Self-Control Motivation and Capacity Scale:

A New Measure of Multiple Facets of Self-Control

by

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ABSTRACT

Self-control has been shown to predict both health risk and health protective outcomes. Although top-down or "good" self-control is typically examined as a unidimensional construct, research on "poor" self-control suggests that multiple dimensions may be necessary to capture aspects of self-control. The current study sought to create a new brief survey measure of top-down self-control that differentiates between self-control capacity, internal motivation, and external motivation. Items were adapted from the Brief Self-Control Scale (BSCS; Tangney, Baumeister, & Boone, 2004) and were administered through two online surveys to 347 undergraduate students enrolled in introductory psychology courses at Arizona State University. The Self-Control Motivation and Capacity Survey (SCMCS) showed strong evidence of validity and reliability. Exploratory and confirmatory factor analyses supported a 3-factor structure of the scale consistent with the underlying theoretical model. The final 15-item measure demonstrated excellent model fit, chi-square = 89.722 p=.077, CFI = .989, RMSEA = .032, SRMR = .045. Despite several limitations including the cross-sectional nature of most analyses, self-control capacity, internal motivation, and external motivation uniquely related to various self-reported behavioral outcomes, and accounted for additional variance beyond that accounted for by the BSCS. Future studies are needed to establish the stability of multiple dimensions of self-control, and to develop state-like and domain-specific measures of self-control. While more research in this area is needed, the current study demonstrates the importance of studying multiple aspects of top-down self-control, and may ultimately facilitate the tailoring of interventions to the needs of individuals based on unique profiles of self-control capacity and motivation.

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INTRODUCTION

Psychological assessment instruments are constantly evolving to more accurately capture risk and protective factors for both physical and mental health problems. The growing field of self-control utilizes well-established measures that reliably relate to a range of outcomes, but there is a continuing need for further specificity. Building upon measures that have advanced the field in important ways, the current study sought to differentiate important subcomponents of self-control. The goal of this study was to develop a brief, convenient survey measure of self-control that distinguishes between self-control capacity, internal motivation, and external motivation. The hope was that the new Self-Control Motivation and Capacity Scale (SCMCS) would predict engagement in health risk and health protective behaviors above and beyond existing measures of self-control.

Although some researchers believe that self-control is unidimensional, ranging from poor to good behavioral control (Dick et al., 2010), many have adopted the Dual Process Model which suggests that good and poor self-control are qualitatively different (Hofmann, Friese, & Strack, 2009; Friese & Hofmann, 2009; Strack & Deutsch, 2004). Good self-control is a more conscious top-down regulatory process that comprises a variety of subcomponents such as the ability to monitor and adjust one's behavior in anticipation of results, delay gratification, inhibit problematic behavior, and engage in goal-directed behavior. Poor self-control is a more automatic bottom-up impulse that interferes with the ability to plan, delay gratification, anticipate consequences, and modify one's behavior appropriately (Pearson, Kite, & Henson, 2013). Prior studies have found only modest negative correlations (-.13 to -.50) between good and poor self-control

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(Pearson et al., 2013), providing evidence for their distinction. Although poor self-control (e.g., impulsivity) is clearly important in understanding health behavior, the current study focused on developing a multi-faceted measure of top-down or "good" self-control, as prior studies have already demonstrated key subcomponents of poor self-control (Whiteside & Lynam, 2001).

The importance of good self-control has been thoroughly demonstrated in the literature with links to both positive and negative health outcomes (Schroder, Ollis, & Davies, 2013; Tangney, Baumeister, & Boone, 2004). Good self-control has been found to be a robust longitudinal predictor of risk behaviors and outcomes, including substance dependence, poor physical health, financial problems, and criminal activity (Moffitt et al., 2011). It has also been found to predict protective behaviors and outcomes, such as academic achievement, less psychopathology, better interpersonal relationships, exercise, diet, and weight loss success (Tangney et al., 2004; Schroder et al., 2013). Moreover, there is some evidence to suggest that habitual top-down control is a better predictor of long-term outcomes than inhibition of bottom-up impulses. Schroder et al. (2013) found that trait-like habitual (good) self-control predicted positive health outcomes above and beyond other measures of bottom-up impulse control. However, relative to the extensive literature on the multidimensional nature of poor self-control, few studies have examined multiple aspects of "good" top-down self-control in relation to positive and negative behavioral outcomes. To address this gap in the literature, the current study sought to develop a novel multidimensional measure of top-down self-control.

Although the distinction between good and poor self-control is now relatively well established, it is unclear if good self-control is a unidimensional or multidimensional

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construct. Many prior studies have treated good self-control as unidimensional, but there is reason to suspect that it may actually be multidimensional. Bottom-up or "poor" self-control has clearly been demonstrated to be multidimensional in nature and there are well-validated measures to capture these dimensions. For example, the UPPS Impulsive Behavior Scale separates impulsivity into sensation seeking, urgency, and lack of perseverance and premeditation (Whiteside & Lynam, 2001). High sensation seeking and lack of premeditation consistently predict alcohol use, while elevated urgency and lack of perseverance predict alcohol problems but not use (Magid & Colder, 2007; Magid, MacLean, & Colder, 2007). Given the multidimensional nature of poor self-control, it seems likely that top-down or "good" self-control may also contain multiple facets. Consistent with this idea, a meta-analysis of the convergent validity of various behavioral and self-report measures of good self-control by Duckworth & Kern (2011) found only moderate overall convergence (r = .34) and high heterogeneity between different types of measures, indicating that good self-control is heterogeneous.

If good self-control is indeed multidimensional, as evidence seems to suggest, two important facets may be the capacity and the motivation to engage in self-control. Within the cognitive psychology literature, the term "capacity" is sometimes further specified as either the total resource available or the individual's ability to utilize this resource. While both of these are important to self-control, their distinction is difficult to measure precisely and it is likely their combination that drives behavior. Therefore, "capacity" is used here to mean a combination of both aspects of the ability to control oneself. In addition to ability, motivation is an important component of action and is defined as the processes that influence the generation, initiation, maintenance, adjustment, and

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termination of goal-directed thought and behavior (P. Karoly, personal communication, October 14, 2015) or generally, as the determinants of human behavior (Weiner, 1992). Motivation has been shown to be an important predictor of positive life outcomes such as self-esteem and general well-being (Ryan & Deci, 2000). Further, motivation-focused interventions, such as Motivational Interviewing, have been shown to be effective in the promotion of a variety of health-enhancing behaviors, such as diet and exercise, and the cessation of health-damaging behaviors such as substance use (Miller & Rollnick, 2012; Burke, Arkowitz, & Menchola, 2003). Since motivation is a key component in many effective interventions, it seems prudent to examine the potential role of self-control specific motivation in human behavior.

Emerging experimental studies have sought to address the potential distinction between self-control motivation and capacity. For example, a series of recent studies examined whether executive control depletion affects motivation or capacity for engaging in further self-control (Brewer, Spillers, McMillan, & Unsworth, 2011; Brewer, Lau, Wingert, Ball, & Blais, 2015). Good self-control often requires effort which may deplete internal resources, a phenomenon referred to in the literature as ego depletion (Baumeister, Bratslavsky, Muraven, & Tice, 1998). This theoretically leaves those with low baseline levels of these resources vulnerable to bottom-up risk factors. Though the literature has demonstrated strong support for ego depletion, or the exhaustion of resources necessary to engage in self-control, specific mechanisms of ego depletion are the subject of debate (Hagger, Wood, Stiff, & Chatzisarantis, 2010). For example, it is not clear whether ego depletion happens because people are incapable of exercising self-control at the end of a long day or because they no longer want to (Muraven &

Slessareva, 2003). Hagger et al. (2010) conducted a meta-analysis based on 83 studies of ego depletion and found that motivational incentives promoted better performance after a depleting task. In addition, studies of executive control depletion have not consistently found negative transfer to subsequent executive control tasks within session (Brewer et al., 2011). Furthermore, Brewer et al. (2015) found that when motivation was manipulated via reward, the effects of negative transfer were neutralized, suggesting that capacity may be unaffected if motivation can be bolstered. Another recent meta-analysis of ego depletion by Carter, Kofler, Forster, & McCullough (2015) challenged the depletion effect of self-control, finding little evidence that a depleting task affects future laboratory tasks that measure self-control. These findings point to an inconsistency in the resource depletion theory of self-control, which presumes that the capacity to control oneself is affected by exertion. However, it is possible that this inconsistency can be better understood through a more thorough examination of the motivation for self-control.

A new model of self-control proposed by Inzlicht & Schmeichel (2012), the process model of self-control, highlights the importance of the distinction between motivation and attention. This model posits that pairs of motivational and attentional shifts happen after an initial depleting task that lower performance on future self-control tasks. More specifically, motivation to continue to control oneself is reduced while motivation to act impulsively is increased. At the same time, attention to cues signaling the need for self-control is reduced while attention to reward is increased. Reduced performance on subsequent self-control tasks is consistent with this framework. While this model does not include capacity explicitly, it is likely that attention contributes to the

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capacity to control one's behavior. The attentional shifts associated with depletion do not necessarily evidence an inability to regulate, but may underlie an insufficient appraisal of the necessity of self-control. The process model of self-control is an alternative to the resource model of self-control which focuses on capacity. The process model identifies the importance of motivation in self-control behavior, suggesting that it may be even more important than capacity. These findings support the notion that self-control motivation and capacity are distinct and may both be important drivers of behavior.

Despite emerging evidence for potential distinctions between self-control motivation and capacity, most prior research on good self-control has used unidimensional measures of the construct. The most widely used self-report measure of good self-control, the Brief Self-Control Scale (BSCS), includes 13 items that load onto a single higher order construct of self-control. The BSCS includes items such as "I have trouble concentrating" and "Sometimes I can't stop myself from doing something, even if I know it is wrong" (BSCS; Tangney et al., 2004). These items are recoded such that higher scores reflect more good self-control. Although the BSCS has been linked to a variety of both health risk and health protective behaviors and is generally described as a measure of self-control capacity, the extent to which it captures capacity versus motivation is not clear. Unlike behavioral measures, such as the Marshmallow Test (Mischel & Mischel, 1987), that manipulate motivation to engage in self-control by offering a reward, self-report measures simply ask about the extent to which individuals engage in self-control in their everyday lives. The extent to which individuals engage in self-control in the real world is almost surely driven by a combination of motivation and capacity. This presents difficulties when attempting to intervene at the level of self-

control because engagement in health risk and protective behaviors may be driven by either motivation or capacity.

Consistent with the idea that there may be multiple subfacets of good self-control, new studies are attempting to differentiate self-control motivation and capacity (Tittle, Ward, & Grasmick, 2004; Hofmann & Kotabe, 2012). Working from Gottfredson and Hirschi's (1990) General Theory of Crime which emphasizes individual self-control, Tittle et al. (2004) developed a self-control measure with two subscales (desire to engage in self-control and capacity for self-control) and found that these subfacets of self-control predicted different aspects of misbehavior. They found cumulative and interactive effects of self-control motivation and capacity on criminal behavior and deviance. To our knowledge, this is the only formal measure differentiating self-control motivation and capacity, and the measure has contributed significantly to the study of self-control in the context of criminology research. It is worth noting, however, that the desire to exercise self-control subscale included both internal and external pressures to conform. Moreover, the measure was developed for use with a very specific population (the criminal justice system). Because the items largely focus on assessing deviance, such a measure is likely to show low base rates in the general population and fail to detect more nuanced effects. Thus, a similar measure adapted for general population samples is clearly needed.

In addition to the theoretical importance of capturing unique subfacets of good self-control, differentiating between self-control capacity and motivation is relevant to intervention efforts. From a developmental perspective, factors that influence self-control change throughout the lifespan (Hay & Forrest, 2006; Romer, Duckworth, Sznitman, &

Park, 2010). In adolescence, self-control capacity is often low due to increases in sensitivity to reward, impulsivity, and sensation seeking (Steinberg, 2008; Steinberg et al., 2008; Boyer, 2006), and parental supervision provides key external motivation to engage in self-control (Laird, Pettit, Bates, & Dodge, 2003; Fletcher, Steinberg, & Williams-Wheeler, 2004). In addition, exploration of risky behaviors and associated adverse consequences typically increases when adolescents move away from home and close parental monitoring (DiClemente et al., 2001). In early adulthood, capacity increases with brain maturation (Steinberg, 2008), but there may be low motivation to control risky behavior in settings where it is normative. For example, in an environment such as college where the motivation to limit drinking alcohol is often low, many individuals meet criteria for an Alcohol Use Disorder, but mature out of this behavior when they take on roles that demand self-control, such as a job or marriage (Fillmore, 1988). Though there is evidence that this maturing out process may operate at least partially through personality change, such as reductions in impulsivity (Littlefield, Sher, & Wood, 2009), research has also demonstrated low readiness to change negative behaviors during this developmental period (Caldwell, 2002) despite the many adverse consequences of drinking observed in college samples. This serves as an example of low motivation even when behaviors are interfering with the ability to function successfully. Therefore, existing measures of good self-control may not simply capture capacity when used with college students and other emerging adults. Together, prior studies point to a multifaceted nature of good self-control and indicate the need to examine capacity and motivation separately.

Even within the construct of self-control motivation, it is important to distinguish between internal motivation driven by things like personal values and views of morality, and external motivation resulting from pressure from peers, society, and parents (Silver & Ulmer, 2012). This distinction has been found to be important in assessing motivations for alcohol consumption (and other drug use). The Drinking Motives Questionnaire (Cooper, Russell, Skinner, & Windle, 1992) assesses coping and enhancement motives, which stem from internal sources of motivation, separately from conformity and social facilitation motives, which can be thought of as external motivators. Since there is evidence for a distinction between external and internal motivators of risk behavior and related consequences, it follows that a similar distinction may be important for understanding protective behaviors such as exercise and good nutrition. Moreover, Self-Determination Theory has shown that intrinsically motivated and extrinsically motivated goals lead to different levels of well-being (Ryan & Deci, 2000), highlighting the potential importance of this distinction when relating self-control to behavioral outcomes.

Given preliminary evidence for the distinction between capacity and motivation for self-control, the current study aims to create a measure that can differentiate between these important subcomponents of good self-control. The primary study hypothesis is that the Self-Control Motivation and Capacity Scale will account for unique variability in positive and negative self-reported behavioral outcomes above and beyond the most widely used measure of self-control. By disaggregating motivation to control oneself and the ability to do so, hypotheses regarding unique relations between subfacets of self-control and individual risk and protective behaviors can also be tested. Such findings would have important clinical implications, as prevention and intervention approaches

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could potentially target capacity or motivation based on the outcome of interest and target population.

Future studies should explore a range of outcomes to see if consistent patterns emerge. For example, it may be that capacity predicts positive outcomes more strongly than motivation. Preliminary evidence for this has been found in several studies, including Schroder et al. (2013) and Galla & Duckworth (2015). Theoretically, people may be highly motivated to attain positive outcomes such as health and attractiveness, but still fail at tasks such as exercise and diet. This points to a potential effect of capacity for prolonged self-control at high levels of motivation. On the other hand, motivation may be more important for risk behaviors in general because one has to override a desire to engage in something that is inherently rewarding. Therefore, motivation may more strongly predict negative outcomes, especially in environments where risk behaviors are perceived as normative (e.g., in college when there may be little social pressure to control substance use). If any such patterns are found, intervention approaches can be tailored to emphasize the more predictive aspects of self-control for the target behavior and population (Friese, Hofmann, & Wiers, 2011). For example, motivation-based treatments may be more effective for risk behaviors such as substance use, as individuals may not be highly motivated to change, while skills-based interventions may function more effectively for highly motivated individuals or behaviors for which motivation is inherently higher (e.g., diet and exercise). Thus, it is our hope that the specificity of the SCMCS may help the field of self-control advance prediction of risk and protective behaviors and develop more effective interventions applicable to a variety of behaviors.

METHOD

Overview of the Measurement Development Process

The development of the Self-Control Motivation and Capacity Scale (SCMCS) was driven by a need for a convenient, but specific survey measure. Initially, items and instructions from the Brief Self-Control Scale (BSCS; Tangney et al., 2004) were adapted to capture capacity, external motivation, and internal motivation separately. The BSCS is a widely used and well-validated measure which provided a theoretical starting point. These items were then administered to students in an undergraduate psychology subject pool to examine factor structure of the new measure using Exploratory Factor Analysis (EFA). This was followed by a second sample from the subject pool to conduct Confirmatory Factor Analysis (CFA) and assess construct validity of the measure.

Participants

Data for the current study were collected online from undergraduate students in a psychology subject pool in two studies with a goal of n=400 in each study. Subjects from study 1 were invited to participate in study 2 so that their data could be longitudinally matched. Study 2 was password-protected during the first week to allow participants from study 1 to complete it first. They were invited via email and provided with the password to access the survey. After 1 week, the password was removed and the survey was accessible to all students in the subject pool. Demographic variables were only assessed in sample 1 as the addition of new (non-matched) participants in sample 2 was not initially anticipated. For demographic variables assessed in study 1, see Table 1.

Measures

Measures included in study 1 only. Demographic variables included sex, age, religion, sexual orientation, ethnicity, native language, political affiliation, and socioeconomic status.

Measures included in study 1 and study 2. Self-Control was assessed using the 13-item Brief Self-Control Scale (BSCS; Tangney, Baumeister, & Boone, 2004). The BSCS uses a 5-point rating scale (1 = "not at all" to 5 = "very much") to assess aspects of a single latent factor of good Self-Control. Original scale development reported good internal consistency with alphas of .83 - .85. In the current study, α = .811 (13 items) in study 1 and α = .793 in study 2.

Self-Control Motivation and Capacity was assessed using the Self-Control Motivation and Capacity Scale under development (see Appendices A and B for the full questionnaire).

Alcohol Consumption was assessed using the three-item set recommended by NIAAA. The questions ask about number of drinking days in a typical week (frequency), number of drinks on a typical drinking day (quantity), and number of binge drinking episodes (5+ drinks for men or 4+ for women) in a typical month (binge).

Additional measures included in study 2 only. Impulsivity and Sensation Seeking were assessed using the 59-item UPPS-P Impulsive Behavior Scale (UPPS-P; Lynam, Smith, Whiteside, & Cyders, 2006). The UPPS-P captures 5 aspects of impulsive behavior based on responses to statements that are scored on a 4-point "agree strongly" to "disagree strongly" scale. Whiteside et al. (2005) reported good internal consistency reliability of the subscales in the original measurement development paper (alpha values of .83 - .89). Internal consistency reliabilities of the subscales were good in the current

study as well: UPPS-P negative urgency α = .716 (12 items), UPPS-P positive urgency α = .925 (14 items), UPPS-P perseverance α = .840 (10 items), UPPS-P sensation seeking α = .860 (12 items), UPPS-P premeditation α = .846 (11 items).

Alcohol-Related Problems were assessed using the 24-item Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler, Strong, & Read, 2005). The BYAACQ assesses the experience of various alcohol problems within the past month using a dichotomous "yes/no" scale. Original scale development reported good internal consistency with a Cronbach's alpha of .83. Internal consistency reliability in the current study was α = .911 (24 items).

Conscientiousness and Neuroticism were assessed using the 10-item Big Five Inventory-10 (BFI-10; Rammstedt & John, 2007) and Behavioral Indicators of Conscientiousness General Subscale (BIC; Jackson et al., 2010). The BFI-10 uses a 5-point "disagree strongly" to "agree strongly" scale that asks participants to rate how statements describe their personality. Original scale development reported part-whole correlations with a larger validated measure of the Big Five personality traits at .77 - .90 in US samples. The BIC is a 185–item list of behaviors that participants are asked to rate on a 5-point "1 never performed the behavior" to "5 performed the behavior quite often" scale. Original scale development reported good internal consistency with an alpha of .92. Only the general subscale consisting of 52 items was used in study 2. Internal consistency reliability of the general subscale in study 2 was α = .831 (52 items).

Perfectionism was assessed using the Family Almost Perfect Scale (FAPS; Wang, 2010) and the Almost Perfect Scale-Revised (APS-R; Slaney, Rice, Mobley, Trippi, & Ashby, 2001). The FAPS measures family-driven perfectionism via 17 statements on a 7-

point "strongly disagree" to "strongly agree" scale. Original scale development found good internal consistency with Cronbach's alphas of .84 - .94. In the current study, internal consistency reliability was also good: standards subscale α = .890 (6 items), order subscale α = .798 (4 items), and discrepancy subscale α = .918 (7 items). The APS-R is a 23-item measure of personal perfectionism using the same measurement scale as the family perfectionism measure. Original scale development reported subscale alphas of .82 - .92, demonstrating good internal consistency. In the current study, internal consistency reliability was also good: standards subscale α = .897 (7 items), order subscale α = .884 (4 items), and discrepancy subscale α = .926 (12 items).

Locus of Control was assessed using the 9-item Brief Version of Levenson's (1974) Locus of Control Scale (Sapp & Harrod, 1993), which was originally based on Rotter's Brief Locus of Control Scale (Rotter, 1966). The version employed in this study uses a 7-point "1 – strongly agree" to "7 – strongly disagree" scale. Original scale development reported Kuder-Richardson internal consistency scores of .69 - .76 in various samples. In the current study, Cronbach's α = .851 (9 items).

Exercise was assessed using the Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985), which asks 2 questions about weekly frequency of strenuous, moderate, and mild exercise, and frequency of engagement in regular cardiovascular activity. In the current study, internal consistency reliability was similar for total exercise; α = .714 (3 items).

Diet was assessed using the Modified Yale Food Addiction Scale (mYFAS; Flint et al., 2014). The mYFAS is a 9-item inventory of eating habits within the past 12 months with a 5-point rating scale ranging from "never" to "4 or more times or daily." Original

scale development showed good internal consistency with a Kuder-Richardson coefficient of .75. Cronbach's alpha of the general food addiction items (excluding 2 questions pertaining to clinical severity) in the current study was .841 (7 items).

Smoking was assessed using 2 questions from the Fagerstrom Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) which ask the participant if they smoke and if so, how many cigarettes per day. Original scale development found acceptable internal consistency with an alpha of .61 considering the short test length.

Academics were assessed using current GPA, attendance (days of missed class during the past month), and the Study Habits questionnaire (Nonis & Hudson, 2010), which is a 10-item measure with a 5-point response scale from "1 never" to "5 very often." Original scale development found good internal consistency with Cronbach's alphas of .74 - .91. Internal consistency reliability in the current study was as follows: notes subscale α = .693 (3 items), schedule subscale α = .759 (4 items), and concentration subscale α = .895 (3 items).

Sleep was assessed using the 21-item Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) which asks various questions about sleep behavior and quality. Original scale development found good internal consistency with an overall Cronbach's alpha of .83. Internal consistency reliability in the current study was α = .651 (7 components).

Stress was assessed using the 7-item Stress subscale of the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). The DASS uses a 4-point scale ("0 – did not apply to me at all" to "3 – applied to me very much, or most of the time") to

assess stress, depression, and anxiety within the past week. Only the stress subscale was used in the current study. Internal consistency for the stress subscale in the original scale development study was .90. In the current study, α = .828 (7 items).

Social Desirability was assessed using the 13-item Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960) Form C (Reynolds, 1982), which uses a dichotomous "true/false" scale. Internal consistency in the original scale development study was found to be good with a Kuder-Richardson alpha of .76. In the current study, Cronbach's α = .549 (13 items).

Religiosity was assessed using the 14-item Intrinsic/Extrinsic Religiosity - Revised (Gorsuch & McPherson, 1989). This measure asks the participant to rate religious statements on a "1 – Strongly Disagree" to "5 – Strongly Agree" scale. Original scale development found good internal consistency with theoretical reliability coefficients (r_{xx}) of .83 for the intrinsic subscale and .57 - .65 for the 3 extrinsic subscales. In the current study, Cronbach's α was .755 for intrinsic religiosity (8 items) and .883 for extrinsic religiosity (6 items).

Social and Academic Motives were measured using the 10-item Social/Academic Motives (SAM; Maggs, 1997) measure. The SAM asks a participant to rate how important various social and academic goals are on a 3-point scale of "Not at all," "Somewhat," and "Very." The current study found good internal consistency reliability for the social motives subscale α = .710 (6 items) and academic motives subscale α = .814 (4 items).

Impaired Control over drinking was assessed using the 10-item part 3 of the Impaired Control Scale which asks about perceived impaired control in the future on a 5-

point "strongly disagree" to "strongly agree" scale (Heather, Tebbutt, Mattick, & Zamir, 1993). Original scale development reported good internal consistency with subscale alphas of .86 - .89. Internal consistency reliability of the future subscale used in the current study was .837 (10 items).

Alcohol-Related Values, Norms, and Motives were measured using several scales. Drinking motives were measured using the 20–item Drinking Motive Questionnaire Revised Short Form (DMQ-R-SF; Kuntsche & Kuntsche, 2009), which asks participants to rate various reasons for drinking alcohol on a 5-point "1 = almost never/never" to "5 = almost always/always" scale. The current study found good internal consistency reliability: social motives subscale α = .947 (5 items), coping motives subscale α = .876 (5 items), enhancement motives subscale α = .907 (5 items), and conformity motives subscale α = .885 (5 items). Personal drinking values were assessed using the 16-item Personal Drinking Values (Perkins & Berkowitz, 1986) measure, which asks participants to rate the appropriateness of personal engagement in various alcohol-related activities on a 7-point "strongly disagree" to "strongly agree" scale. This measure contains several subscales that were not used in analyses, such as those pertaining to sexual and drug-related values. The current study found good internal consistency reliability for the drinking subscale with α = .604 (4 items). Injunctive norms about drinking were assessed using an analogous measure with the same scale, but asking participants to rate the appropriateness of engagement in various drinking activities by an individual's peer group. These items were adapted from Perkins & Berkowitz (1986) by Fromme & Corbin (2004). The current study found good internal consistency reliability of the alcohol subscale with α = .686 (4 items). Drinking norms for the typical male and female college

student were assessed using the 2-item Modified Drinking Norms Rating Form (Baer, Stacy, & Larimer, 1991), which asks participants to indicate the number of alcohol drinks they think a typical male or female college student consumes on each of day of a typical week.

Self-Efficacy to resist alcohol was measured using the 3-item Alcohol Resistance Self-Efficacy Scale (Schwarzer & Renner, 2009), which asks participants about their certainty that they can control themselves to resist alcohol on a 4-point "very uncertain" to "very certain" scale. The current study found good internal consistency reliability with $\alpha = .889$ (3 items).

Parental Monitoring was assessed using The Parental Monitoring Knowledge Scale (Brown, Mounts, Lamborn, & Steinberg, 1993). This 5-item scale asks participants to rate how much their parents know about various topics such as friends and money on a "1 – don't know," "2 – know a little," "3 – know a lot" scale. The current study found good internal consistency reliability with $\alpha = .813$ (5 items).

Procedures

Items for the new measure of self-control capacity and motivation were initially adapted from the BSCS. The decision not to reverse-score several items, as is done in the BSCS, was made to allow less confusing wording and faster scoring. Moreover, since the Dual Process Model distinguishes qualitatively between good and bad self-control, the current study strove to eliminate the possibility that a reverse-scored question may be capturing poor self-control rather than good self-control (Clark & Watson, 1995). Further, reverse-scoring works best to counteract acquiescence within a dichotomous response format, while the response format of the SCMCS is continuous (i.e., the

rejection of an item does not necessitate its endorsement). Output was generated using Qualtrics software Version 61604 of the Qualtrics Research Suite Copyright © 2015. Qualtrics was used to administer the online surveys and randomize the order of SCMCS subscales for each participant. A meta-analysis by Gosling, Vazire, Srivastava, & John (2004) found that web-based samples are comparable to and often better than traditional samples, which influenced the decision to develop a brief measure that can easily be administered online.

Participants in the current studies enrolled through the Department of Psychology Research Participation website and followed a link to Qualtrics software. They first completed informed consent electronically, then proceeded to answer survey measures. As mentioned previously, some subjects from study 1 received an email invitation to participate in study 2 so that their data could be longitudinally matched. Study 2 was password-protected during the first week to allow participants from study 1 to complete it first. After 1 week, the password was removed to make the survey accessible to all students who enrolled through the department website, up to a maximum of 400. 1 research participation credit was granted electronically through the department website system to each participant who enrolled in the study and began the surveys.

Data Analytic Plan

Data obtained in study 1 was used to perform exploratory factor analysis in SPSS Statistics software to identify the underlying factor structure of the SCMCS. Principal axis factoring was used with oblimin rotation, as the subfacets of the SCMCS were not expected to be orthogonal. Eigenvalues and a scree plot were used to determine the number of factors that best accounted for the variance in the data. Poorly-loading or

cross-loading individual items were reworded into several versions of similar thematic content and included along with the original items in study 2. Because of the introduction of new items, exploratory factor analysis was repeated per the same procedure as above.

Subsequently, confirmatory factor analysis was applied to the final version of the SCMCS. Confirmatory factor analysis was performed in Mplus software using maximum likelihood estimation with robust standard errors and full information maximum likelihood (FIML) for estimation of missing data. FIML estimation of missing data does not rely on the assumption that data will be missing completely at random. Robust standard errors were used because data was not expected to be completely normally distributed. Factors were allowed to freely covary. Model fit was evaluated using the Chi-Square Test of Model Fit, Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Good model fit was indicated by CFI > .95, RMSEA < .06, and SRMR < .08 (Hu & Bentler, 1999), taking into account cautions provided by Marsh, Hau, & Wen (2004). Modification indices were examined to see if there were any parameters that were problematic and could be added or dropped to improve model fit. Only modifications that were consistent with the underlying theoretical model were entertained. Internal consistency reliability of the resulting factors was examined in SPSS.

Construct validity was examined in a variety of ways. First, convergent validity was assessed by examining the correlation between the SCMCS capacity subscale and the BSCS in both study 1 and study 2. Discriminant validity was assessed by examining correlations between the motivation subscales of the SCMCS and the BSCS, as well as measures of impulsivity, conscientiousness, neuroticism, perfectionism (self and parental

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as parallels to internal and external motivation), locus of control, social desirability, and religiosity. Only moderate correlations were expected. When possible, discriminant validity was also examined using confirmatory factor analysis comparing model fit between models that specified a single factor (e.g., SCMCS variables and BSCS variables loading onto a single latent factor) and models that specified two correlated factors (e.g., separate latent variables for SCMCS items and BSCS items). A significant difference in model fit suggested that the two constructs under examination are distinct. Concurrent validity was assessed through correlations between SCMCS subscale scores and self-reported behavioral outcomes such as diet, exercise, alcohol and nicotine use, alcohol-related problems, impaired control over alcohol use, academics, sleep, and stress.

Incremental validity was tested via regression with the self-reported behavioral outcomes listed above. A squared semi-partial correlation was used to test gain in prediction from the SCMCS subscales over and above the prediction from the BSCS to see if the SCMCS accounted for unique variance in self-reported behavioral outcomes. Because the BSCS and SCMCS subscales were expected to be significantly correlated, the Variance Inflation Factor (VIF) was examined for indication of issues with collinearity. A VIF value below 5 indicated the absence of significant multicollinearity problems in the data.

Finally, predictive validity of the SCMCS was tested in the matched subset of participants who completed both survey 1 and survey 2 measures. The SCMCS was examined as a predictor of change in alcohol use during the first semester of college. In general, higher self-control at time 2 should be associated with a smaller increase in alcohol use from time 1 to time 2. Specifically, it was hypothesized that the internal

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motivation subscale would predict a smaller increase in alcohol use for several reasons. First, college is an environment where drinking is normative, so there may be a wide range of levels of internal motivation to control substance use. Therefore, higher motivation (vs. capacity) may be predictive of substance use outcomes. In contrast, because relatively few college students may be actively trying to control their drinking, capacity may not be a significant predictor. Similarly, given the relatively permissive environment and lack of direct parental supervision, there may be relatively little pressure from parents or peers to control alcohol consumption. Thus, external motivation may have relatively limited predictive utility during this developmental transition.

To address this hypothesis, linear regression analyses were performed in SPSS statistical software separately for each outcome variable. The outcome variables were calculated as the change in each of the three NIAAA alcohol use questions (time 2 score minus time 1 score). The scores on the three subscales of the SCMCS (assessed at time 2) were entered as simultaneous predictors in each analysis. Because the subscales were expected to be significantly correlated, the Variance Inflation Factor (VIF) was examined for indication of issues with collinearity. A VIF value below 5 indicated the absence of significant multicollinearity in the data.

The primary study hypothesis was that theoretically relevant subscales of the SCMCS would account for unique variability in self-reported behavioral outcomes above and beyond the BSCS and that SCMCS subscales would be differentially related to different self-reported behavioral outcomes. For example, we hypothesized that the capacity subscale may be more strongly predictive of health protective behaviors like diet

and exercise and the two motivation subscales may more strongly predict risk behaviors such as substance use.

RESULTS

Preliminary Analyses

First, all data were visually screened. Seventeen blank and/or duplicate entries were removed. When obvious patterns were detected (e.g., all responses were the same number or a repeated pattern such as "1 2 3 4"), the case was deleted to ensure data integrity. Furthermore, SPSS syntax was created to simulate this process in the SCMCS and BSCS measures to add additional verification. This syntax was designed to detect the number of equivalent responses in a row (maximum 48) and cases with very high scores (above 34) were removed. These verification procedures led to the deletion of 36 additional cases. The resulting time 2 data set contained 347 participants, some of whom also completed the time 1 survey. IDs were successfully matched across the two surveys for 93 participants. To keep the two data sets distinct for the purpose of measurement development, these 93 cases and 6 others whose potential status as a study 1 participant was unclear were deleted from the study 2 data set, resulting in a total of 248 participants who only completed the time 2 survey. For more information on missing data, see Table 2.

Numerous outcome variables were measured via self-report questionnaire. The measures were scored according to the instructions given by the original authors of the scales. For answers that allowed free response, responses were converted into equivalent numeric values or removed if there was no corresponding numeric value (i.e., responses such as "I'm not sure"). When a range of values was given, the average of the values was

substituted (i.e., responses such as "10-20" were coded as "15"). Frequencies were then examined for free response questions to detect outliers.

The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) contained two free response questions for which outliers were removed. The first question, "During the past month, how long (in minutes) has it usually taken you to fall asleep each night?" had several responses in the 7-12 hour (420-720 minutes) range, suggesting that people may have misinterpreted the question. The distribution returned a mean of 41.512 and standard deviation of 89.432. Therefore, responses of 360 minutes or greater were deleted because they were more than 3 standard deviations away from the mean (Tabachnick & Fidell, 2000). This resulted in the deletion of 8 cases with responses of 360, 420 (3), 480, 510, 600, and 720 minutes. The second question, "During the past month, how many hours of actual sleep did you get at night?" had one response greater than 3 standard deviation away from the mean. This response was deleted because 40 hours per night is not a possible value and the participant likely misinterpreted the question.

On the Modified Drinking Norms Rating Form (MDNRF; Baer, Stacy, & Larimer, 1991), one participant gave answers in ounces instead of standard drinks, but did not specify which type of alcohol. Because the volume of a standard drink depends on the type of alcohol, these responses were deleted. Frequencies were examined for outliers and values above 20 drinks in a day were recoded as 21. This resulted in the recoding of between 1 and 8 values per item on the scale. Because the values were not technically impossible, it made sense to winsorize instead of delete these values.

The Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin & Shephard 1997) also had questions that allowed free responses, but all responses were in numeric-only format so no recoding was necessary. These questions asked for the number of times per week that participants performed a certain type of exercise. Frequencies were examined and one outlier of 60 for question 3 was winsorized to 34 because 60 was not a technically impossible response, but was still an outlier.

Following data cleaning, the percentage of complete data was examined for all study 2 variables (see Table 2). The PSQI sleep measure had the largest proportion of missing data (70.56% complete data available) because the sum score consisted of seven modules, each with its own missing cases. Other than PSQI sleep, total exercise (87.1% complete), and BIC conscientiousness (87.5% complete), data was at least 91.53% complete for all measures. The proportion of data present in Mplus CFA analyses was 96.7% to 99.2% (range for individual items) for the 15-item SCMCS and 95.9% to 99.2% for the 39-item SCMCS.

Descriptive statistics were then examined to determine if any variables were non-normally distributed and needed to be transformed to satisfy the assumptions of regression analyses. Several variables had an absolute skew value greater than 1. Positively skewed variables included the 3 NIAAA questions about alcohol use, alcohol-related problems, days of missed class, female and male drinking norms, conformity drinking motives, smoking, total exercise, personal values about drinking and driving, and clinical severity of food addiction. Therefore, a log 10 transformation was employed, after which all variables except female and male drinking norms, total exercise, and smoking fell under an absolute skew value of 1. Total exercise had a skew value of 3.874

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before transformation and -2.269 after a log 10 transformation. A square root

transformation was tested and brought the skew of the total exercise variable down to

.230. Smoking had a skew value of 1.226 before and after transformation and was

therefore left untransformed. Female drinking norms had a skew value that was changed

from 3.530 to -1.250 by the transformation, and male drinking norms transformed from

3.004 to -1.563. Since the resulting skew values were all less than 2, no further

transformations were performed on these variables. One variable, academic motives, was

negatively skewed (-1.835). Several transformations were tested and an inverse

transformation with reflection yielded the best result, -1.005.

Primary Analyses

      Exploratory factor analysis. Data obtained in study 1 was used to perform

exploratory factor analysis in SPSS Statistics software to identify the underlying factor

structure of the Self-Control Motivation and Capacity Scale. Principal axis factoring with

oblimin rotation identified 8 eigenvalues greater than 1. However, the scree plot indicated

that 2 factors accounted for relatively large portions of the variance and that relatively

little variance was accounted for by factors 5-8. The first 2 factors explained 46.26% of

the total variance, with factor 3 explaining 3.53% additional variance, factor 4 explaining

an additional 4.21%, and factor 5 explaining an additional 2.93%. Based on this

information, 2, 3, and 4 factor models were given further consideration.

      When the 2-factor model was examined, 45.43% of the total variance was

explained. In this model, the first factor comprised items related to capacity and internal

motivation with the second factor comprising external motivation items. There were no

significant cross-loading items. The 3-factor model explained 50.11% of the total

variance. The pattern matrix revealed that the 3 factors mapped onto the 3 theoretical subscales of capacity, internal motivation, and external motivation. However, several items on the capacity subscale had problematic factor loadings. Items 4, 6, 12, and 13 had factor loadings of .237, .347, .389, and .395, respectively. In addition, item 5 cross-loaded onto internal motivation at .423 (.336 with capacity factor). With the exception of these low loading items, factor loadings for the capacity items were higher for the 3 factor model relative to the 2 factor model. All factor loadings for the external and internal motivation subscales were above .5 on the appropriate factors and item loadings for internal motivation were larger than for the two-factor model. Thus, it appears that the relatively good fit of the two-factor model was a result of a small number of items on the capacity scale that did not clearly load with this factor.

Finally, the 4-factor model explained 54.26% of the total variance. In this model, factor 1 consisted of internal motivation items and factor 2 was made up of the external motivation items with no cross-loading items. Factor 3 was made up of 10/13 items related to capacity, one of which cross-loaded onto factor 4, which included 3 items related to capacity. All three items on factor 4 loaded below .50 and two of the three items were items that loaded poorly in the 3-factor model. Thus, the 4-factor model appeared to be a result of a few poorly loading items related to capacity.

Based on the findings across the 3 models, it was evident that a few questions on the capacity subscale negatively impacted the 3 and 4 factor models. The 2-factor model resolved this by combining capacity and internal motivation items into a single factor, and the 4-factor model attempted to create a new factor out of the capacity questions that did not fit well with the other capacity items. Consistent with the underlying theoretical

model, factor loadings were best in the 3-factor model. Therefore, the decision was made to retain the 3-factor model and examine more closely the capacity questions that did not load well onto their respective factors.

All items on the capacity subscale started with the same stem in the instructions, "When I have the motivation to, I'm able to…" and were directly rephrased from the items on the Brief Self-Control Scale. The capacity items that loaded poorly were items 4 "…avoid saying inappropriate things," 5 "…avoiding doing certain things that are bad for me even though they are fun," 6 "…refuse things that are bad for me," 12 "…stop myself from doing something if I know it is wrong," and 13 "...act after thinking through all the alternatives." Additional items were created to tap into similar thematic content, but with an effort to use clearer wording to avoid potential double-barrel questions or motivational components. For example, item 5 which cross-loaded with internal motivation items was reworded into 2 new items, "…choose to do things I need to do over things I want to do" and "…resist urges to do things that are bad for me," to avoid the potential motivational component implied by the word 'fun.' Next, exploratory factor analysis was repeated in the study 2 data.

Using all of the data from study 2, principal axis factoring with oblimin rotation revealed 9 factors with Eigenvalues greater than 1. The first 3 factors explained the majority (51.70%) of the total variance followed by a drop-off with factor 4 explaining 3.10% of the variance and factor 5 explaining 2.16% of the total variance. When extraction of 3 factors was specified, 51.00% of the total variance was explained. The pattern matrix revealed that all 25 items on the capacity subscale loaded well onto a single factor. The internal and external motivation items also loaded onto their respective

factors and had good factor loadings with no cross-loadings. The capacity items that were reworded were then examined more closely. The factor loadings for three of the four items that performed poorly in the first sample performed well in sample 2 (factor loadings > .70). Therefore, those three were retained without revision and only item 4 "avoid saying inappropriate things" was replaced with a higher loading item, 17 "avoid saying things that might get me into trouble" (factor loadings of .614 vs. .448).

The EFA was then repeated in sample 2 with only the 39 final items (13 per subscale). The first three factors explained 52.52% of the total variance, followed by a drop-off (also evidenced in the screen plot). When the procedure was constrained to extract 3 fixed factors, 51.77% of the total variance was explained. All items loaded well (coefficients above .499) onto their respective factors and no items cross-loaded significantly. The 3 factors were significantly correlated (r values between .316 and .449) but distinct. Therefore, the results of exploratory factor analysis suggested that the data was best explained by 3 factors which split neatly into the 3 hypothesized subscales.

In summary, although 2-factor and 4-factor models provided reasonable fit to the data, factor loadings were higher for the 3 factor model, and the fourth factor appeared to be driven by a small number of items that loaded poorly on the capacity factor. Thus, given the higher factor loadings and consistency with the underlying theoretical model, poorly loading capacity items were reworded to create new items rather than abandoning the three-factor model. When items were reworded and tested in a separate sample, the 3-factor model fit the data best and the factors were consistent with the underlying theoretical model (i.e., separate factors for capacity, internal motivation, and external motivation).

Confirmatory factor analysis. Next, using study 2 data, the 3-factor model was subjected to confirmatory factor analysis in Mplus. This model was examined using maximum likelihood estimation with robust standard errors and full information maximum likelihood (FIML) for estimation of missing data. Factors were allowed to freely covary. The model specified correlated errors for matching items across subscales (e.g., question 1 for the capacity subscale, question 1 for internal motivation, and question 1 for external motivation).

Model fit was evaluated using the chi-square value, CFI, RMSEA, and SRMR. The fit indices were as follows: chi-square = 1302.301 $p<.001$, CFI = .884, RMSEA = .063, SRMR = .062. All standardized factor loadings were >= .592 and statistically significant. According to the guidelines established by Hu & Bentler (1999), good model fit is indicated by CFI > .95, RMSEA < .06, and SRMR < .08. The model met the guidelines for good model fit based on SRMR, and RMSEA was right at the threshold, whereas the CFI did not meet the cutoff of .95 and the chi-square value was significant. Marsh, Hau, & Wen (2004) caution that these guidelines result in a high probability of incorrectly rejecting an acceptable model, and argue that these guidelines may be better suited for testing statistical significance than evaluating goodness-of-fit. Given the cautions of Marsh, Hau, & Wen (2004) and the relatively good model fit based on the RMSEA and SRMR, the 3 factor model was retained.

Given the marginal fit based on the CFI and chi-square value, modification indices were examined to see if any parameters were problematic and should be added or dropped to improve model fit. There were several modification indices with values greater than 20. All involved correlated errors within individual factors (e.g., correlations

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among errors for the capacity factor). When these correlated errors were added iteratively based on the highest index value (a total of 5 correlated errors), the model fit improved somewhat; chi-square = 1163.724 $p<.001$, CFI = .908, RMSEA = .056, SRMR = .060. However, the CFI value still did not meet the threshold for adequate fit and the chi-square value was still significant. Nevertheless, the modification indices provided a theoretical starting point for reducing scale length by indicating possible redundancy between questions.

To better match the length of the original Brief Self-Control Scale and to make the measure easier to implement, the number of questions was reduced. Corresponding items across subscales (e.g., item 1 within each subscale) with factor loadings >.70 on all three subscales were retained, initially reducing the scale from 39 items to 18 items. This allowed for the creation of a shorter version consisting of 6 matching questions per subscale. Model fit for the 18-item SCMCS was good, chi-square = 231.984 $p<.001$, CFI = .945, RMSEA = .065, SRMR = .050. However, there were still modification indices > 20, including two that involved Item #8 (correlated errors with item #7 on the capacity subscale (M.I. = 12.647) and external motivation subscale (M.I. = 34.434), suggesting that the two items capture similar content. Upon examination of factor loadings, item #7 loaded higher on two out of the three subscales and the items were essentially equivalent on the third (.713 vs. .714), so item #8 was dropped from the model for all three subscales. This resulted in a 15-item SCMCS, which is similar in length to the original 13-item BSCS. The final 15-item version of the SCMCS demonstrated excellent model fit, chi-square = 89.722 $p=.077$, CFI = .989, RMSEA = .032, SRMR = .045. There were no suggested modification indices.

Given the simple structure of the final model (no specified cross-loadings), correlations were examined between simple sum scores and factor scores derived from the CFA. High correspondence would indicate that use of a simple sum score is appropriate. The capacity subscale sum scores and CFA derived factor scores correlated significantly at .990, $p<.001$; the internal motivation subscale correlated significantly at .993, $p<.001$; and the external motivation subscale correlated significantly at .992, $p<.001$. Therefore, simple sum scores capture the constructs well enough that simple sum scores can reasonably be used in future research.

Reliability. Next, internal consistency reliability of the factors resulting from the CFA was examined in SPSS. Cronbach's alpha coefficients in study 1 for the full 39-item scale were as follows: capacity $\alpha = .891$ (13 items), internal motivation $\alpha = .916$ (13 items), and external motivation $\alpha = .957$ (13 items). Cronbach's alpha coefficients in study 2 for the full 39-item scale were: capacity $\alpha = .932$ (13 items), internal motivation $\alpha = .925$ (13 items), and external motivation $\alpha = .935$ (13 items). For comparison, internal consistency reliability of the Brief Self-Control Scale was $\alpha = .811$ (13 items) in study 1 and $\alpha = .793$ in study 2. Cronbach's alpha coefficients for the shorter 15-item scale in study 1 were as follows: capacity $\alpha = .805$ (5 items), internal motivation $\alpha = .844$ (5 items), and external motivation $\alpha = .919$ (5 items). In study 2, Cronbach's alpha coefficients for the 15-item scale were as follows: capacity $\alpha = .884$ (5 items), internal motivation $\alpha = .864$ (5 items), and external motivation $\alpha = .877$ (5 items). Therefore, internal consistency reliability was very good for all subscales and higher than that of the BSCS even for the 15-item SCMCS.

Validity analyses. *Convergent validity.* Convergent validity was assessed in SPSS via bivariate correlations of the SCMCS Capacity subscale with the BSCS in both study 1 and study 2. In study 1, SCMCS Capacity and BSCS were correlated at .550, $p<.001$. In study 2, SCMCS Capacity and BSCS were correlated at .401, $p<.01$. While the measures are correlated significantly, the correlations are not so high as to indicate redundancy.

Concurrent validity. Concurrent validity was assessed in SPSS via bivariate correlations with behavioral outcomes of diet, exercise, alcohol and nicotine use, alcohol-related problems, impaired control over alcohol use, academics, sleep, and stress. These correlations are presented by subscale of the 15-item SCMCS and the 13-item BSCS in Table 3. As evidence supporting the concurrent validity of the SCMCS, the capacity subscale was significantly correlated with 12 out 18 measures, the internal motivation subscale was significantly correlated with 8 out of 18 measures, and the external motivation subscale was significantly correlated with 8 out of 18 measures. For comparison, the BSCS was significantly correlated with 14 out of 18 measures.

Discriminant validity. Discriminant validity was assessed first by examining correlations between the motivation subscales of the SCMCS and the BSCS. In Study 1, the BSCS correlated with the internal motivation subscale of the SCMCS at .534, $p<.001$ and with the external motivation subscale at .126, $p<.05$. In Study 2, the BSCS correlated with the Internal Motivation subscale at .460, $p<.001$, and the External Motivation subscale at .239, $p=.022$. Discriminant validity with the SCMCS and measures of impulsivity, conscientiousness, neuroticism, perfectionism (self and parental as parallels to internal and external motivation), locus of control, social desirability, and religiosity

was examined in Mplus using CFA. 246 out of 248 participants in Study 2 provided data on the SCMCS and could be analyzed. Discriminant validity was tested via difference in model fit between models in which items from the SCMCS and the measure of interest all loaded onto a single factor and models in which the SCMCS items and the measure of interest loaded onto separate latent factors.

For the purpose of testing discriminant validity, Mplus model fit was compared and a p-value was calculated online using the chi-square model fit and degrees of freedom. Several models had severe convergence problems that prevented completion of chi-square analyses. For example, the 2-factor model of BFI Neuroticism and the SCMCS did not converge normally (though the single-factor model did). The longer measure of conscientiousness (BIC) converged as a single factor model with the SCMCS, but did not converge as a 2-factor model. Religiosity (IERR) converged as a 2-factor model, but not as a single factor model. Finally, impulsivity (UPPS-P) did not converge as either a single or 2-factor model. For the 4 measures that could not be subjected to a confirmatory factor analytic approach, correlations with the SCMCS subscales were examined and were as follows: BFI Neuroticism correlated with SCMCS capacity at -.087, with SCMCS internal motivation at .040, and with SCMCS external motivation at .014. None of these effects were statistically significant. BIC conscientiousness correlated with SCMCS capacity at .508, $p<.01$, with SCMCS internal motivation at .398, $p<.01$, and with SCMCS external motivation at .311, $p<.01$. IERR internal and external religiosity subscale correlations with subscales of the SCMCS ranged from .026 to .156, $p<.05$. The only significant correlations were between the IERR internal subscale and the SCMCS internal motivation subscale (.150, $p<.05$) and between the IERR internal

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subscale and the SCMCS external motivation subscale (.156, *p*<.05). UPPS-P subscale

correlations with the SCMCS ranged from .006 to -.487, *p*<.01. For correlations between

all discriminant validity measures and the SCMCS, see Table 4. While many correlations

were significant, as is expected for thematically similar concepts, no correlations were

above .508, supporting the notion that the SCMCS and these measures are not completely

redundant.

For the models in which the CFA discriminant validity analyses converged, all p-

values were significant, indicating that the SCMCS is distinct from the BSCS as well as

concepts such as conscientiousness, social desirability, internal locus of control,

social/academic motives, alcohol resistance self-efficacy, family perfectionism, and

perfectionism. See Table 5 for the results from Mplus analyses of discriminant validity.

Incremental validity. Incremental validity was tested via regression with self-

reported behavioral outcomes. Adjusted squared semi-partial correlations were used to

test gain in prediction from the SCMCS subscales over and above the prediction from the

BSCS to see if the SCMCS accounted for unique variance in self-reported behavioral

outcomes. Because the BSCS and SCMCS subscales are not orthogonal and large

redundancies can contribute to unstable regression coefficients and large standard errors,

the Variance Inflation Factor (VIF) was examined for indication of issues with

collinearity. All VIF values were less than 2, indicating no significant collinearity

problems. The SCMCS significantly predicted 19 out of 32 outcomes above and beyond

the BSCS. The capacity subscale was significantly related to 9 outcomes, the internal

motivation subscale was significantly related to 6 outcomes, and the external motivation

subscale was significantly related to 6 outcomes above and beyond the BSCS. For a table of Adjusted R Square values and subscale significance patterns, see Table 6.

Predictive validity. Using the merged data set collected from the 93 participants who completed both of the surveys, change in alcohol use was examined as a function of self-control capacity, internal motivation, and external motivation. Sample sizes for these analyses ranged from 86 (alcohol use frequency) to 88 (alcohol use quantity and binge drinking) due to missing data. Drinking frequency and quantity were log-transformed resulting in reasonably normally distributed outcomes, whereas transformation failed to normalize the distribution for binge drinking. Gender, age, socioeconomic status, and ethnicity were examined as potential covariates. None significantly predicted change in alcohol use, and significance of results was not affected when any of these covariates were included. Therefore, these variables were not included in final analyses. All VIF values were less than 2, indicating no collinearity problems in the data.

Change in alcohol use frequency was significantly predicted by the SCMCS, $F(3,82) = 6.440$, $p<.001$, with an adjusted R^2 of .161. SCMCS internal motivation was largely responsible for this effect, standardized $b = -.418$, $t(82) = -3.232$, $p = .002$. The other two SCMCS subscales were not significant predictors of change in alcohol use frequency. SCMCS scores did not significantly predict change in alcohol use quantity, $F(3,84) = 1.627$, $p=.189$, with an adjusted R^2 of .021. However, the internal motivation subscale approached significance, standardized $b = -.271$, $t(84) = -1.953$, $p = .054$. Change in the frequency of binge drinking pattern was not significantly predicted by the SCMCS, $F(3,84) = 1.003$, $p=.395$, and no subscales approached significance. Results for

binge drinking should be interpreted with caution given the positive skew for this outcome and inability to normalize the distribution through transformation.

In summary, the SCMCS demonstrated strong evidence of reliability and construct validity. Internal consistency reliability of subscales was very good and higher than that of the BSCS in both the 39-item and shorter 15-item versions. Convergent validity analyses indicated that the capacity subscale and BSCS were significantly correlated, but not redundant. Concurrent validity analyses indicated that subscales of the SCMCS were uniquely correlated with certain outcomes, revealing new information about underlying self-control components that may contribute to behavior. Discriminant validity analyses demonstrated that the SCMCS was related to, but relatively distinct from associated concepts such as conscientiousness. In support of the incremental validity of the new measure, the SCMCS significantly predicted 19 out of 32 self-reported behavioral outcomes above and beyond variance accounted for by the BSCS. Lastly, preliminary longitudinal analyses showed that the SCMCS (internal motivation in particular) predicted change in alcohol use frequency over time. Overall, these results support the unique value of the SCMCS in examining self-control.

DISCUSSION

The current study provides evidence for the reliability and validity of the Self-Control Motivation and Capacity Scale (SCMCS), which allows for multiple subfacets of top down self-control to be examined separately. Self-control has been reliably linked to a variety of protective and risk behaviors, but the mechanisms through which it operates are unclear. This article represents an initial effort to operationally define and examine self-reported top down self-control in a systematic manner. Future research can use this

as a starting point to elucidate the mechanisms that may operate under the umbrella of "good self-control" and link subcomponents of good self-control to various life outcomes.

The SCMCS is a succinct and convenient measure that can easily be administered online and provide valuable information about the heterogeneity of self-control processes. Consistent with literature demonstrating that bottom up (poor) self-control is a multifaceted construct, the current study provides support for the existence of different aspects of top down self-control. Both EFA and CFA analyses confirmed a three-factor structure for good self-control, including capacity, internal motivation, and external motivation. Internal consistency reliability was good for all three subscales in both the full 39-item and brief 15-item versions of the SCMCS. In addition, the three self-control subscales related differentially to various self-reported behavioral outcomes. Collectively, these multiple aspects of self-control account for variance in self-reported behavioral outcomes above and beyond existing measures of self-control. These findings have potentially important implications for prevention and intervention efforts which might address unique components of self-control depending upon the behavior of interest.

Based on the current study, internal and external motivation more strongly relate to alcohol and nicotine use than does capacity. However, once substance use becomes problematic, capacity becomes a stronger correlate, as evidenced by relations with measures of impaired control over alcohol use, alcohol-related problems, and food addiction. These results fit with the incentive-sensitization model (Robinson & Berridge, 2001) which posits that drug use sensitizes certain brain systems to promote drug wanting. As substance-related problems progress, drug use becomes driven by less

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controlled and more automatic processes (Tiffany, 1990). Once these brain structures are affected and there is abundant motivation to continue drug use, then the strength of capacity to resist the drug becomes a more salient variable. Therefore, the presence or absence of capacity may be particularly important to outcomes such as impaired control and related problems.

An alternative explanation for differential correlates of use and problems involves social reactions to these different behaviors in the college context. Motivation may have been a strong correlate of alcohol use in particular because the culture of drinking in college is permissive (e.g., people may not be motivated to control alcohol use). However, problem drinking may be less accepted by peers, prompting people to give more negative feedback to those who are problem drinkers, thereby increasing motivation to change and making capacity a more relevant factor in drinking decisions. It is worth noting that both internal motivation and capacity were strong correlates of alcohol-related problems. Thus, although capacity becomes more important for problems than for use, internal motivation remains important for both, suggesting that efforts to target internal motivation may reduce risk for both outcomes.

Self-control capacity also related to certain positive outcomes in the current data (i.e., total exercise, good note-taking, and a stronger internal locus of control) more strongly than did motivation. This may be because outcomes obtained through exercise (health, body image) and note-taking (academic achievement) are strongly motivating in nature and reinforced by important others. Thus, motivation may be uniformly high for these behaviors, at least at the trait level. Therefore, the strength of capacity may be particularly important for success and/or engagement in such behaviors. With respect to

locus of control, those with higher capacity to control themselves and succeed at these behaviors may develop a stronger internal locus of control because they (accurately) perceive that they are more capable of affecting their behavior. Alternatively, individuals with a stronger locus of control may simply perceive that they have greater self-control capacity because they more strongly believe that they can control their own behavior. Longitudinal research is needed to determine the direction of effects. Additionally, longitudinal analyses would allow us to test more complex relationships like mediated effects. For example, locus of control may mediate the effect of capacity on highly motivating behaviors such as exercise, or capacity may mediate the effect of locus of control. In summary, self-control capacity may be more strongly related to behaviors for which motivation is typically high, while motivation may be more strongly indicative of engagement in substance use, particularly in environments where cultural norms are supportive of heavy drinking. If such patterns are supported by future research, this knowledge could contribute to treatment selection and intervention tailoring for various behaviors of interest.

Theoretical Implications

The evidence for distinctions between self-control motivation and capacity in the current study is consistent with emerging findings on ego depletion. A recent meta-analysis of ego depletion by Carter, Kofler, Forster, & McCullough (2015) challenged the well-documented depletion effect of self-control. Rigorous examination of the empirical evidence for this effect did not support the notion that self-control necessarily relies on a limited resource. Part of the problem may be that many studies treat ego depletion as the exhaustion of the capacity for self-control. If that is the case, then evidence that

motivational incentives replenish this resource does not make sense. However, it is possible that capacity is not affected by depleting tasks so much as motivation is. For example, an individual may be capable of exerting further self-control after a depleting task, but may not be sufficiently motivated to continue to exert control. Therefore, providing a motivational incentive boosts motivation and replenishes the underlying depleted resource. Such a pacing approach, known as the central governor hypothesis, is explained in the physical exercise literature. People perceive that they are incapable of further physical exertion, but are in fact capable if sufficient motivation is provided in the form of a stimulus that kicks in the fight or flight response. However, the use of this reserve of physical capacity is taxing on the body and may lead to adverse health consequences such as heart attacks. Therefore, people choose to stop physical exertion at a certain point to maintain homeostasis (Gibson & Noakes, 2004). Likewise, people may calculatedly choose to stop the exertion of self-control out of self-protective and homeostatic motives unless a motivational incentive changes the evaluation of the costs and benefits to additional self-control behavior. This inconsistency is precisely why measures that distinguish between capacity and motivation are necessary.

The process model of self-control (Inzlicht & Schmeichel, 2012) attempted to remediate this inconsistency and established motivation and attention as important components of self-control. The current study further broke down motivation to study the importance of the source (internal vs. external) and found that this distinction helps account for unique variance in self-reported behavioral outcomes. Internal and external motivation were uniquely related to different outcomes. Within the process model of self-control, attention is not viewed as a part of motivation, but it likely does contribute to it,

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as well as to capacity. While the attentional shifts that happen after a depleting task do not necessarily evidence an inability to regulate, they point to the participants' failure to notice that regulation is necessary. Therefore, attention in the process model is not the same as capacity in the SCMCS. Nevertheless, attention and appraisal of the need for self-control are important to the ability to carry out self-control.

In addition to implications for theories of self-control and ego-depletion, the findings regarding relations between self-control and perfectionism were intriguing and could have implication for our understanding of "good" aspects of perfectionism. Personal and family perfectionism, as measured in the current study, each contain several subscales. The order and high standards subscales are considered "good" aspects of perfectionism and are associated with better outcomes such as higher GPA and better self-esteem, while the discrepancy subscale is associated with distress and poor outcomes (Slaney et al., 2001). Interestingly, the capacity subscale of the SCMCS was uniquely related to both order and high standards suggesting that the relation between these positive aspects of perfectionism and positive health outcomes may be, at least in part, a function of their association with good self-control. Future research with the SCMCS could seek to determine if there are unique protective effects of these positive aspects of perfectionism or if relations between good aspects of perfectionism and positive health outcomes are fully accounted for by good self-control. If the latter is true, it would have important implications for our understanding of "good" aspects of perfectionism.

Clinical and Research Implications

In terms of clinical implications, it seems possible that distinguishing between self-control capacity and motivation could facilitate matching of individuals to

interventions. For example, college is an environment that is ripe for engagement in risky behaviors. College administrations work hard to effect prevention efforts at the population level for various behaviors. The SCMCS could be used to delineate whether college students lack internal motivation, external motivation, or capacity for self-control, which may differentially affect target behaviors. Prevention efforts might then be tailored based on the aspect of self-control that is driving risk behavior. If internal motivation is lacking, for example, therapeutic approaches such as Motivational Interviewing (Miller & Rollnick, 2012) might be integrated to inform prevention efforts. If external motivation is the problem, then the university could develop systematic reinforcements to shape behavior by providing motivation to control behavior. Some universities are already attempting to influence protective behaviors with programs to reward people for losing weight, exercising, etc. If these behaviors are driven more by capacity, however, these types of interventions may not have as much impact as approaches tailored to capacity. For behaviors for which capacity is most lacking, perhaps skills-based approaches such as Cognitive Behavioral Therapy (Beck & Beck, 2011) would most effectively help change behavior. However, future research is needed to test these hypotheses directly. Such research could provide specificity that can help make prevention programs more efficient and effective, and help avoid unnecessary costs.

Differentiating between self-control capacity, internal motivation, and external motivation could also have implications for public policy. For example, the self-control capacity of the perpetrator is sometimes questioned in cases of sexual assault and violence (Lowell, 2010; Polaschek & Ward, 2002; Williams & McCarthy, 2014), especially when alcohol is involved. A large population-based study could help

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illuminate whether it is truly the capacity to control oneself that is diminished, or whether sexually coercive and violent behavior is more strongly related to a lack of internal and/or external motivation. This is particularly important if the current attitude about self-control capacity and sexual violence contributes to self-licensing and excuse-giving effects which are frequently observed under the influence of alcohol. Additionally, it could have implications for criminal sentencing and university policies that aim to reduce high rates of sexual assault on campus. Another example where the distinction between different components of top down self-control could be important is with eating behaviors. The current study examined food addiction and found that it was significantly related to self-control capacity, but not motivation. If overeating is driven by capacity, rather than motivation, then more responsibility is placed on those providing unhealthy low cost foods in the environment (Gearhardt, Grilo, DiLeone, Brownell, & Potenza, 2011; Gearhardt et al., 2012). This could have far-reaching consequences for rates of obesity and related health problems if policies are enacted with the understanding that self-control motivation in a certain domain is not sufficient to regulate behavior.

Limitations and Future Directions

While the SCMCS can help specify important distinctions between aspects of top down self-control, one important limitation to consider is that the SCMCS cannot distinguish between perceived and actual self-control. Like all self-report measures, the SCMCS collects data filtered through the perception of the participant. There could potentially be a discrepancy between perceived and actual capacity and motivation. For this reason, it is important to examine more general measures of self-efficacy in the future, which may be related to perceived self-control capacity. However, whether the

SCMCS measures perceived or actual capacity, internal motivation, and external motivation, these subscales relate differentially to self-reported behavioral outcomes. From a scientific perspective, it is important to understand this distinction through future research, but from a behavioral perspective, the SCMCS may still be a useful tool despite this limitation.

Perhaps the most important limitation of the current study was the cross-sectional nature of most of the analyses. With the exception of the one set of analyses predicting changes in drinking outcomes from the SCMCS, we were not able to determine the temporal precedence of the variables in the analyses. Thus, longitudinal research is needed to examine the stability of self-control during non-transitional periods of life and establish the direction of effects. For example, prior research has shown that a variety of negative health outcomes are associated with an external locus of control (Wallston & Wallston, 1978). Since an internal locus of control is associated with greater self-control capacity in the current analyses, it may be that those with a greater self-control capacity go on to develop a more internal locus of control because they are, in fact, better able to engage in self-control. On the other hand, it may be that those with a more internal locus of control infer a greater degree of personal responsibility and exercise self-control more regularly, thereby strengthening their capacity. Similarly, substance use, which is associated with self-control motivation in the current study, could involve bidirectional effects. Although those who are more motivated to control themselves may choose to engage in less substance use, it is also possible that heavier drinking contributes to a reduction in motivation to control behavior. The preliminary longitudinal results suggest that the former is more likely, but more longitudinal research is needed to confirm this

hypothesis. Lastly, those with greater self-control capacity may be less susceptible to impaired control, addiction, and alcohol-related problems. However, they may also perceive a greater capacity for control over their behavior because they experience fewer adverse addiction-related consequences. Therefore, future longitudinal and experimental research is necessary to determine causal pathways between self-control capacity, internal motivation, external motivation, and behavioral outcomes.

The nature of the current samples must also be taken into consideration when thinking about the generalizability of the findings. The current samples consisted of college students enrolled in an introductory psychology course so the findings may not be generalizable to all populations. Future research is needed to examine self-control capacity and motivation in more diverse populations, as well as during important transition periods during which self-control may be changing. For example, it is important to assess the development of self-control in childhood, over the transition from high school to college, the transition out of college, and during the maturational transitions that occur in the later stages of the lifespan. During childhood, the capacity for a variety of cognitive functions is rapidly developing, and the development of these cognitive functions may contribute to increases in the capacity for self-control. However, it is not clear to what degree children are internally and externally motivated to control their impulses and how parental reinforcement affects the development of self-control. The developmental trajectory of all three subcomponents of self-control could elucidate later associations with a variety of risk and protective outcomes. Over the transition from high school to college, the external motivation previously provided by parents is diminished as teenagers experience more independence, but little is known about how

self-control capacity and internal motivation calibrate to balance out this adjustment. When transitioning out of college, young adults often take on more demanding roles which provide more external motivation to control behavior, and success in navigating these roles may therefore depend heavily on capacity and internal motivation. Finally, as people age, the capacity for self-control may become particularly strong with practice, such that motivation shifts having to do with later life goals may drive behavior. These hypotheses require future research, which may yield useful information about how health risk and protective behaviors relate to self-control across the lifespan.

As discussed previously, the findings of the current study may have implications for our understanding of ego depletion, helping to test competing models that attempt to explain the phenomenon (i.e., resource vs. process models). However, a limitation of the measure for addressing these questions is that it is really more of a "trait" than a "state" measure. To truly examine self-control motivation and capacity "in the moment," a more state-like version of the measure would be needed. Future research is needed to develop an explicitly state-like measure of capacity and motivation. To measure self-control in the moment, the question stems from the SCMCS could easily be adapted, much like they are between subscales, to include wording such as "In the current moment, because of [my own values/ external pressure], I feel motivated to…" or "In the current moment, I feel that if I were motivated to, I could…" Such a measure could then be used to test the process and resource models of self-control and help understand which subcomponents of top down self-control are affected by depleting tasks. Additionally, interventions might be tailored to restore potentially depleted self-control resources which may affect risk and protective behaviors and outcomes.

The goal of the current study was to develop a global measure of self-control motivation and capacity that could be used to understand a variety of risk and protective behaviors. However, a limitation of this approach is that these aspects of good self-control might operate quite differently for different behaviors. If this were the case, a measure that examines self-control motivation and capacity separately for different behaviors might be needed. This could be relatively easily accomplished by changing the individual items on the scale to refer to specific behaviors. For example, if one were studying smoking, the SCMCS internal motivation items could read, "Because of my own personal values, identity, standards, etc. I am motivated to… resist the temptation to smoke, avoid smoking even though I enjoy it, refuse smoking because I know it is bad for me, have self-discipline not to smoke, stop myself from smoking because I know it is wrong." If both a general SCMCS and a domain-specific SCMCS were administered to the same participant, a discrepancy found between a matching subscale on the two measures could indicate several things. On an individual level, it could mean that self-control in a certain domain is viewed differently than in other domains. For example, if an individual scores lower on the smoking-specific SCMCS capacity subscale than on the general SCMCS capacity subscale, it could mean that the deficit in capacity is greater for smoking than for other behaviors. Perhaps this individual perceives a particular weakness of willpower when attempting not to smoke, but can otherwise control his or her behavior with less difficulty in other domains. On a larger population level, such a discrepancy could indicate that a domain is somehow intrinsically different from other domains in relation to self-control. If a large sample of people indicates lower capacity scores on a smoking-specific SCMCS than a general SCMCS, then self-control may be more difficult

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overall for smoking behavior rather than a difference within individuals. On such a level, it may be interesting to explore what these differences may be and why they arise, which could inform behavior-specific interventions.

Despite the aforementioned limitations, the current study makes an important contribution, as building on established measures of self-control to more accurately and precisely measure top down self-control is essential to move the field forward. Evidence that self-control capacity, internal motivation, and external motivation uniquely relate to different behaviors or to the same behavior across contexts or developmental transitions has important implications for both theory and practice. Knowledge of the unique predictors of behaviors across contexts and time may guide the tailoring of interventions to the unique needs of both individuals and broader populations. Although there is great potential in differentiating aspects of self-control, there is still much to be done. Future research is needed to establish the stability of the multiple dimensions of self-control as traits and develop a state-like measure to be used to assess self-control in the moment. This will facilitate a better understanding of the mechanisms behind self-control and may help remediate some of the discrepancies in the current literature. Longitudinal studies are also needed to establish the direction of the relationships with behavioral outcomes and to better understand their development and tailor interventions. Lastly, adaptation of the SCMCS to specific domains of behavior could help improve our understanding of how behaviors differ in relation to self-control and inform behavior-specific intervention efforts. There are a lot of questions left to answer, but the SCMCS provides a tool that will allow researchers to begin to address important questions about the relative influence of self-control motivation and capacity.

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APPENDIX A

TABLES

Table 1

Demographic Variables

	Study 1	Matched Subset
Ethnicity	54.8% White, 13.9% Latino, 15.2% Asian, 2.6% Black, 13.5% Other	63.4% White, 16.1% Latino, 14% Asian, 1.1% Black, 5.4% Other
Gender	48% male, 54.7% female, 0.4% other	43% male, 55.9% female, 1.1% other
SES (Class)	44.6% middle, 32.9% upper-middle, 9.5% lower-middle, 5.1% upper, 7.9% working	46.2% middle, 34.4% upper-middle, 8.6% lower-middle, 6.5% upper, 4.3% working
Age	mean=19.42 (SD=2.543)	mean=19.77 (SD=3.474)
n	447-455	93

Table 2

Missing Data, Means, and Standard Deviations for Study 2 Variables

	N			Std.
	Valid	Missing	Mean	Deviation
SCMCS Capacity	240	8	19.7167	4.03993
SCMCS Internal Motivation	242	6	18.9504	4.05533
SCMCS External Motivation	241	7	18.2697	4.28538
BSCS	235	13	40.4851	7.33062
NIAAA Frequency	246	2	.2877	.26267
NIAAA Quantity	246	2	.4555	.36558
NIAAA Binge	246	2	.4727	.44677
Alcohol-Related Problems	244	4	.5709	.45014
FTND Smoking	246	2	.2398	.42785
Social Drinking Motives	245	3	15.0408	6.55544
Coping Drinking Motives	245	3	10.0694	4.94636
Enhancement Drinking Motives	245	3	12.6388	6.02021
Conformity Drinking Motives	245	3	.9466	.17629
UPPS-P Premeditation	237	11	2.0690	.48746
UPPS-P Sensation Seeking	235	13	2.7858	.57631
UPPS-P Positive Urgency	235	13	2.0602	.58514
UPPS-P Negative Urgency	233	15	2.2915	.40627
UPPS-P Perseverance	230	18	2.0630	.50911
BFI Agreeableness	242	6	6.8802	1.66428
BFI Conscientiousness	243	5	6.8436	1.59033
BFI Neuroticism	240	8	5.9125	1.78694
BFI Openness	242	6	6.9587	1.67677
BFI Extraversion	242	6	6.5785	1.83670
BIC Conscientiousness	217	31	175.5023	18.08420
Personal Drinking Values (Alcohol)	243	5	3.0008	1.01387
Personal Drinking Values (Driving)	242	6	.4274	.17007
Total Exercise	216	32	7.4819	2.69520
Exercise Frequency	245	3	1.7755	.70900
MCC Social Desirability	236	12	6.9619	2.29399
IERR Internal Religiosity	240	8	21.7917	6.51217
IERR External Religiosity	239	9	13.7364	5.83973
DASS	239	9	16.0084	4.24659
Impaired Control	238	10	20.2983	7.34267
Study Habits - Notes	243	5	10.6955	2.15271
Study Habits - Schedule	244	4	10.3566	2.94391
Study Habits - Concentration	240	8	8.2958	2.50021
GPA	242	6	3.31986	.476374
Days of Missed Class	237	11	.5367	.32003

Food Addiction	236	12	10.22	7.334
Clinical Severity of Food Addiction	242	6	.3615	.34912
PSQI Sleep	175	73	6.9829	3.30530
Drinking Norms for Males	227	21	1.2475	.40655
Drinking Norms for Females	227	21	1.1173	.39219
BLCS Internal Locus of Control	241	7	40.2614	10.37476
Injunctive Norms (Alcohol)	241	7	3.4921	1.02696
Injunctive Norms (Driving)	243	5	2.3724	1.47996
SAM Social Motives	240	8	2.1847	.42869
SAM Academic Motives	243	5	.8554	.18890
PMKS Parental Monitoring	242	6	2.1298	.53541
ARSE Alcohol Resistance Self-Efficacy	241	7	9.8465	2.57821
FAPS Standards	241	7	40.0622	6.61188
FAPS Order	241	7	24.8008	4.34283
FAPS Discrepancy	243	5	32.2963	10.12089
APS Standards	237	11	38.9367	7.42934
APS Order	235	13	20.4085	4.86431
APS Discrepancy	229	19	51.9039	14.21543

Table 3

Correlations among SCMCS subscales, the BSCS, and Self-reported Behavioral

Outcomes

	SCMCS Capacity	SCMCS Internal Motivation	SCMCS External Motivation	BSCS
NIAAA Drinking Frequency	-.163[*]	-.267[**]	-.241[**]	-.234[**]
NIAAA Drinking Quantity	-.155[*]	-.265[**]	-.197[**]	-.215[**]
NIAAA Binge Drinking	-.178[**]	-.251[**]	-.238[**]	-.265[**]
Alcohol-Related Problems	-.327[**]	-.332[**]	-.230[**]	-.357[**]
Smoking	-.167[**]	-.287[**]	-.246[**]	-.298[**]
Total Exercise	.155[*]	.016	-.033	.103
Exercise Frequency	-.125	-.079	-.021	-.095
Stress	-.113	-.055	.019	-.197[**]
Impaired Control	-.447[**]	-.291[**]	-.208[**]	-.414[**]
Study Habits - Notes	.370[**]	.194[**]	.173[**]	.256[**]
Study Habits - Schedule	-.079	.007	.012	.287[**]
Study Habits - Concentration	-.047	-.037	-.062	.274[**]
GPA	.134[*]	.148[*]	.128[*]	.193[**]
Days of Missed Class	-.049	-.095	-.047	-.333[**]
Food Addiction	-.185[**]	-.049	-.027	-.292[**]
Clinical Severity of Food Addiction	-.250[**]	-.124	-.103	-.293[**]
Internal Locus of Control	.172[**]	.080	.010	.056
Sleep	.044	-.021	-.003	-.061

[*]. Correlation is significant at the 0.05 level (2-tailed).
[**]. Correlation is significant at the 0.01 level (2-tailed).

Table 4

Discriminant Validity Correlations

	SCMCS Capacity	SCMCS Internal Motivation	SCMCS External Motivation
BSCS	.416**	.448**	.276**
UPPS-P Premediation	-.350**	-.346**	-.331**
UPPS-P Sensation Seeking	.157*	0.006	-0.039
UPPS-P Positive Urgency	-.397**	-.353**	-0.112
UPPS-P Negative Urgency	-.288**	-.265**	-.166*
UPPS-P Perseverance	-.487**	-.393**	-.292**
BFI Conscientiousness	.318**	.268**	.209**
BFI Neuroticism	-0.087	0.04	0.014
BIC Conscientiousness	.508**	.398**	.311**
MCC Social Desirability	.201**	.139*	0.105
IERR Internal Religiosity	0.026	.150*	.156*
IERR External Religiosity	-0.054	0.076	0.105
BLCS Internal Locus of Control	.172**	0.08	0.01
SAM Social Motives	0.05	0.007	0.101
SAM Academic Motives	.329**	.319**	.335**
ARSE Alcohol Resistance Self-Efficacy	.358**	.301**	.216**

FAPS Standards	.433**	.307**	.315**
FAPS Order	.260**	.227**	.233**
FAPS Discrepancy	-0.091	-0.105	-0.01
APS Standards	.476**	.351**	.325**
APS Order	.367**	.251**	.263**
APS Discrepancy	-0.052	-0.095	0.087

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 5

Discriminant Validity Chi-Square Model Fit Analyses

	1-Factor Chi-square	1-Factor df	2-Factor Chi-Square	2-Factor df	Chi-square difference	df difference	*p*
BSCS	1633.21	350	1545.068	349	88.142	1	*p*<.001
Conscientiousness (BFI)	815.839	119	809.998	118	5.841	1	*p*=0.01565693
Social Desirability (MCC)	1300.973	350	1207.554	349	93.419	1	*p*<.001
Internal Locus of Control (BLCS)	2071.2	252	1360.169	251	711.031	1	*p*<.001
Social/Academic Motives (SAM)	1677.315	275	1343.243	274	334.072	1	*p*<.001
Alcohol Resistance Self-Efficacy (ARSE)	1052.788	135	809.481	134	243.307	1	*p*<.001
Family Perfectionism (FAPS)	3196.745	464	2537.37	463	659.375	1	*p*<.001
Perfectionism (APS)	3795.592	665	3243.015	664	552.577	1	*p*<.001

Table 6

Adjusted R Square Values and Standardized Regression Coefficients for Incremental

Validity Analyses

	Adjusted R Square		Δ Adjusted R Square	Standardized Regression Coefficients		
	BSCS	SCMCS	SCMCS over & above BSCS	Capacity over & above BSCS	Internal Motivation over & above BSCS	External Motivation over & above BSCS
Smoking	0.085***	.088***	0.033*	.000	-0.143	-.130
Total Exercise	-0.001	0.024	0.019	.219*	-0.080	-0.068
Exercise Frequency	0.001	0.006	0.013	-.172*	-0.023	0.019
Stress	0.046**	0.001	-0.004	-0.012	0.006	0.1
Impaired Control over Alcohol	.173***	.187***	0.064***	-.297***	-0.005	-0.015
Study Habits (Notes)	.076***	.117***	0.065***	.302***	-0.064	0.072
Study Habits (Schedule)	.064***	-0.008	0.011	-0.129	-0.089	0.045
Study Habits (Concentration)	.084***	-0.012	0.031*	-0.128	-0.131	-0.032
GPA	.030**	0.017	-0.003	0.057	0.043	0.049
Food Addiction	.081***	.026*	0.012	-0.151	0.147	0.039
Food Addiction (Clinical Severity)	.085***	.045**	0.004	-0.15	0.084	-0.002
Internal Locus of Control	0.006	0.016	0.001	0.127	0.02	-0.066
Sleep	-0.004	-0.014	-0.012	0.107	-0.048	0.018
Alcohol Use Frequency	.056***	.080***	0.043**	0.03	-0.151	-.163*

Alcohol Use Quantity	.048**	.067***	0.029*	0.071	-.199*	-0.08
Alcohol Use Binge	.066***	.068***	0.029*	0.016	-0.115	-.152*
Days of Missed Class	.110***	-0.006	-0.002	0.088	0.05	-0.018
Alcohol-Related Problems	.134***	.127***	0.038**	-0.123	-0.135	-0.062
Social Drinking Motives	.068***	.034*	0.008	-0.035	-0.055	-0.106
Coping Drinking Motives	.072***	.071***	0.031*	-0.114	-0.127	-0.053
Enhancement Drinking Motives	.105***	.084***	0.039**	-0.025	-0.107	-.164*
Conformity Drinking Motives	.074***	.116***	0.074***	-.221**	-.176*	0.029
Drinking Norms for Males	0.011	-0.005	0.009	0.071	0.029	0.109
Drinking Norms for Females	.014*	0.014	0.03*	0.088	0.041	.158*
Personal Drinking Values (Alcohol)	.043**	.076***	0.046**	0.038	-.254**	-0.054
Personal Drinking Values (Driving)	.039**	.113***	0.084***	-0.098	-.275**	-0.038
Injunctive Norms (Alcohol)	-0.004	.033*	0.026*	.189*	-.217*	0.036

Injunctive Norms (Driving)	-0.003	.046**	0.048**	-.189*	-0.154	.161*
Social Motives	.016*	0	0.019	0.141	0.008	0.101
Academic Motives	.027**	.145***	0.134***	.185*	.186*	.173*
Parental Monitoring	.143***	.110***	0.051***	0.132	0.136	0.091
Alcohol Resistance Self-Efficacy	.071***	.126***	0.08***	.244**	.136	.025

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
***. Correlation is significant at the 0.001 level (2-tailed).

APPENDIX B

15-ITEM SELF-CONTROL MOTIVATION AND CAPACITY SCALE ITEMS

Capacity
Using the scale provided, please indicate how easy or difficult the following tasks would be for you to complete if you were motivated to do them.

With much difficulty   1———2———3———4———5   Very easily

When I have the motivation, I'm able to…
1. … resist temptation.
5. … avoid doing certain things that are bad for me even though they are fun.
6. … refuse things that are bad for me.
7. … have self-discipline.
12. … stop myself from doing something if I know it is wrong.

Internal Motivation
Using the scale provided, please indicate the extent to which you are motivated to do each of the following because of your own personal values, identity, standards, etc.

Not at all   1———2———3———4———5   Very much

Because of my own personal values, identity, standards, etc. I am motivated to…
1. … resist temptation.
5. … avoid doing certain things that are bad for me even though they are fun.
6. … refuse things that are bad for me.
7. … have self-discipline.
12. … stop myself from doing something if I know it is wrong.

External Motivation
Using the scale provided, please indicate the extent to which you are motivated to do each of the following because of how you would be viewed by others (e.g. parents, friends, peers, society, etc.)

Not at all   1———2———3———4———5   Very much

Because of how I'd be viewed by others (e.g. parents, friends, peers, society, etc.), I am motivated to…
1. … resist temptation.
5. … avoid doing certain things that are bad for me even though they are fun.
6. … refuse things that are bad for me.
7. … have self-discipline.
12. … stop myself from doing something if I know it is wrong.

APPENDIX C

39-ITEM SELF-CONTROL MOTIVATION AND CAPACITY SCALE ITEMS

Capacity
Using the scale provided, please indicate how easy or difficult the following tasks would be for you to complete if you were motivated to do them.

With much difficulty   1———2———3———4———5   Very easily

When I have the motivation, I'm able to…
1. … resist temptation.
2. … break bad habits.
3. … avoid being lazy.
4. ... avoid saying things that might get me into trouble.
5. … avoid doing certain things that are bad for me even though they are fun.
6. … refuse things that are bad for me.
7. … have self-discipline.
8. … behave in a way that people would say that I have iron self-discipline.
9. … prevent pleasure and fun from keeping me from getting work done.
10. … have no trouble concentrating.
11. … work effectively toward long-term goals.
12. … stop myself from doing something if I know it is wrong.
13. … act after thinking through all the alternatives.

Internal Motivation
Using the scale provided, please indicate the extent to which you are motivated to do each of the following because of your own personal values, identity, standards, etc.

Not at all   1———2———3———4———5   Very much

Because of my own personal values, identity, standards, etc. I am motivated to…
1. … resist temptation.
2. … break bad habits.
3. … avoid being lazy.
4. … avoid saying inappropriate things.
5. … avoid doing certain things that are bad for me even though they are fun.
6. … refuse things that are bad for me.
7. … have self-discipline.
8. … behave in a way that people would say that I have iron self-discipline.
9. … prevent pleasure and fun from keeping me from getting work done.
10. … have no trouble concentrating.
11. … work effectively toward long-term goals.
12. … stop myself from doing something if I know it is wrong.
13. … act after thinking through all the alternatives.

External Motivation
Using the scale provided, please indicate the extent to which you are motivated to do each of the following because of how you would be viewed by others (e.g. parents, friends, peers, society, etc.)

Not at all   1———2———3———4———5   Very much

Because of how I'd be viewed by others (e.g. parents, friends, peers, society, etc.), I am motivated to…
1. … resist temptation.
2. … break bad habits.
3. … avoid being lazy.
4. … avoid saying inappropriate things.
5. … avoid doing certain things that are bad for me even though they are fun.
6. … refuse things that are bad for me.
7. … have self-discipline.
8. … behave in a way that people would say that I have iron self-discipline.
9. … prevent pleasure and fun from keeping me from getting work done.
10. … have no trouble concentrating.
11. … work effectively toward long-term goals.
12. … stop myself from doing something if I know it is wrong.
13. … act after thinking through all the alternatives.

APPENDIX D

HUMAN SUBJECTS APPROVAL DOCUMENTS

ASU Knowledge Enterprise Development

APPROVAL FULL BOARD

William Corbin
Psychology
480/766-1846
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Dear William Corbin:

On 10/24/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Self-Control Motivation and Capacity Survey
Investigator:	William Corbin
IRB ID:	STUDY00001569
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Consent 10-22-14.docx, Category: Consent Form; • MA2 IRB 10-23-14-R.docx, Category: IRB Protocol; • Response to Reviewer Concerns.pdf, Category: Other (to reflect anything not captured above); • Modifications 10-21-14, Category: Other (to reflect anything not captured above); • Confidentiality Statement Papova.pdf, Category: Other (to reflect anything not captured above); • Recruitment Email 10-23-14.docx, Category: Recruitment Materials;

The IRB approved the protocol from 10/17/2014 to 10/16/2015 inclusive. Before 10/16/2015, you are to submit a completed "FORM: Continuing Review (HRP-212)" and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 10/16/2015 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Anna Papova
       Kyle Jackson
       Alejandra Astiazaran
       Kyle Menary
       Benjamin Berey
       Caitlin Scott
       Anna Papova
       Julie Patock-Peckham