) is similar to the partial correlation, but only holds the controlled IVs constant for either the DV or the IV by correlating the residuals from a linear regression of the IV with the controlled IVs and the unresidualized or raw DV. In this way, the semi-partial measures unique and joint variance, whereas the partial only measures unique variance accounted for by an IV. Although the partial correlations can be particularly relevant to certain research designs (i.e., when independent contributions of IVs in relation to each other in a simultaneously-entered model are of interest), regression typically focuses on the semi-partial correlation, which represents the contribution of a single IV in explaining the variance accounted for in the DV, over and above the influence of other IVs. As such, the squared semi-partial coefficient represents the incremental  $R^2$ , or the proportion of variance of the DV accounted for by a given IV after other IVs have already been taken into

Table 19

*Hierarchical regression analyses examining the incremental validity of acquired capability subscales from the "Acquired Capability for Maladaptive Behaviors" scale over other common risk factors in associations with self-reported disordered eating behavior*

Variables	<i>B</i> (SE)	$\beta$	<i>t</i>	Partial	Semi-partial <sup>2</sup>
Step 1					
(Constant)	0.01 (0.26)		0.04 <sup>ns</sup>		
Sensation Seeking	-0.05 (0.08)	-0.02	-0.58 <sup>ns</sup>	-0.02	0.00
Affective Dysregulation	0.77 (0.07)	0.38	10.71***	0.38	0.14
Step 2					
(Constant)	-1.12 (0.22)		-5.00***		
Sensation Seeking	-0.20 (0.07)	-0.09	-3.03**	-0.11	0.01
Affective Dysregulation	0.37 (0.06)	0.17	5.77***	0.21	0.03
Acquired Capability-Enhancing Events	0.50 (0.04)	0.43	13.38***	0.45	0.15
Acquired Capability-Related Beliefs	0.33 (0.04)	0.26	8.31***	0.30	0.06

*Note:*  $N=700$ .  $R^2=.14$  for Step 1 (Adjusted- $R^2=.14$ ) and  $\Delta R^2=.28$  for Step 2,  $ps < .001$ . <sup>ns</sup> not significant, \*\* $p < .01$ , \*\*\* $p < .001$ .



Table 20

*Hierarchical regression analyses examining the incremental validity of acquired capability subscales from the "Acquired Capability for Maladaptive Behaviors" scale over other common risk factors in associations with self-reported problematic alcohol use*

Variables	<i>B</i> (SE)	$\beta$	<i>t</i>	Partial	Semi-partial <sup>2</sup>
Step 1					
(Constant)	-0.53 (0.10)		-5.41***		
Sensation Seeking	0.23 (0.03)	0.27	7.66***	0.28	0.07
Affective Dysregulation	0.20 (0.03)	0.25	7.06***	0.26	0.06
Step 2					
(Constant)	-0.89 (0.09)		-9.96***		
Sensation Seeking	0.09 (0.03)	0.10	3.23**	0.12	0.01
Affective Dysregulation	0.11 (0.02)	0.14	4.64***	0.17	0.02
Acquired Capability-Enhancing Events	0.13 (0.01)	0.30	9.80***	0.35	0.08
Acquired Capability-Related Beliefs	0.15 (0.01)	0.38	11.62***	0.40	0.12

*Note:*  $N=700$ .  $R^2=.15$  for Step 1 (Adjusted- $R^2=.15$ ) and  $\Delta R^2=.25$  for Step 2,  $p_s < .001$ . \*\*  $p < .01$ , \*\*\*  $p < .001$ .

enhancing events ( $\beta=.43, p < .001$ ) and acquired capability-related beliefs ( $\beta=.26, p < .001$ ) were of greater influence than these common risk factors (see Table 19).

A similar hierarchical multiple regression was conducted to examine the unique contribution of acquired capability-enhancing events and acquired capability-related beliefs over and above other common risk factors in the explanation of problematic alcohol use. Variables that were hypothesized to explain problematic alcohol use were entered in two steps. In step 1, the common risk factors of sensation-seeking (as measured by the UPPS Impulsivity subscale score) and affective dysregulation (as measured by the DERS total score) were regressed on symptoms of problematic alcohol use, as measured by AUDIT scores, and, in step 2, the acquired capability-enhancing events and acquired capability-related beliefs for problematic alcohol use subscales were entered into the step 1 equation. The results of step 1 indicated that the first model (including only sensation seeking and affective dysregulation) was statistically significant, but accounted for only 14.7% of the variance in problematic alcohol use ( $F_{(2,698)}=59.83, p < .001, R^2=.15, \text{Adjusted-}R^2=.15$ ). In this model, both affective dysregulation ( $\beta=.25, p < .001$ ) and sensation seeking ( $\beta=.27, p < .001$ ) were significantly positively associated with problematic alcohol use. In step 2, the acquired capability-enhancing events and acquired capability-related beliefs for problematic

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account. The hierarchical nature of hierarchical multiple regression already controls in step 2 for the potential influence on the DV of the IVs entered in step 1; as such, the partial and semi-partial correlations are similar to the standardized beta weights in these analyses and lead to analogous conclusions. Both standardized ( $\beta$ ) and residual-based (partial and squared semi-partial) coefficients are presented here. *Dominance analysis*, another popular method of determining relative IV influence, does so by calculating the proportion of predictable DV variance accounted for by a given IV by computing the average increase in  $R^2$  across all possible non-submodels in simultaneous multiple regression. Dominance analysis is not utilized here, as its creators do not recommend its usage to test specific hierarchical models (Azen & Budescu, 2003; Budescu, 1993).

alcohol use subscales were entered into the regression equation. This model (including sensation seeking, affective dysregulation, acquired capability-enhancing events, and acquired capability-related beliefs) was statistically significant and accounted for 39.5% of the variance in problematic alcohol use ( $F_{(4,696)}=112.87, p < .001, R^2=.40$ , Adjusted- $R^2=.39$ ). Furthermore, the model showed a significant increase in variance accounted for of 24.8% ( $\Delta R^2=.25, p < .001$ ), suggesting a superior model fit when acquired capability variables were added ( $F_{(2,696)}=141.64, p < .001$ ). Sensation seeking ( $\beta=0.10, p < .01$ ) and affective dysregulation ( $\beta=.14, p < .001$ ) both remained significant in this model, but comparison of beta weights, partial correlation coefficients, and squared semi-partial correlation coefficients<sup>13</sup> suggested that acquired capability-enhancing events ( $\beta=.30, p < .001$ ) and acquired capability-related beliefs ( $\beta=.38, p < .001$ ) were of greater influence than these common risk factors (see Table 20).

As such, hypotheses 7 and 8 were supported, in that acquired capability-enhancing events and acquired capability-related beliefs for both disordered eating and problematic alcohol use continued to show a positive association with self-reported behavior, even when common risk factors (sensation seeking and affective dysregulation) were controlled.

## **Discussion**

The purpose of Study 2 was to establish the preliminary reliability (Aim 1) and validity (Aim 2) of the "Acquired Capability for Maladaptive Behaviors" scale. In Aim 1, it was hypothesized that the "Acquired Capability for Maladaptive Behaviors" scale would demonstrate adequate reliability, as established through exploratory and confirmatory factor analysis and examination of internal consistency. As expected,

exploratory factor analysis using a bootstrapping parallel analysis procedure produced a four-factor solution, with factors corresponding to acquired capability-enhancing events for disordered eating, acquired capability-related beliefs for disordered eating, acquired capability-enhancing events for problematic alcohol use, and acquired capability-related beliefs for problematic alcohol use. This factor solution was corroborated as being an adequate fit to the data by confirmatory factor analysis, and adequate to excellent internal consistency was found for each of the four subscales suggested by factor analyses.

It is not surprising that the hypothesized four-factor solution was found, as the scale was designed to assess two aspects of acquired capability (acquired capability-related beliefs and acquired capability-enhancing events) for two domains of maladaptive risky behavior (disordered eating and problematic alcohol use). The idea that acquired capability has both a physiological and cognitive component is strongly supported by the field of suicidology, wherein the construct of acquired capability was first elaborated (Joiner, 2005; Van Orden et al., 2008). Joiner's Interpersonal-Psychological Theory of self-harm behavior has been extensively supported by the empirical literature (Joiner, 2005; Joiner et al., 2005; Joiner et al., 2007; Joiner et al., 2009a; 2009b; Selby et al., 2010; Stellrecht et al., 2006). According to this theory of self-destructive behavior, many persons may have the desire to hurt themselves as a result of their life experiences or common risk factors, such as affective dysregulation or sensation-seeking traits; however, only certain persons are able to override their self-preservation instincts and engage in self-destructive behavior. Joiner's theory states that those who are capable of engaging in self-harmful acts have acquired this capability through experiential or vicarious exposure to painful and provocative events that have allowed them to habituate to the physical and

emotional pain associated with such acts. This exposure to painful and provocative events functions as “practice,” causing a gradual wearing down through repeated habituation to the pain and fear associated with self-harm (Joiner, 2005), as would be suggested by opponent-process theory (Solomon, 1980). This habituation includes a developed physical tolerance to the noxious physiological effects associated with the risky behavior, as well as extinction of the fear, disgust, shame, or emotional pain associated with engaging in self-harmful acts. Acquired capability for self-harm develops through repeated exposure to life-events that allow one to develop both physiological habituation and the cognitive belief that one can withstand noxious physical and emotional effects as means to an end (Van Orden et al., 2008; Bender et al., 2007).

Although the cognitive and physiological aspects of acquired capability had never previously been studied outside the field of self-harm, the overwhelming evidence for the construct’s existence in one field of risky behavior was suggestive that similar physiological and cognitive/affective processes may occur across problematic behaviors and was the impetus for the creation of the "Acquired Capability for Maladaptive Behaviors" scale. The fact that a stable four-factor structure was found, as hypothesized, lends support to the possibility that the acquired capability construct may play a role in other domains of risk. Extending the construct of acquired capability into the fields of disordered eating and problematic alcohol use may help to explain findings that are similar across domains of risky behavior, such as the fact that past participation in the behavior is highly predictive of future participation in the behavior and behaviors tends to escalate over time (Ham & Hope, 2003; Stice, 2002), factors commonly referenced in the acquired capability for self-harm literature (Brown et al., 2000; Darke & Ross, 2002;

Holm-Denoma et al., 2008; Joiner et al., 2005; 2007; 2009; Kidd & Kral, 2002; Tarquini et al., 2008).

Contrary to what was hypothesized but also possibly a result of similarities across domains of risk, factor analyses identified several item cross-loadings on two of the four subscales, corresponding to capability-enhancing events for disordered eating (factor 1) and problematic alcohol abuse (factor 4), respectively. These life events items were empirically identified through the factor analysis as being similar to items meant to assess acquired capability-enhancing events for both problematic alcohol use and disordered eating. It is not overwhelmingly surprising that several items cross-loaded, as it is theoretically possible that certain events in the learning history may be associated with the development of multiple risky behaviors (Fotti, Katz, Afifi, & Cox, 2006; King et al., 2003); in this way, the events measured by these items may increase one's capability in multiple categories of risk, not just one. For example, being prescribed medication that makes a person feel woozy or high was initially conceptualized as an item that would represent a capability-enhancing event for problematic alcohol use; however, the data suggested that this also contributed as a capability-enhancing event for disordered eating, possibly because feeling woozy is an effect that one must also habituate to after engaging purging behavior or periods of fasting. Similarly, witnessing others drink to the point of intoxication, originally conceptualized as a means of vicariously habituating to alcohol's negative physical effects, may also contribute similar habituation to the negative physical effects shared by disordered eating behavior (i.e., nausea, vomiting, headaches, etc.). Given the high comorbidity of disordered eating and problematic alcohol use in college females (between 12-55%; Blinder et al., 2006; Grilo et al., 1995; Holderness et al., 1994;

Higuchi et al., 1993; Taylor et al., 1993; von Ranson et al., 2002; Wilson, 1991, amongst myriad others), it is not surprising that some risk factors may increase capability for both problem domains.

It is probable that risk for problematic alcohol use and disordered eating may have several capability-enhancing events in common (e.g., experiential or vicarious exposure to gastrointestinal distress, feeling lightheaded, experiencing headaches, etc.), much as common risk factors such as affective dysregulation and sensation seeking frequently serve as a common diathesis for myriad variants of disorder (Folkman & Moskowitz, 2004; Hittner & Swickert, 2006; Linehan, 1993; Spoor et al., 2007; Willis et al., 2009; Zuckerman & Neeb, 1979). These clusterings of risk may also be responsible for the higher likelihood of other types of psychopathology frequently found in familial probands or peer groups of persons exhibiting disordered eating or problematic alcohol use (Bierut, Dinwiddie, Begleiter, Crowe, Hesselbrock, Nurnberger, ... & Reich, 1998; Lilenfeld, Kaye, Greeno, Merikangas, Plotnicov, Pollice, ... & Nagy, 1998; Merikangas, Stevens, Fenton, Stolar, O'Malley, Woods, & Risch, 1998; Trace, Baker, Penas-Lledo, & Bulik, 2013; Wade, Martin, Tiggemann, Abraham, Treloar, & Heath, 2000). Most likely, a combination of influences – genetic and environmental, biological and experiential, vicarious and lived – all ultimately culminate in the development of acquired capability for a number of risky behaviors (Bierut et al., 1998; Joiner, 2005; Joiner et al., 2005; 2007; 2009; Lilenfeld et al., 1998; Merikangas et al., 1998; Trace et al., 2013; Wade et al., 2000). Those events common across areas may increase capability for multiple domains of risk, whereas events more specific to a given behavior (i.e., encouragement of dieting behavior for disordered eating or high physiological tolerance to the chemical

properties of alcohol, etc.) may develop independently of other domains of risk and confer specific vulnerability to a particular category of risk. Alternatively, it is possible that third variables such as a chaotic home life or childhood abuse and neglect may be both independently associated with multiple maladaptive risk behaviors, as well as the types of events that would increase acquired capability for these maladaptive behaviors. In this way, acquired-capability enhancing events may be important mediators between common environmental risk factors and the subsequent development of maladaptive behaviors (Joiner, 2005).

Despite the high comorbidity between risky behavior domains (Blinder et al., 2006; Grilo et al., 1995; Holderness et al., 1994; Higuchi et al., 1993; Taylor et al., 1993; von Ranson et al., 2002) and the theoretical rationale for why some items may cross-load, the decision was made to not allow items to be members of more than one subscale/factor. As the goal of this project was to create a measure that would assess *specific* (and not common) risk factors for the maladaptive behaviors of problematic alcohol use and disordered eating, allowing items to cross-load would have reduced the precision of the measure to differentiate between persons at-risk for a given behavior. By having some items cross-load onto multiple scales, the ability for each subscale to specifically associate with a single risk behavior would be reduced. Furthermore, allowing items to cross-load is frequently frowned upon methodologically (Anderson and Gerbing, 1988; DeVellis, 2003), as the goal of measurement development is typically to select items that associate strongly with only the factor they intend to measure. From this standpoint, allowing items to cross-load reduces factor interpretability and introduces measurement error in the form of shared variance (i.e., some disordered eating items



would be rated highly by persons without eating pathology due to their shared association with problematic alcohol use items, etc.). In order to avoid this blurring of the patterns of associations with the criterion behavior hoping to be predicted, these cross-loading items were dropped from the scale (as suggested by Anderson and Gerbing, 1988). Instead, only items that loaded highly on the factor they were purported to measure and that did not load highly on any other factor were used (Anderson and Gerbing, 1988; DeVellis, 2003), increasing interpretability of subscales and precision of construct measurement.

Although a substantial number of items were dropped during the factor analysis process (28 of 68 items, or approximately 41%), the reduction in the number of items did not adversely affect stability of factor structure as corroborated by confirmatory factor analysis or internal consistency of subscales. Frequently, reducing the number of items in a measure may reduce internal consistency (Hays, 2007); however, internal consistency remained adequate to good for all subscales, despite reductions in the number of items. The measure was initially designed with a large number of items in order to counteract the possibility that several items may need to be dropped to create a measure with stable factor structure and clear differentiation between subscales and the constructs they purport to measure (DeVellis, 2003); as such, dropping items was expected. Furthermore, the reduction in length (while retaining sufficient reliability) may be considered a strength, since briefer measures are typically preferred in practical settings, easing the paperwork burden placed on patients or research participants. A briefer, yet still psychometrically strong, scale can be particularly effective as a screener across both research and clinical settings.

Once adequate reliability was found as hypothesized, the second aim of this study was to establish preliminary validity for the newly-designed "Acquired Capability for Maladaptive Behaviors" scale. As hypothesized, validity was sufficiently established by examining patterns of association between acquired capability for a given behavior with criterion behaviors to establish convergent and divergent validity. Three of four subscales met the stringent criteria of correlations less than .20 with the opposite domain of risk for divergent validity. Although one subscale did not meet this strict criteria, this is unsurprising, given the significant association between disordered eating and problematic alcohol use behavior in this sample ( $r = .21, p < .001$ ) and the high comorbidity between these behaviors in the population at large (Blinder et al., 2006; Grilo et al., 1995; Holderness et al., 1994; Higuchi et al., 1993; Taylor et al., 1993; von Ranson et al., 2002; Wilson, 1991). While lack of divergent validity may sometimes suggest a weakness of the construct to differentiate between related concepts, this mild blurring of associations is to be expected when both behaviors are correlated. As such, although one subscale slightly missed stringent criteria for divergent validity, the patterns of associations for all subscales were in expected directions and three of four subscales were of the expected magnitude, suggesting adequate to good differentiation between criterion behaviors for all subscales. The scale performed similarly well in regards to convergent validity, in that three of four subscales met the stringent criteria of correlations greater than .50 with the expected domain of risk (and the remaining subscale only fell slightly short at  $r = .43$ ). As with divergent validity, the patterns of associations for all subscales were in the expected directions and three of four subscales were of the expected magnitude. This

suggests that, despite high comorbidity of problem behaviors, each subscale still is strongly associated with the criterion behavior it was expected to predict.

It is likely that patterns of association were found as hypothesized because great care went into construction of the scale and selection of scale items. An extensive literature review was conducted into events in the life history empirically associated with disordered eating and problematic alcohol use; similarly, a thorough review of cognitive beliefs or expectancies about disordered eating and problematic alcohol use was also completed. All items were derived from life events or beliefs that have been systematically, repeatedly associated with disordered eating (Fairburn, Doll, et al., 1998; Fairburn, Sharan, & Cooper, 1998; Fotti et al., 2006; Graber et al., 1994; Killen et al., 1996; Marchi & Cohen, 1990; Striegel-Moore, 2006; Sher et al., 2005) or problematic alcohol use (Ellis et al., 1997; Fergusson et al., 2002; Fergusson et al., 1999; Fotti et al., 2006; Hill et al., 2000; Sher et al., 2005; Windle, 2000) through rigorous empirical study, and then all items were evaluated for clarity and relevance to the constructs of interest by panels of experts in the fields of disordered eating and problematic alcohol use in Study 1. It is likely that this multi-step process, wherein the empirical literature and experts in the field extensively informed and guided scale construction, helped to strengthen relationships between subscales and criterion behaviors.

Further evidence for the validity of the "Acquired Capability for Maladaptive Behaviors" scale was shown when incremental validity over other common risk factors for disordered eating and problematic alcohol use was demonstrated. As hypothesized, the subscales demonstrated strong incremental validity through the use of hierarchical multiple regression, in that the acquired capability subscales were superior independent

predictors of the criterion behavior over and above the influence of other common predictors of risk, such as affective dysregulation and sensation-seeking. Despite selecting psychometrically-strong measures of common risk factors that are strongly implicated in the development and maintenance of both disordered eating and problematic alcohol use (Gratz & Roemer, 2004; Whiteside & Lynam, 2001; Whiteside et al., 2005), the subscales of the newly-designed "Acquired Capability for Maladaptive Behaviors" scale were significantly more strongly associated with disordered eating and problematic alcohol use than either common risk factor, even when the effects of the common risk factors were controlled. Considering the enormous research base linking affective dysregulation and sensation-seeking to the maladaptive behaviors of disordered eating and problematic alcohol use both cross-sectionally and longitudinally (Brody & Ge, 2001; Ghaderi, 2003; Krug et al., 2009; Measelle et al., 2006; Shoal et al., 2005; Stice, 2001; 2002; Stice et al., 1998; Waxman, 2009; Willis et al., 1999), finding incremental validity for this newly-developed measure over and above the effects of these well-substantiated common risk factors is strong evidence of the measure's utility.

Given that the results of this study suggest that the measure is both reliable and valid, these findings of incremental validity imply that acquired capability could be an extremely powerful explanatory construct in both research and clinical conceptualization of risk behaviors, including both disordered eating and problematic alcohol use. The use of acquired capability as a differentially-specific risk factor could ultimately expand conceptualizations of risky behavior in research, as well as simplify identification and assessment of persons at-risk clinically. Acquired capability can pose as a unifying framework for conceptualization of many commonly-cited risk factors, functioning as a

parsimonious theory that synthesizes theories of childhood family environment, life events, physiological tolerance, and cognitive beliefs. Instead of using myriad measures of potential risk factors to shed light on the mechanisms of maladaptive behavior, assessment of acquired capability may provide a useful framework for those in the fields of disordered eating and problematic alcohol use, just as it revolutionized the field of suicidology and self-harm a few short years ago.

Although future studies will need to replicate these results and validate the measure more extensively in other populations, the findings of this study strongly imply that the "Acquired Capability for Maladaptive Behaviors" scale demonstrates strong preliminary reliability and validity.

## **General Discussion & Conclusions**

The purpose of this project was to create a scale of acquired capability for engaging in disordered eating and problematic alcohol use behaviors (study 1), and establish the measure's preliminary reliability and validity in a nonclinical sample of college students (study 2). The creation of this scale was theoretically important, as much of the research in risk factors for maladaptive behaviors has focused on factors common across many domains of risk, rather than factors that can specifically predict engagement in a given maladaptive behavior (Comeau et al., 2001; Claes et al., 2005; Dawe & Loxton, 2004; Fischer et al., 2007; Fox et al., 2008; Loxton & Dawe, 2001; Martin et al., 2002; Moses & Barlow, 2006; Sim & Zeman, 2006; Spoor et al., 2007; Whiteside et al., 2007). To date, no one has looked at acquired capability as a specific predictor across risk groups. Although self-harm researchers have utilized this construct in regards to one specific type of maladaptive behavior (Joiner et al., 2005; 2007; 2009), an exploration of the relationships between the physiological and cognitive/affective aspects of acquired capability across domains of risk has never previously been conducted. This prior narrow look has limited knowledge and broader theoretical development in the literature, as well as the possibility of more targeted and efficacious interventions. As such, the current study has the potential to make a tremendous contribution to the literature, both in the way of a new measure and a novel conceptual understanding.

This dissertation attempted to address some of those critical gaps in the literature through two studies. Study 1 developed a measure of acquired capability to engage in risky behaviors such as disordered eating and problematic alcohol use. Similar to measures already designed for the field of self-harm, this newly-designed measure assesses both physiological and cognitive/affective components of acquired capability by exploring the role of exposure and habituation to certain events in the learning history in the development of capability-related beliefs. Study 2 validated this measure by testing the associations between common risk factors for risky behavior (e.g., affect dysregulation, sensation-seeking), and specific risk-factors (e.g., capability-enhancing events in the learning history and subsequently-developed capability-related beliefs) in a sample of college undergraduates. Results of study 2 clearly indicate that the "Acquired Capability for Maladaptive Behaviors" scale demonstrates adequate psychometric properties, including a stable four-factor structure, good internal consistency of subscales, and preliminary evidence of convergent, divergent, and incremental validity. In this manner, the goals of the project were met, in that a measure of acquired capability for disordered eating and problematic alcohol use was created that showed strong associations with criterion behaviors, even when the effects of other established common risk factors such as affective dysregulation and sensation-seeking were controlled.

These studies had a number of substantial strengths. First and foremost, this dissertation sought to create a useful theoretical framework for conceptualization of risky behavior, and established preliminary reliability and validity of a measure of the acquired capability construct for disordered eating and problematic alcohol use behaviors. Previous research has underemphasized the importance of examining risk factors

transdiagnostically, and the acquired capability framework provides a potentially helpful conceptualization for developing risk factor research across domains of risk, as well as provides a possible way in which to determine specific trajectories of problematic behavior. Furthermore, this measure was developed by building on the long history of research and theory in the fields of suicidology, disordered eating, and problematic alcohol use, allowing for the strengths of each of these fields to inform development of measure items from a transdiagnostic perspective. Lastly, in Study 1, these items were then reviewed for clarity, relevance, and breadth of construct coverage by a panel of extremely well-regarded experts in the fields of disordered eating and problematic alcohol use (participants had an average of over 160 published articles in their field of expertise). It was a particular strength to obtain input from experts within these fields in order to most effectively bridge theory transdiagnostically. As a result, Study 1 was able to produce a strong pool of items to be further developed in Study 2.

Study 2 also had numerous strengths. Most notably, this study utilized a large diverse sample of 700 participants, making its results more generalizable to other college-aged females, a population particularly at-risk for disordered eating and problematic alcohol use (Anderson & Petrie, 2012; Correia, Murphy, & Barnett, 2012; Matthews, Zullig, Ward, Horn, & Huebner, 2012; Ragsdale, Porter, Zamboanga, St. Lawrence, Read-Wahidi, & White, 2012; Stice, Rohde, Shaw, & Marti, 2012). Despite being drawn from a psychology undergraduate participant pool, this strong validation sample closely approximated the racial and ethnic breakdown of the university and surrounding geographic area (approximately 60% Caucasian, 18% Hispanic/Latino/a, 11% Black/African-American, 6% Asian, 2.5% multiracial, and 2% another group). The



sample utilized showed a much higher degree of cultural diversity than is often seen in studies utilizing college populations; given that this effort was made to obtain a large number of participants from myriad backgrounds, it is likely that the generalizability of these results is improved over similar studies using more homogenous samples.

Furthermore, the use of both exploratory factor analysis (using a bootstrapping parallel analysis procedure) and confirmatory factor analysis to determine factor structure is methodologically rigorous and lends more confidence relative to the subscale stability than either procedure used alone (DeVellis, 2003). In summary, this use of a multi-step development process across two studies, selection of a strong validation sample, and use of thorough statistical methodology has produced a scale with compelling preliminary evidence of reliability and validity, as well as a novel transdiagnostic approach to the identification of risk for disordered eating and problematic alcohol use behaviors.

### **Limitations**

As with all research, this study had some limitations. First and foremost, the results regarding reliability and validity are preliminary and need to be further validated in other samples. As such, although it appears that evidence for reliability and validity for the "Acquired Capability for Maladaptive Behaviors" scale was sufficient in this sample, that does not rule out the possibility that consistency and associations may change in a different sample of college undergraduate females, let alone other populations.

Additionally, this study did not evaluate the measure's test-retest reliability and the sensitivity of the measure to change over time. While the findings regarding adequate stability of factor structure and good to excellent internal consistency were robust, only replication in different samples will provide corroborating evidence of the measure's

reliability. Future replications should ensure stability of the four-factor solution by confirming the factor structure in additional samples. Future research may also seek to improve model fit, especially considering the original exploratory factor analysis only accounted for 34% of the variance in the data and later confirmatory factor analyses indicated only borderline fit on some statistics. Despite showing great promise as a theoretical framework, it is likely that acquired capability is but one of many constructs interacting to explain the development and maintenance of disordered eating and problematic alcohol use. While it is likely based on these data that acquired capability plays a role in these problematic behaviors, there are surely numerous nodes in the actual model able to most accurately explain disordered eating behavior and problematic alcohol usage. This study remains the first in a long line of inquiry that will necessarily include the examination of genetic and environmental factors and other psychosocial influences (i.e., outcome expectancies, negative and positive urgency, the actual consequences of risk behavior, etc.). Nevertheless, despite the need to replicate these findings and the recognition that acquired capability may be only one of many differentially-specific risk factors for maladaptive behavior, preliminary evidence suggests that the "Acquired Capability for Maladaptive Behaviors" scale is a reliable instrument, and future studies can hopefully further contribute to its psychometric base, expanding its clinical and research utility.

Likewise, correlational and regression analyses also suggested that the measure demonstrates good initial convergent and divergent validity, as well as incremental validity over other already established common predictors of risk. Future studies will also need to replicate these findings, as well as extend the use of the measure to other

populations. An additional limitation of this study is that the results are not generalizable to all persons who engage in disordered eating or problematic alcohol use. Although the emphasis on college females can be justified (as this is a group that is particularly burdened with the morbidity and mortality of disordered eating and problematic alcohol use; Anderson & Petrie, 2012; Correia et al., 2012; Matthews et al., 2012; Ragsdale et al., 2012; Stice et al., 2012), it remains a limitation that this research, conducted with a sample of female college undergraduates currently-enrolled in psychology courses, may not be generalizable to males, younger adolescents, older adults, or even same-age, same-gendered peers in different courses or who are not pursuing higher education. Similarly, this research may not generalize cross-culturally, or even to ethnic or sexual minorities whose groups were not well-represented in this sample. Nevertheless, the sample was relatively racially and ethnically diverse, an improvement over many previous studies in the field of self-destructive behaviors. Of note, future studies should include both males and females, so comparisons of factor stability can be made and it can be empirically determined if acquired capability bears a similar pattern of associations with criterion behaviors across genders. Given the gender differences in disordered eating and problematic alcohol use behaviors (Brady & Randall, 1999; Lewinsohn et al., 2002), there is a distinct possibility that factor structure or magnitude of associations may be different between males and females; as such, future research should empirically determine this possibility.

Furthermore, future research should also replicate the factor structure and patterns of associations using persons experiencing clinical levels of disorder (i.e., alcohol abuse/dependence rather than just problematic alcohol use and anorexia or bulimia

nervosa rather than just disordered eating behaviors). This study utilized a community sample of college students. While college students may experience psychopathology at varying levels of severity (Hopwood & Moser, 2011; Labouliere, 2009), their level of functioning on average is inherently higher than persons experiencing clinical disorders requiring more intensive treatment or causing severe disruption to everyday life (Gotlib, 1984). As such, it is possible that clinical samples may demonstrate different factor solutions, may have differing levels of internal consistency for subscales, or may display different patterns of association between acquired capability and criterion behaviors, due to their likelihood to experience lower levels of psychosocial functioning and higher levels of psychiatric comorbidity. While these future directions are necessary to fully establish the reliability and validity of the measure, preliminary evidence is supportive that the "Acquired Capability for Maladaptive Behaviors" scale is both sufficiently reliable and valid.

Likewise, it is possible that the self-report online administration of the measures used in this study may have skewed the results in some way, in comparison to the results that may have been obtained if life events, beliefs, or behaviors had been observed, discussed via interview, or reported by multiple informants. However, many capability-related beliefs involve internal, cognitive events that would be difficult for others to observe or report, and capability-enhancing events necessarily occurred in the past, requiring external observers to have been present throughout the participant's childhood. Due to these challenges, the self-report format was selected, but it is recognized that the self-report retrospective design of the study may have introduced some degree of bias. Furthermore, it is also recognized that retrospectively reporting on behavior occurring

earlier in the lifespan may be biased and unduly influenced by current experiences and behavior (i.e., participation in current problematic alcohol use may have biased recollections of earlier life events such as alcohol exposure, etc.). Nevertheless, there is some evidence that anonymous self-report measures assessing self-destructive behavior result in as much or greater disclosure than face-to-face interviews regarding the same subject matter (Carter et al., 2001; Scoliers, Portzky, Madge, Hewitt, Hawton, de Wilde, et al., 2009), suggesting that self-report measures may actually reduce social desirability and other reporting biases. Similarly, studies have suggested that participants do not perform differently across online and in-person conditions (Means, Toyama, Murphy, Bakia, & Jones, 2010). Nevertheless, it is possible that the online-administered self-report format may have affected the results found, or that the number of items and measures administered online may have fatigued participants, altering their results in some way; as such, future studies should endeavor to validate further by obtaining data from in-person administration, interviews, multiple informants, or by observation when possible.

Future validation studies may also need to address the complications inherent in studying highly correlated behaviors. Disordered eating and problematic alcohol use are highly comorbid in the population (Blinder et al., 2006; Grilo et al., 1995; Holderness et al., 1994; Higuchi et al., 1993; Taylor et al., 1993; von Ranson et al., 2002; Wilson, 1991); thus, it stands to reason that acquired capability-enhancing events and acquired capability-related beliefs for these behaviors may overlap as well. The decision was made to drop items that cross-loaded onto multiple factors in order to have cleaner differentiation of acquired capability factors for each behavior. This decision, while methodologically rigorous, may have omitted events or beliefs that play an important role

in the development of acquired capability, simply because those events or beliefs contribute to *multiple* areas of risk. These common risk factors, behaviors or beliefs that contribute to both acquired capability for disordered eating and problematic alcohol use, are not currently reflected in the "Acquired Capability for Maladaptive Behaviors" scale. While the goal of this study was to produce a measure that could identify acquired capability-enhancing events and acquired capability-related beliefs that could differentiate trajectories of risk between behaviors, future studies may want to explore the importance of events and beliefs that contribute to acquired capability for multiple domains of risk.

Lastly, while correlational and regression analyses suggested that the "Acquired Capability for Maladaptive Behaviors" scale showed strong associations with criterion behaviors and incremental validity over other common risk factors, these results are only preliminary and cross-sectional in nature, which precludes the ability to determine directionality of effects. As such, while literature in the field of self-harm suggests that acquired capability precedes and may even potentially mediate the transition from self-harm ideation to behavior (Joiner et al., 2005; Joiner et al., 2009a; 2009b; Selby et al., 2010; Van Orden et al., 2008), no such empirical literature yet exists for disordered eating or problematic alcohol use. While it is likely that the development of acquired capability for disordered eating or problematic alcohol use precedes the onset of these behaviors (and that participation in these behaviors, in turn, subsequently increases one's acquired capability to continue engaging in the behaviors), temporal precedence can only be shown through the use of longitudinal designs and causation can only be shown using true experimental designs. Given that such necessities of experimental design as random

assignment to groups would be both impossible and unethical, future studies should explore quasi-experimental longitudinal designs that may be more amenable to structural equation modeling to further explore directionality of effects.

However, despite these limitations, the study was able to adequately extend the acquired capability framework to alternative domains of risky behavior, and to create a measure with preliminary evidence of reliability and validity. Future research should continue to develop the acquired capability framework across domains of risk, as well as expand the measurement of acquired capability for maladaptive behaviors to other populations across the developmental lifespan, including males and persons experiencing diagnosable clinical disorders. Additionally, future research should explore the trajectories of how both common and specific risk factors develop over time, clarifying how the intersecting development of acquired capability and other common risk factors interact to produce and maintain maladaptive behaviors. Nevertheless, the development of the "Acquired Capability for Maladaptive Behaviors" measure lays the groundwork and provides critical guidance for such future endeavors. The "Acquired Capability for Maladaptive Behaviors" scale also provides a useful clinical tool that can be used as a potential screening assessment for at-risk populations in intervention and prevention settings, identifying who may be at greater risk for developing a particular constellation of maladaptive behaviors and targeting treatment or prevention endeavors more effectively. As such, this study is an invaluable addition to the literature on risk factors for health risk behaviors.

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## Appendices



## **Appendix A: Proposed Measure Items**

### Acquired Capability-Enhancing Events

#### *Disordered Eating:*

1. I have experienced a period of illness where I suffered from gastrointestinal distress (e.g., nausea, vomiting, lack of appetite, etc.).
2. I have taken medications that have made me feel nauseated or reduced my appetite (for purposes other than losing weight).
3. I have experienced times where I was ridiculed for my appearance, weight, or shape.
4. I have participated in an activity where a certain weight, shape, or appearance is emphasized (i.e., dance, cheerleading, wrestling, etc.).
5. I have been put on a diet or had a diet strongly suggested to me by others.
6. I was overweight as a child.
7. Important people in my life were often on a diet or struggling to alter their weight or shape.
8. I have experienced times of poverty or neglect where I did not have enough to eat.
9. I was encouraged to eat less than I wanted by important people in my life so that my appearance, weight, or shape would change.
10. I grew up in a family with healthy opinions on weight, shape, and diet. (reverse-scored)
11. I have watched a close friend or family member struggle with an eating disorder.
12. Growing up, there was a strong focus in my family or peer group on looking a certain way.
13. My family or peer group often discusses or tries different dieting trends or fads (i.e., not eating carbs, eating only certain foods, etc.).
14. My childhood home had fashion and beauty magazines in it.
15. When I was younger, I played with dolls or action figures that had idealized body types.

#### *Problematic Alcohol Use:*

1. My family members or peers drank alcohol in my presence when I was a child.
2. I have tolerated a period of illness where I suffered from nausea or vomiting.
3. I have tolerated painful headaches.
4. I have taken medications that have made me feel intoxicated, woozy, or high.
5. I have experienced times as a child where I witnessed others drink alcohol to the point of intoxication.
6. My older siblings or family members were drunk in my presence when I was a child.
7. My family members allowed me to drink alcohol before I was of legal age.
8. I participated in an activity where drinking alcohol is emphasized (e.g., sports teams, fraternities/sororities, etc.).
9. I have been pressured to drink alcohol by peers or family members.
10. I have been in social situations where drinking a large amount of alcohol is expected.
11. I drank alcohol before the age of 15.

12. I have watched a close friend or family member struggle with alcoholism.
13. I was exposed to advertising for alcohol on billboards, television, radio, the internet, or in magazines when I was a child.
14. Underage drinking was common where I grew up.
15. Adults did not do much to deter underage drinking in my community.

### Acquired Capability-Related Beliefs

#### *Disordered Eating:*

1. I do not need to eat as much as other people.
2. I can go longer without food than most people and not feel hungry.
3. I can eat a lot more than other people and not feel full.
4. I am disgusted by vomiting. (reverse-scored)
5. I keep exercising, even if it hurts.
6. I can exercise for longer than most people.
7. I have difficulty telling if I'm hungry or full.
8. I need to eat three full meals per day. (reverse-scored)
9. I could make myself vomit if I wanted to. (Even if you have never wanted to make yourself vomit, please answer this question.)
10. I could go long periods of time without eating if I wanted to. (Even if you have never wanted to restrict your food intake, please answer this question.)
11. I can keep dieting even if I feel hungry.
12. I do not mind having an empty stomach or feeling hungry.
13. I like the ache in my muscles after I exercise.
14. I like to look at pictures of persons thinner and more in-shape than I am as inspiration.
15. I am more controlled about my diet and exercise than most people.

#### *Problematic Alcohol Use:*

1. I enjoy drinking, regardless of the consequences.
2. After a night of drinking, I experience hangovers less than most people.
3. After a night of drinking, I am less likely to feel sick than other people.
4. I feel nauseous or get headaches if I drink too much. (reverse-scored)
5. I can drink more than most people without getting drunk.
6. Alcohol does not affect me as strongly as other people.
7. I can still do what I need to the day after a night of drinking.
8. I like feeling "tipsy" or slightly drunk.
9. I feel out of control when I drink. (reverse-scored)
10. I am afraid to get drunk in public or with people I don't know well. (reverse-scored)
11. I am disgusted by vomiting. (reverse-scored)
12. I cannot function after a night of drinking. (reverse-scored)
13. I can drink more than most people without getting drunk.
14. Being around drunk people does not bother me.
15. I have a higher tolerance for alcohol than most people.
16. I have difficulty telling if I'm drunk or not.

## **Appendix B: Definition Sheet**

*Acquired capability:* The ability to engage in a deliberately self-destructive manner to achieve an end, despite the pain, discomfort, fear, disgust, or shame associated with doing so. This capability develops in those who have personally or vicariously experienced substantial and/or repeated exposure to events that have allowed them to habituate to the aversive consequences of such behavior, thereby overriding their own self-preservation instincts. The Joiner Interpersonal-Psychological Theory suggests that, although many persons may experience risk factors for risky behavior, only those individuals that acquire the capability to overcome one's innate desire to avoid pain and negative consequences progress from ideation to action. Acquired capability has both physiological and cognitive/affective components: physical habituation to discomfort and pain that occurs through exposure to *capability-enhancing events* and cognitive/affective habituation to negative affect (i.e., fear, shame, disgust, etc.) that allows one to develop positive beliefs about one's ability to engage in a risky behavior in order to achieve a desired end.

*Capability-enhancing events:* Experiences or events in a person's learning history that expose them to the physical pain/discomfort associated with (fill-in risk group) behavior, allowing them to habituate to the fear and discomfort associated. Enough capability-enhancing events in the learning history allow a person to override their self-preservation instinct through repeated exposure and habituation to pain, thus increasing their acquired capability to enact (fill-in risk group) behaviors.

*Capability-related beliefs:* The cognitive belief that one is capable of tolerating the physical and emotional discomfort that may result from participating in (fill-in risk group) behavior or that one could persevere with a directly (fill-in risk group) behavior despite the fear or pain that such an act could produce. Such a belief does not imply that a person desires to engage in such behavior, only that they believe themselves able if they wanted to do so.

## Appendix C: Sample Keywords for Literature Searches

### *Acquired Capability-Enhancing Events:*

("risk factor" OR "life events" OR learning OR history OR exposure OR habituation OR tolerance) AND

( ("disordered eating" OR anorexia nervosa OR "binge eat\*" OR purging OR bulimia nervosa OR "eating disorder" OR starvation OR compulsive exercise OR "eating pathology" OR dieting)

OR

(self-harm OR self-injury OR suicide OR suicidal OR "suicide attempt" OR "deliberate self harm" OR "non-suicidal self-injury" OR NSSI OR parasuicide OR suicid\* gesture OR "self-injurious behavior")

OR

(drinking OR alcohol OR alcohol use OR alcoholism OR "alcohol dependence" OR "alcohol abuse" OR "alcohol use" OR "binge drinking" OR "problematic drinking" OR "problematic alcohol use" OR "heavy drinking" OR "intoxication" )

### *Acquired Capability-Related Beliefs:*

((cognitions OR beliefs OR learning OR thoughts OR attitudes) AND ("risk factor" OR "life events" OR history OR exposure OR habituation OR tolerance) AND

( ("disordered eating" OR anorexia nervosa OR "binge eat\*" OR purging OR bulimia nervosa OR "eating disorder" OR starvation OR compulsive exercise OR "eating pathology" OR dieting)

OR

(self-harm OR self-injury OR suicide OR suicidal OR "suicide attempt" OR "deliberate self harm" OR "non-suicidal self-injury" OR NSSI OR parasuicide OR suicid\* gesture OR "self-injurious behavior")

OR

(drinking OR alcohol OR alcohol use OR alcoholism OR "alcohol dependence" OR "alcohol abuse" OR "alcohol use" OR "binge drinking" OR "problematic drinking" OR "problematic alcohol use" OR "heavy drinking" OR "intoxication" )

## Appendix D: Acquired Capability for Maladaptive Behaviors (ACMB) scale

Please answer the following questions regarding your experiences in life. For each question select only ONE answer using the scale below.

1	2	3	4	5	6	7
Never experienced this event	Experienced this event ONCE	Experienced this event 2-4 times	Experienced this event 5-10 times	Experienced this event 11-15 times	Experienced this event 16-20 times	Experienced this event frequently (20+ times)

- \_\_\_\_\_ 1. I have experienced a period of illness where I suffered from severe gastrointestinal distress (e.g., extended nausea, vomiting, lack of appetite, diarrhea, etc.).
- \_\_\_\_\_ 2. I have taken medications that have made me feel nauseated or reduced my appetite (for purposes other than losing weight).
- \_\_\_\_\_ 3. I have experienced times where I was ridiculed for my appearance, weight, or shape.
- \_\_\_\_\_ 4. I have participated in an activity where a certain weight, shape, or appearance is emphasized (i.e., dance, gymnastics, figure skating, body building, cheerleading, wrestling, etc.).
- \_\_\_\_\_ 5. I have been put on a diet or had a diet strongly suggested to me by others for weight loss purposes.
- \_\_\_\_\_ 6. Important people in my life were often on a diet or struggling to alter their weight or shape.
- \_\_\_\_\_ 7. I have experienced times of poverty or neglect where I did not have enough to eat.
- \_\_\_\_\_ 8. Important people in my life encouraged me to eat less in order to change or control my appearance, weight, and/or shape.
- \_\_\_\_\_ 9. I grew up in a family that was not preoccupied with food, weight, shape, and/or dieting.
- \_\_\_\_\_ 10. I have watched a close friend or family member struggle with eating disordered behavior (i.e., self-induced vomiting, restrictive eating, etc.).
- \_\_\_\_\_ 11. Growing up, I felt uncomfortable because there was such a strong focus in my family or peer group on looking a certain way.
- \_\_\_\_\_ 12. My family or peer group often discussed or tried different dieting trends or fads (i.e., not eating carbs, eating only certain foods, counting calories, etc.).
- \_\_\_\_\_ 13. The home in which I grew up had many fashion and beauty magazines in it.
- \_\_\_\_\_ 14. When I was younger, I played with dolls or action figures that had idealized body types (i.e., Barbie, G.I. Joe, etc.).

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
Never experienced this event	Experienced this event ONCE	Experienced this event 2-4 times	Experienced this event 5-10 times	Experienced this event 11-15 times	Experienced this event 16-20 times	Experienced this event frequently (20+ times)

- \_\_\_\_\_ 15. I engaged in sports where I had to strenuously exercise for hours at a time or push myself to the limits and keep going despite my pain and muscle fatigue.
- \_\_\_\_\_ 16. When I was sick as a child, I fought my body and tried not to vomit even though I knew I would feel better once I did.
- \_\_\_\_\_ 17. During childhood, there were periods in which I fasted by eating little or nothing at all for a religious or illness-related reason.
- \_\_\_\_\_ 18. During childhood, I was told to wait to eat when I asked for food even when was very hungry.
- \_\_\_\_\_ 19. When I was growing up, my family frequently ate meals together.
- \_\_\_\_\_ 20. Others have pushed me to eat when I wasn't hungry.
- \_\_\_\_\_ 21. I have experienced a period of illness where I suffered from nausea or vomiting.
- \_\_\_\_\_ 22. I have experienced painful headaches.
- \_\_\_\_\_ 23. I have been prescribed and taken medications that have made me feel intoxicated, woozy, or high.
- \_\_\_\_\_ 24. I have experienced times as a child where I witnessed others drink alcohol to the point of intoxication.
- \_\_\_\_\_ 25. My older siblings or family members were drunk in my presence when I was a child.
- \_\_\_\_\_ 26. My family members allowed me to drink alcohol before I was of legal age.
- \_\_\_\_\_ 27. I participated in an activity where drinking alcohol is emphasized (e.g., sports teams, fraternities/sororities, etc.).
- \_\_\_\_\_ 28. I have been pressured to drink alcohol by peers or family members.
- \_\_\_\_\_ 29. I have been in social situations where drinking a large amount of alcohol is expected.
- \_\_\_\_\_ 30. I drank alcohol (more than just a sip) before the age of 15.
- \_\_\_\_\_ 31. I have had a close friend or family member with alcoholism.
- \_\_\_\_\_ 32. I was exposed to advertising for alcohol on billboards, television, radio, the internet, or in magazines when I was a child.
- \_\_\_\_\_ 33. Underage drinking was common where I grew up.

Please read each item below and indicate to what extent you feel the statement describes you *in general*. Rate each statement using the scale below.

1	2	3	4	5	6	7
Not at all like me			Somewhat like me			Very much like me

- \_\_\_\_\_ 34. I do not need to eat as much as other people.
- \_\_\_\_\_ 35. I can go longer without food than most people and not feel hungry.
- \_\_\_\_\_ 36. I can eat a lot more than other people and not feel full.
- \_\_\_\_\_ 37. I am disgusted by vomiting.
- \_\_\_\_\_ 38. I can keep exercising, even if I am in substantial pain or injured.
- \_\_\_\_\_ 39. I can exercise for longer than most people.
- \_\_\_\_\_ 40. I have difficulty telling if I'm hungry or full.
- \_\_\_\_\_ 41. I need to eat at least three times throughout the day.
- \_\_\_\_\_ 42. I could make myself vomit if I wanted to. (Even if you have never wanted to make yourself vomit, please answer this question.)
- \_\_\_\_\_ 43. I could go long periods of time without eating if I wanted to. (Even if you have never wanted to restrict your food intake, please answer this question.)
- \_\_\_\_\_ 44. I can keep dieting even if I feel hungry.
- \_\_\_\_\_ 45. I do not mind having an empty stomach or feeling hungry.
- \_\_\_\_\_ 46. I like the ache in my muscles after I exercise strenuously.
- \_\_\_\_\_ 47. For inspiration, I like to look at pictures of models or athletes who are leaner or in better shape than me.
- \_\_\_\_\_ 48. I am more controlled about my diet and exercise than most people.
- \_\_\_\_\_ 49. I enjoy drinking, regardless of the consequences.
- \_\_\_\_\_ 50. After a night of drinking, I experience hangovers less often or less intensely than most people.
- \_\_\_\_\_ 51. After a night of drinking, I am less likely to feel sick than other people.
- \_\_\_\_\_ 52. I feel nauseous or get headaches if I drink too much.
- \_\_\_\_\_ 53. I can drink more than most people without getting drunk.
- \_\_\_\_\_ 54. Alcohol does not affect me as strongly as other people.
- \_\_\_\_\_ 55. I can still do what I need to do the day after a night of drinking.
- \_\_\_\_\_ 56. I like feeling "tipsy" or slightly drunk.
- \_\_\_\_\_ 57. I feel out of control when I drink.
- \_\_\_\_\_ 58. I am uncomfortable/afraid to get drunk in public or with people I don't know well.
- \_\_\_\_\_ 59. I cannot function after a night of heavy drinking.



<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Not at all like me</b>			<b>Somewhat like me</b>			<b>Very much like me</b>

- \_\_\_\_\_ 60. I can drink more than most people without getting drunk.
- \_\_\_\_\_ 61. Being around drunk people does not bother me.
- \_\_\_\_\_ 62. I have a higher tolerance for alcohol than most people.
- \_\_\_\_\_ 63. I have difficulty telling if I'm drunk or not.
- \_\_\_\_\_ 64. I am not afraid of the consequences of drinking too much.
- \_\_\_\_\_ 65. I am less ashamed of my behavior while drunk than most people.
- \_\_\_\_\_ 66. Blackouts or memory lapses after drinking do not bother me.
- \_\_\_\_\_ 67. I am concerned about conflicts I have with friends or family members over things I said or did while drunk.
- \_\_\_\_\_ 68. I dislike feeling "fuzzy in the head" the day after heavy drinking.