NEED FOR RECOVERY AND INEFFECTIVE SELF-MANAGEMENT

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ABSTRACT

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The present study examined the role of a person's need for recovery in the relationship between work-related stress and a new set of behavioral and cognitive outcomes related to a person's ability to work effectively. These new criteria, self-defeating behaviors and cognitions included decision making delay/avoidance, impulsivity, procrastination, escalation of commitment, and self-handicapping. All were measured with newly developed situational judgment and scenario-based measures.

The guiding hypothesis was that need for recovery would mediate the relationships between stress and the multiple self-defeating behaviors and cognitions. Following two pilot studies for measure refinement, the actual sample of undergraduate students (N = 311) responded to two surveys (one week apart). Participants provided information about their current levels of perceived stress, personal recovery needs, and likelihood of engaging in each of the self-defeating behaviors and cognitions depending on a specific scenario.

Results of a series of hierarchical regression analyses supported the hypothesized mediation by need for recovery of the relationship between stress and self-handicapping. No evidence for mediation was found with respect to the other self-defeating behaviors and cognitions. However, several other important findings emerged, including main effects of need for recovery on procrastination and behavioral impulsivity. Several individual characteristics were also identified as significant predictors of multiple self-defeating behaviors and cognitions.

These results highlighted the important roles need for recovery appears to play in the stress process as both a stress mediator and main effect on several forms of ineffective or self-defeating behaviors and cognitions. Also apparent was the key role of personal characteristics

such as gender and personality as additional predictors of a person's development of self-defeating behaviors and cognitions. Future research possibilities include further refinement of the situational measures and replication within different participant samples. Implications for occupational stress and recovery research and application are several, including (a) possible changes to the basic focus of stress research from stress perception to need for recovery identification and (b) multiple new uses for the new measure of need for resource recovery.

This research is dedicated to my wife and best friend, Lori. Without her support, and the undying love and support of my family, my recovery needs would forever go unmet.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The present study examined the impact of work demands on work effectiveness in a new way. Instead of focusing on perceptions of particular stressors in the work environment as antecedents of negative work outcomes, the focus here was on peoples' need for recovery, composed of perceived fatigue and perceived need for resource recovery. In addition, rather than considering the attitudinal and affect-based outcomes common to most occupational stress studies, I developed situational judgment measures for multiple new outcomes related to counterproductive cognitive and behavioral patterns.

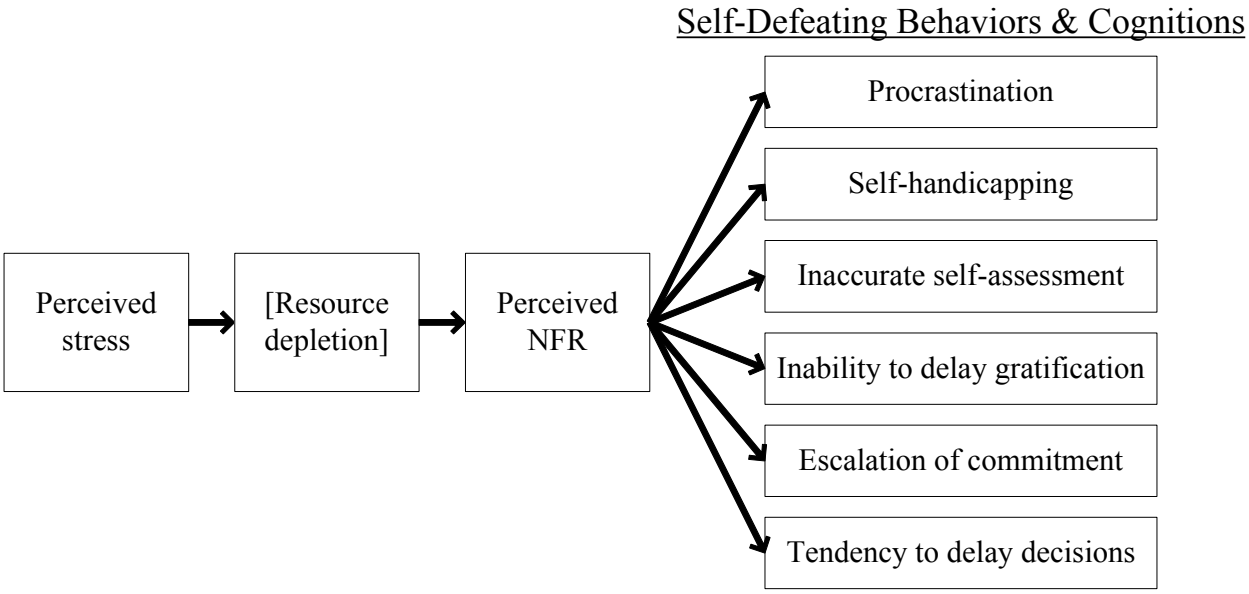
Overview

To prevent serious physiological and physical consequences of occupational stress, people need time to recover and restore. In today's workplaces, fatigue and psychological distress, two symptoms of a need for recovery, are very common conditions among workers (e.g., Bültmann, Kant, Kasl, Beurskens, & van den Brandt, 2002). One reason these symptoms are so prevalent is that people tend to make poor judgments about their personal need for recovery. Accurate recognition of personal recovery needs is increasingly becoming an issue as the work period shifts from a standard core set of daily hours to a 24 hour a day, seven day a week commitment. Employees increasingly must struggle with knowing when to stop working and when to start recovering on a day-to-day basis.

A primary goal of the present study was to evaluate the utility of a need for resource recovery (NFRR) construct as a marker of a person's state of resource-based well-being (i.e., an indication of whether he/she needs more recovery to reach peak functioning levels) that goes beyond basic measures of fatigue. A second goal was to gain insight regarding the relationship of work-related stress to the development of various self-defeating behaviors and cognitions (Renn,

Allen, Fedor, & Davis, 2005) associated with employee ineffectiveness. Figure 1 visually summarizes these goals in a mediational framework. More specifically, the impact of work-related stress on multiple self-defeating behaviors and cognitions was expected to be mediated by need for recovery.

Figure 1. Conceptual Model Linking Need for Recovery with Self-Defeating Behaviors and Cognitions



Note. "Resource depletion" is a condition and component of this process not directly measured in the present study, but rather evaluated in terms of a person's perceived need for recovery.

Why Consider the Need for Resource Recovery?

The traditional and simple assumption that stress has a consistent and direct negative impact on employee performance at workplace is no longer tenable. It is now understood that certain types of stress may actually improve employee performance under certain conditions, especially when the criterion is required job task performance (i.e., "get this report to me by the

end of the day"; Boswell, Olson-Buchanan, & LePine, 2004; Hammond, 2000; Jex, Cunningham, De La Rosa, & Broadfoot, 2006; LePine, Podsakoff, & LePine, 2005; McCauley, Ruderman, Ohlott, & Morrow, 1994). Longer work hours do not always translate into more serious strain (Rook & Zijlstra, 2006), nor do higher levels of workload (Taris et al., 2006). The impact of occupational stress on the health and well-being of workers depends on multiple individual-level factors (e.g., Zijlstra & Sonnentag, 2006). An important consideration when studying stress is to remember that it is not simply the situation itself that matters, but also on each individual's characteristics (e.g., Appley & Trumbull, 1986) and perception/appraisal of the situation (e.g., Lazarus, 1995; Lazarus & Folkman, 1987).

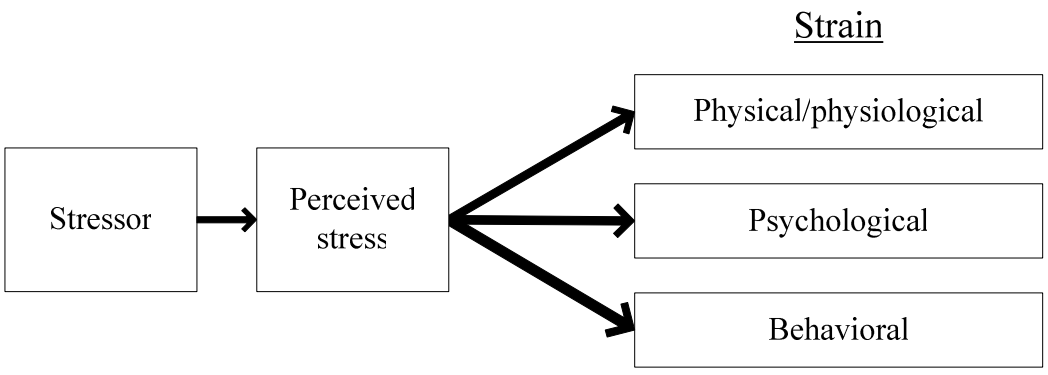
This is not to say that stress at work is a non-issue. Indeed, when attention shifts toward a broad criterion of employee effectiveness, multiple pathways emerge by which stress from work demands or environmental factors could impact employee functioning. Although an employee's performance on actual job-task related performance may even increase under a certain amount of stress, as a multidimensional criterion, employee effectiveness incorporates multiple other forms of performance including contextual performance behaviors (i.e., enthusiasm and persistence, volunteering to help, endorsing/supporting the organization to others; e.g., Borman & Motowidlo, 1993; 1997), and creative or innovative behavior and cognitive processing. These latter components are what allow employees to function at optimal levels within their specific occupational roles. These latter components of effectiveness are also strongly influenced by each individual employee and they are therefore more likely to be influenced by the negative effects of work stress than their task performance counterparts (Jex et al., 2006).

Research that identifies relationships between work stress and work effectiveness can be useful in developing a strategy for keeping these relationships positive. Currently this often

involves interventions targeted at improving employees' stress-handling skills such as time management with the expectation that this will buffer the effects of stress (e.g., Adams & Jex, 1999; Peeters & Rutte, 2005). Such an approach is logical given the predominating perspective on work stress, which identifies stress as a process – if people are better equipped to handle this process, then perhaps the negative effects of stress will not develop (or at least be reduced).

The stress process has been described in many different ways (e.g., Spector, 1998; Sulsky & Smith, 2005), with a common thread being the following underlying sequence (summarized in Figure 2): Psychosocial or environmental stressors at work are perceived and appraised as stressful (either as challenging or threatening), leading to physical, psychological, and behavioral strains. It may also be possible for physical stressors in the work environment (e.g., light, noise, air contaminants) to lead directly to strain reactions, bypassing a need for cognitive perception and appraisal (e.g., Schaubroeck, 1999). With occupational stress research, the assumption following this process, is that strain will then be related to decrements in job performance or some other form of employee effectiveness.

Figure 2. The Basic Stress (Stressor → Strain) Process



Conceptually simple, this type of process model has guided the majority of work stress research for the last four decades. A limitation of this model however, is that it draws the focus of researchers and interventionists to the presence of stressors or the appraisal of these stressors as critical antecedents leading to strain. Such a perspective may be a natural extension of this process model, but it has several unfortunate drawbacks.

First, it sidesteps the fact that it is often impossible (and undesirable) to fully remove stressors from work environments. For example, the nature of work is that tasks need to be completed by a certain time. Without deadlines and other forms of external motivation, work could not be accomplished, goods would not be produced, and progress would not be made. Thus, stress is an inherent and sometimes desirable motivating feature of an environment (e.g., McEwen, 2000; Sapolsky, 1998). Second, the traditional process model suggests that the effects of stress extend directly from a person's perception of being stressed, a circular definitive statement that has created problems in stress research, especially with stress measurement methods (e.g., Jex, Beehr, & Roberts, 1992). Third, it ignores the importance of intermediate psychological and physiological states that may be more proximate to and more strongly predictive of negative work-related outcomes than more distal and abstract perceptions and appraisals of environmental stimuli.

Instead of focusing simply on a person's perception of the presence of stressors or stress-inducing conditions in the environment, researchers may be better served by considering a person's need for recovery as an indication of that person's susceptibility to psychological, physical, and behavioral failure. From this perspective, stressors may lead to strains by depleting a person's resources, increasing need for recovery, and increasing the risk that more serious strains will develop if recovery is not achieved. In the following sections, I discuss the

multidimensional criterion of employee ineffectiveness, working backward from the model outlined in Figure 1. Then the discussion turns to the psychological state of need for recovery and the recovery process. Building on this background, the goals for the present study are presented.

The general proposition to keep in mind while reading is that I expected perceived need for recovery to reflect a person's sense of having depleted cognitive, emotional, and energy-related resources needed for effective self-management and self-direction when working. In the absence of these resources a person can be expected to be less able to self-manage him/herself in work, leading to an increase in self-defeating behaviors and cognitions that may be seen as a decrease in overall employee effectiveness.

Self-Defeating Behaviors and Cognitions, and Ineffective Work

Existing recovery-related research has not yet strongly demonstrated a consistent relationship between recovery processes and criteria related to employee work performance (with the exception of preliminary findings from Fritz & Sonnentag, 2005). This is due in part to the newness of this area of research (approximately 10 years), but it is also due to the difficulty inherent in defining and adequately measuring performance and effectiveness on the job (Austin & Villanova, 1992; Ghiselli, 1956; James, 1973). Recent conceptual work by Renn et al. (2005) provides a framework of ineffective or self-defeating behaviors and cognitions that may be useful to occupational health researchers who study recovery-related constructs.

Related research isolating the similar, but potentially more serious emotional exhaustion component of burnout has identified a negative relationship with organizational performance (Schaufeli & Enzmann, 1998; Wright & Bonett, 1997; Wright & Cropanzano, 1998). These findings support the notion that lack of resources (especially ones needed for regulation of

emotion) may hinder an employee's effectiveness at work. Separate research has also found that efforts to recover spent resources during non-work time can positively influence job-related behaviors (e.g., Fritz & Sonnentag, 2005; Sonnentag, 2003). These findings suggest that using non-work time to recover may help an individual regain resources needed for effective work in the next work period.

The study of the NFRR construct is in its early stages and the ability to associate it with measurable elements of employee effectiveness would help to support its validity as a construct relevant to individual functioning within work organizations. An immediate impediment to such research, though, is that a useable framework for employee effectiveness has been lacking from the research on work-related outcome criteria. One possible framework for effectiveness (e.g., Jex et al., 2006) would include task performance and multiple forms of contextual performance (e.g., organizational citizenship behaviors, prosocial organizational behavior, personal initiative), as well as other effectiveness-related elements (creativity, counterproductive work behaviors). Although more comprehensive, such a framework is limited in its applicability because it lacks a central theory to connect its multiple components.

In the present study a more useful effectiveness framework was one linked to the concept of self-control or self-management as a resource that could be depleted when coping with work stress. Renn et al.'s (2005) framework of self-defeating behaviors and cognitions fits this need. Renn et al. characterize self-defeating behaviors and cognitions as, "unintentional or deliberate acts with counterproductive effects on self or one's projects" (Renn et al., p. 660). This definition is a direct extension of Baumeister and Scher's (1988) discussion of self-defeating behavior patterns, which, along with counterproductive cognitions, were shown to be more harmful to people than intentional self-destructiveness.

If not quickly addressed, the counterproductive behaviors and cognitions outlined in Renn et al.'s (2005) framework can lead to self-management failure, or an inability to effectively coordinate one's behaviors and cognitions toward a desired goal. This in turn would translate into dramatically impaired work effectiveness. The six general self-defeating behaviors and cognitions identified by Renn et al. are summarized in Table 1. All six are theorized to impair an employee's ability to effectively self-manage his/her actions within the workplace.

Self-management involves setting standards, checking one's behavior against those standards, and directing oneself and one's environment to achieve those standards (Carver & Scheier, 2000; Manz, 1986; Manz & Sims, 1987). In its simplest form self-management is roughly synonymous with self-control of behaviors and emotions (Logue, 1996; Rachlin, 2000) or self-regulation (Carver & Scheier, 2000; Vancouver, 2000; Vohs & Baumeister, 2004). Self-management *failure* occurs when these regulatory activities are poorly coordinated (Baumeister, 2002).

Renn et al.'s (2005) discussion of self-defeating behaviors and cognitions focuses mainly on what self-management failure would mean to an employing organization. No explicit attention however, is given to the potential relationship between a person's need for recovery and the development of these self-defeating behaviors and cognitions. From an occupational health perspective, this is an important omission, as these self-defeating behaviors and cognitions may represent an important outcome to integrate into studies of stress, recovery, and strains of behavioral, psychological, and physiological varieties.

Table 1. Renn et al.'s (2005) Self-Defeating Behaviors and Cognitions

Behavior	Explanation
Procrastination	Results from motivational states and is influenced by cognitive, affective, and behavioral proceses -- may create a self-destructive cycle of putting off negative emotion and delaying of work (p. 662)
Inaccurate self-assessment	Involves gathering information and identifying which behaviors to develop or improve -- may lead to damaging distortions in cognitive structures and self-beliefs that could contribute to misguided actions and negative outcomes (p. 662)
Self-handicapping	Meant to increase a person's ability to blame failure on external causes and successes on internal factors -- may be related to self-obstruction at work, insecurity, and motivation by anxiety/fear of failure (p. 663)
Inability to delay gratification	Reflects an inability to sacrifice immediate rewards for more distant, but larger ones -- may contribute to impulsive behavior/thought and an inability to maintain focus on long-term goals and to delay gratification when necessary (p. 663)
Emotional self-absorption	Excessive focus on one's personal thoughts, feelings, and behaviors -- problematic when results in misallocation of resources needed for other work-related activities (p. 664)
Escalation of commitment	Can be thought of as extreme persistence, even when such continued efforts are misguided -- becomes a problem when withdrawal from a course of action is prevented by this psychological inertia (p. 664)

A second area in need of development following Renn et al.'s (2005) discussion is that leisure and relaxation were presented as little more than "immediate temptations and distractions," which need to be restricted or delayed for an employee to be considered an

effective self-manager (p. 663). However, Renn et al. also note that successful or effective self-management, "often depends on individuals' ability to muster the strength to overcome unwanted impulses driven by thoughts and feelings of immediate pleasures.

When employees cannot gather the strength to ward off such impulses or become exhausted from counteropposing strength, delay of gratification can fail and often so does operating and monitoring" (p. 672). This latter point seems to highlight the importance of self-control as a limited resource needed for effective self-management. Such a perspective is closely in line with psychological research on self-control and self-regulation of emotions and behaviors (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven & Baumeister, 2000; Muraven, Tice, & Baumeister, 1998).

Need for Resource Recovery: Running Low on Resources

When experiencing stress, people do their best to cope. Sometimes that coping involves direct efforts to change the source of that stress (i.e., the stressor) and other times that coping may be directed at changing the perception and appraisal of a stressor in more cognitive or emotional ways (e.g., Koeske, Kirk, & Koeske, 1993; Perrewé & Zellars, 1999; Sulsky & Smith, 2005). In general, coping is often conceptualized as being directed at the most ambiguous portion of the stress process, where perception of stressors occurs.

Successful coping of any form taxes a person's resources that are also necessary for sustaining energy and maintaining emotional and attentional control in a stressful environment. This draining of resources increases a person's NFRR. Sustained use and depletion of personal resources without respite or recovery leaves a person without sufficient resources to continue handling future stressful situations in the work or nonwork environment (Zijlstra & Sonnentag, 2006). Sustained NFRR is likely to translate into increasingly serious physical and psychological

consequences (Renn & Zijlstra, 2006; Sluiter, van der Beek, & Frings-Dresen, 1999; Sluiter, Frings-Dresen, van der Beek, & Meijman , 2001). Thankfully, when a person takes the time to rebuild his/her spent resources, then recovery can occur and NFRR build-up can be stopped (Fritz & Sonnentag, 2005; Sonnentag, 2003; Westman & Etzion, 2001).

This process of resource depletion, renewal, and development/maintenance is a central component of the developing research on the recovery process. At present, this process is most commonly outlined by two complementary theories. The first of these theories is Conservation of Resources theory (Hobfoll, 1989; 2001; 2002), in which resources are seen as objects, personal characteristics, conditions, and energies that a person may draw on when facing stressful situations. When faced with a stressor, a person is motivated to minimize the loss of these resources, and when not facing a stressor, a person is motivated to increase his/her store of these resources for later use. When resources are low, a person's capability to effectively respond to life's challenges is reduced.

The second recovery-relevant theory is the Effort-Recovery model developed by Meijman and Mulder (1998). Applied to recovery, this theoretical model suggests that effort spent in response to work demands results in short-term physical and psychological costs, which can be recouped if a person is able to recover. When recovery is complete, a person returns to a balanced or homeostatic state in which, at least theoretically, no demands are being placed on the person. Without recovery, however, these costs can accumulate and develop into more serious physical and psychological consequences (e.g., burnout, serious physical symptoms). This second theory has been increasingly applied in recent recovery research (e.g., Rook & Zijlstra, 2006; Taris et al., 2006).

A limitation of the Effort-Recovery theory is that it does not directly account for individual differences. This is one reason why integrating a Conservation of Resources perspective is so important when studying recovery. This in fact was a conclusion reached by Rook and Zijlstra (2006), who also suggest that, "Individuals need to discover their own thresholds and live at a pace of life suited to their needs" (p. 237). This is the reason for studying NFRR as a condition or state that people can learn to recognize as a sign of their recovery thresholds and as a metric for evaluating effective strategies for recovery.

The connection between these two theories has been made already by other researchers (Sonnentag & Natter, 2004). The integration of these two theories is at the point of resource recovery, with Conservation of Resources theory suggesting that recovery requires a person to stop drawing on depleted resources that were used in meeting demands. To rebuild these resources the person can either rely on other, untapped resources, or can take a rest. Resources may also be recovered by following the principles of the Effort-Recovery model, by directly reducing the presence of demands. Whereas Effort-Recovery can describe the evaluative process a person may engage in when identifying a true need to recover, Conservation of Resources can be helpful in explaining what a person might actually do during the recovery process. Thus, the two theories are necessarily closely related.

Within the present context, resources are the linking pins that connect NFRR to self-defeating behaviors and cognitions. As will be discussed in more detail in the presentation of hypotheses for Study 1, Baumeister and colleagues have generated an impressive amount of data suggesting that self-regulatory/ management resources may be generic in the sense that they are used for most if not all forms of self-control. If this general self-regulatory or self-control resource is depleted, the effects of this depletion are therefore likely to be widespread and

multiply identified, highlighting the potential utility of the present self-defeating behaviors and cognitions framework.

Developing a need for resource recovery. A person is expected to develop and experience NFRR at the point where available resources begin to be outstripped by the demand for those resources. As originally conceptualized, NFRR can be viewed as an intervening psychological and physical state that arises between perceived work demands and experienced fatigue (e.g., Sluiter et al., 2001). A high NFRR condition represents a more serious degree of resource depletion than is captured by assessing a person's feelings of fatigue because energy is only one resource that is depleted when confronting stressors. The psychologically and physiologically determined state of NFRR can be considered a pre-strain condition that is likely to develop before an individual exhibits symptoms associated with physical and biological strain or feels a total sense of being burned out (e.g., Maslach, 2006; Shirom, 2003).

The recovery process. Building on the preceding theoretical discussion, perceived NFRR reflects a person's desire to restore, maintain, and/or extend his/her remaining resources in preparation for the next challenge. Recovery is a complex process of emotional and physical relaxation and rejuvenation by which this restoration occurs either actively or passively (Kabanoff & O'Brien, 1986; Sonnentag, 2003; Sonnentag & Jelden, 2005; Sonnentag & Zijlstra, 2006). Recovery begins when a person "shifts gears" away from trying to meet work-related demands and on to a different set of activities or interests.

Recent research has shown that active recovery (i.e., energy-consuming activities such as physical exercise or community involvement) may actually be perceived as more valuable and rewarding to individuals than more passive recovery activities (e.g., watching television, reading a book). Paradoxically, it has also been shown that despite the perceived superior value of active

recovery, people tend to opt for passive recovery options following especially stressful work days (i.e., days when perceived work demands were very high and when recovery is sorely needed; e.g., Sonnentag & Jelden, 2005). Findings such as these highlight a major human inconsistency relevant to personal health: Knowing how to recover does not necessarily lead people to respond appropriately or adequately to their personal recovery needs.

Recovery and need for resource recovery. The lack of awareness of personal recovery needs due to work stress is a major issue for occupational health psychology researchers and practitioners. In part this is because the workplace represents a consistent source of resource demands (including stress) and a goal of research in this area is to better equip people to handle these demands. A second reason is that employee fatigue and more generalized NFRR are critical indications of the health of an organization's human resources, reflecting the internal capabilities and abilities of each worker to function effectively on the job.

Ignoring personal resource levels is akin to taking a road trip without paying attention to the fuel gauge on the car. Recent research within work organizations supports this assertion. In a Dutch population study, for example, nearly all respondents reported some recovery needs and the level of this need was associated with demographic, work-related, and health-related factors (Jansen, Kant, & van den Brandt, 2002). The evidence was striking enough for Jansen et al. to note that, "repeated insufficient recovery from work-induced fatigue is seen as the start of a vicious circle where extra effort has to be exerted at the beginning of every new working period to rebalance the suboptimal psycho-physiological state, and to prevent performance breakdown" (p. 323; see also Sluiter et al., 1999). A similar notion was advanced by Rook and Zijlstra (2006) in their discussion of "fatigue residuals" developing when recovery is incomplete between workload exposures (p. 233).

Chronically high and therefore unmet recovery needs may also increase a person's risk of illness, over and above the influence of other work factors (e.g., de Croon, Sluiter, & Frings-Dresen, 2003). The evidence for a clear mediating influence of need for recovery between stress exposure and strain is mixed (e.g., de Croon et al.; Sonnentag & Zijlstra, 2006), but high work/nonwork demands and poor off-job activities have been shown to predict need for recovery (Sonnentag & Zijlstra, 2006). In turn, need for recovery has also been shown to predict impaired well-being (e.g., Sluiter et al., 1999) and higher turnover on the job (e.g., de Croon, Sluiter, Blonk, Broersen, & Frings-Dresen, 2004). Thus an important relationship between need for recovery, health, and work-related variables appears to exist, though the precise nature of this relationship is not yet fully understood.

CONNECTING NEED FOR RECOVERY AND SELF-DEFEATING BEHAVIORS AND COGNITIONS

The development of self-defeating behaviors and cognitions equates to the development of barriers to a person's ability to effectively self-manage one's behaviors and cognitions toward a specific goal (Renn et al., 2005). Extending from research that has identified self-regulation or self-control as a limited resource, one likely contributing factor to the development of self-defeating behaviors and cognitions (and eventually self-management failure) is a person's inability to draw on sufficient personal resources when required. Such processes involve actively directing and sustaining resources such as focus, attention, control, and energy, all of which will be depleted as an individual copes with work stress.

As these resources are expended, individuals will experience an increased need for recovery. Until recovery is achieved, these individuals can be expected to be less effective in accomplishing their work-related tasks than other individuals who have met their personal recovery needs. Support for this assertion comes from studies showing decreases in performance for individuals following a period of resource depletion (Baumeister et al., 1998).

Ineffectiveness in work stemming from resource depletion is unlikely to be identifiable when the criterion of interest is some variant of task performance. Such required performance is regulated by both external and internal agents and is therefore unlikely to vary with fluctuations in need for recovery. In other words, even if personal self-management fails, one's coworkers or managers will tend to exert external control to make sure required tasks are completed. Instead, it is more likely that the influence of resource depletion on an employee's work effectiveness will develop at the level of more personally controlled elements of effectiveness such as the cognitive and behavioral processes by which work gets done.

In this way, self-defeating behaviors and cognitions can stand in the way of fully effective functioning in a work setting. Employee effectiveness as a criterion involves task and contextual performance, but also the behavioral and cognitive actions of an individual required for both forms of performance. These behaviors and cognitions may become self-defeating when a person's self-regulatory resources are depleted (e.g., when NFRR is high and unmet). This is problematic, because without effective self-management of behaviors and cognitions, a person's performance on work-related tasks is likely to suffer.

This is especially likely to occur if need for recovery remains high over an extended period of time, developing into the more severe condition of burnout. While need for recovery develops from resource depletion associated with work-related demands (including tasks, interpersonal relationships, and environmental conditions), burnout develops not only from these factors, but also from prolonged perceptions of lack of control, inequitable reward, lack of fairness, and mismatched value between a person and the organization (Maslach & Leiter, 1997; Schaufeli & Enzmann, 1998). By definition, once an individual has reached a state of burnout, that worker has little chance of improving his/her condition without the help of professionals or some sort of restructuring of work demands (Brill, 1984; Schaufeli & Enzmann, 1998).

Thus, need for recovery can be seen as a pre-condition leading to burnout, with the potential to influence the cognitions and behaviors that guide employee efforts. While need for recovery can be expected to influence a person's management of cognitions and behaviors, the more severe condition of burnout has been shown to influence the actual quality of a person's work (Leiter, Harvie, & Frizzell, 1998; Maslach, 2006; Schaufeli & Enzmann, 1998).

The first step in integrating need for recovery and self-defeating behaviors and cognitions is to evaluate the nature of the relationship between these two constructs. To build on existing

recovery research it is first important to demonstrate the relationship between work-related stress and need for recovery. The next step is to test for the possible mediating influence of need for recovery on the relationship between stress and multiple self-defeating behaviors and cognitions. Although existing empirical support for the mediating effect of need for recovery on the relationship between stress and performance is mixed, conceptually its role as an important intervening variable seems clear. In the present study therefore, need for recovery (including fatigue and NFRR) was positioned as a process-related variable that develops from resource depletion due to attempts to handle stress. Higher levels of need for recovery were expected to predict higher levels of self-defeating behaviors and cognitions.

In the present study I focused on six self-defeating behaviors and cognitions, all of which are relevant to work effectiveness. All six presented serious measurement challenges in the present context, especially because several have frequently been studied as unchanging personality traits (e.g., procrastination, impulsivity, emotional self-absorption). In most of these research areas, however, the possibility has been left open that situationally influenced (i.e., state- rather than trait-induced) forms of all six self-defeating behaviors and cognitions may emerge.

I included all self-defeating behaviors and cognitions from Renn et al.'s (2005) discussion except emotional self-absorption, because its presence was not expected to be counterproductive unless sustained over long periods of time (a scenario that could not be tested in the present study). In addition to these five original self-defeating behaviors and cognitions I also incorporated a sixth that I believed would be relevant, the tendency to delay decision making. That said, the final set of self-defeating behaviors and cognitions considered in the present study included procrastination, inaccurate self-assessment, impulsivity/inability to delay

gratification, self-handicapping, escalation of commitment, and tendency to delay decision making.

This being the case, I developed a battery of situational judgment style measures for five of the six self-defeating behaviors and cognitions. The sixth, inaccurate self-assessment, was evaluated with information linked to personal goals tracked over the period of a week. The measures for the other five self-defeating behaviors and cognitions were developed to evaluate behavioral and cognitive responses to situational stimuli given each participant's momentary state, rather than basing assessment on retrospective self-reports or an existing trait measure. The sections that follow provide background information on each of the six self-defeating behaviors and cognitions. Each section also discusses my hypotheses involving each self-defeating behaviors and cognitions, work-related stress, and need for recovery.

Procrastination

Procrastination develops from a person's general motivational state, which involves a combination of cognitive, affective, and behavioral processes linked with task avoidance (Renn et al., 2005). Procrastination reflects a person's inability to direct his/her fullest attention to the task at hand and the desired outcome of completing that task (Van Eerde, 2003). Behaviorally, procrastination involves, "needlessly delaying tasks to the point of experiencing subjective discomfort" (Solomon & Rothblum, 1984, p. 503). Procrastination is a prevalent form of self-defeating behavior (Ferrari, O'Callaghan, & Newbegin, 2005), common not only among students, but also among adults, chronically affecting the daily tasks of 15-20% of the population (Harriott & Ferrari, 1996).

A common perspective among current procrastination researchers is that this phenomenon reflects a relatively stable personality characteristic (Steel, 2007). There is,

however, some evidence to suggest that situational cues that can lead to procrastination including the timing of rewards (i.e., if more distant, more likely to procrastinate), task aversiveness (i.e., if more disliked, more likely to procrastinate; Steel, 2007), low autonomy (a form of occupational stressor), low task significance, and minimal feedback may increase decisional procrastination (Lonergan & Maher, 2000). As noted by Steel (2007), behavioral procrastination has been shown to increase with frustration, resentment, boredom, and various other features of a work assignment (Ackerman & Gross, 2005; Blunt & Pychyl, 2000).

In a typical work environment, procrastination can be seen as a lack of motivation to start working on a project, even though a known deadline for that project may exist (e.g., Senécal, Koestner, & Vallerand, 1995; Van Eerde, 2003). Procrastination is self-defeating because it inevitably leads to increased pressure to complete work as deadlines eventually approach (Renn et al., 2005). Such pressure, although motivating, may lead to an increased number of errors for procrastinating as opposed to non-procrastinating individuals (e.g., Ferrari, 2001; Hammond, 2000). This in turn may lead to negative emotional experiences that can further pull an employee into a chronic delaying cycle of trying to avoid anxiety and negative feelings by further delaying efforts, only to experienced increased pressure to perform, and so on and so forth.

Chronic procrastination has been shown to impair a person's performance under time pressure and other situational demands (e.g., Ferrari, 2001). Similar findings have been observed when comparing procrastinators versus non-procrastinators over time on measures of academic performance (e.g., Tice & Baumeister, 1997). Of particular relevance to the present study, procrastination has been shown to increase with negative mood or emotional distress (e.g., Tice, Bratslavsky, & Baumeister, 2001). Role stress has also been shown to predict procrastination in

academic work, mediating the influence of students' underlying motivations for accomplishing their work (e.g., Senécal, Julien, & Guay, 2003).

There are times when procrastination may have positive effects. For example, in a short-term way, delaying action might allow for more careful forethought or for the build-up of pressure needed to motivate a person to eventual action (e.g., Van Eerde, 2003). Delaying effort (a form of procrastination), may also allow an employee a small stress break (e.g., Tice & Baumeister, 1997). However, procrastination quickly becomes self-defeating when deadlines are central and recurring features of the work environment (Van Eerde, 2003). This is because procrastinating prevents a person from changing or reducing a particular source of stress. In this way procrastination can be seen as a form of avoidance coping, which has generally been shown to be less effective at preventing strain development than more active forms of coping (e.g., Koeske et al., 1993; Semmer, 2003). If maintained over time, therefore, procrastination is likely to create increasing difficulties for workers, potentially contributing to additional need for recovery and additional procrastination in another negative cycle.

In addition to developing as a form of coping, procrastination may also arise when individuals lack the capability to effectively self-regulate their behaviors, such as when need for recovery is high. Senécal et al. (1995) demonstrated that self-regulation accounted for 25% of the variance in students' procrastination, contributing to procrastination over and above variables associated with fear of failure (e.g., depression, anxiety, low self-esteem). Carried further, their analysis showed that procrastination was also significantly and negatively correlated with grade point average as an index of student performance, supporting the notion that this self-defeating behavior may lead to performance decrements. These findings underscore the motivational and resource-related connections to procrastination, rather than the more simplistic notion that

procrastination reflects inadequate time management skills or a consistent and defective dispositional characteristic.

Hypothesis 1. (a) A positive relationship will be observed between stress and procrastination and (b) need for recovery will mediate the relationship between stress and procrastination.

Inaccurate Self-Assessment

A core feature of effective self-management is the ability to regulate one's behaviors and cognitions against some sort of standard. Self-assessment is the process through which these comparative standards are established and during which a person decides how much of his/her specific resources are required to address current environmental conditions (including tasks, goals, stressors, etc.). Within work settings it can be very difficult to form accurate self-assessments due to limited access to clear and factual information (Renn et al., 2005). Within a work environment, inaccurate self-assessment can emerge as a visible self-defeating cognition in terms of an employee's, "inappropriate development objectives, pursuing misguided actions, and experiencing disappointing outcomes" (p. 662, citing also Peterson & Hicks, 1995).

To evaluate the accuracy of a person's self-assessment a natural starting point is the literature on human judgment and decision making. From this research base it is possible to conceptualize self-assessment in terms of an individual's accuracy in forming work-related plans. Inaccurate self-assessment can be evaluated, therefore, by considering a person's time estimation accuracy when planning work and the accuracy of a person's confidence ratings with

respect to those plans. In the judgment and decision making arena, these two phenomena are often studied as the planning fallacy and the overconfidence effect.

The planning fallacy refers to the tendency people have to underestimate the amount of time and/or resources needed to accomplish a particular task within a set timeframe (e.g., Buehler, Griffin, & Ross, 2002; Kruger & Evans, 2004). This inaccuracy develops from a failure to obtain and consider all relevant information about future influential factors that might affect a person's ability to finish a task as originally intended (i.e., inaccurate construal can result from uncertainty and lack of information regarding the future time in which a project is due). Usually people make a "best guess" estimate for what they expect to accomplish based on what they remember from past experience or perceive to be accurate at the present moment.

Unfortunately, people are chronically wrong in these estimates and it is very easy to see the negative impact such poor planning/estimating could have on an individual's and an organization's functioning. As an example, underestimating the time and money needed to complete a consulting project could put a consultant and his/her organization into a difficult position of either not finishing the work or having to finish the necessary work without compensation. Overestimation of needed time and resources could result in a consultant losing business because of unnecessarily expensive cost estimates to clients during the proposal stage of contract negotiations.

This phenomenon is closely related to the overconfidence effect, which refers to a person's tendency to systematically overestimate the correctness of his/her judgments or predictions (compared against subsequent observations of the accuracy of such judgments/predictions). This inaccuracy results in a miscalibration between a person's stated confidence in his/her ability to perform and the actual level of performance eventually achieved

(e.g., Dunning, Griffin, Milojkovic, & Ross, 1990; Pallier et al., 2002). In other words, the overconfidence effect reflects a "systematic discrepancy between expectations and reality" (McGraw, Mellers, & Ritov, 2004, p. 282).

Existing research suggests that as processing effort increases (as could be expected when recovery needs are high and resources needed for processing are low), the tendency to exhibit the planning fallacy increases (e.g., Buehler, Griffin, & MacDonald, 1997; Buehler, Griffin, & Ross, 1994). Thus, the potential clearly exists for both decision making phenomena to be exacerbated by a lack of cognitive and attentional resources needed for effective self-management and self-assessment. The planning fallacy and overconfidence effect are both indicative of inaccurate or incomplete processing of information from a person's internal and external environment. From a human judgment and decision making perspective, few attempts have been made to examine how psychological states might influence the degree to which these phenomena emerge. In the present context, a high need for recovery is expected to indicate a state of decreased cognitive resources, which can be expected to translate into an inability to fully construe future situations when forming plans.

> *Hypothesis 2.* Positive relationships will be observed between stress and (a) errors in planning accuracy and (b) overconfidence toward predicted outcomes, and (c) need for recovery will mediate the relationships between stress and both forms of inaccurate self-assessment.

Self-Handicapping

The third self-defeating behavior/cognition, self-handicapping, develops when a person purposefully creates barriers to his/her success using external excuses for failures (Baumeister & Scher, 1988). The motivation to self-handicap may come from a desire to protect self-image. Self-handicapping behaviors and cognitions can take many forms, among the most common including use of drugs such as alcohol, procrastinating until it is nearly too late to prepare for a performance situation (e.g., waiting until the day before a term paper is due to start writing it), exaggerating an illness or injury (especially common among athletes), constant ingratiation ("just trying to be nice" effect), and creating sleep deprivation for oneself (e.g., leaving only two hours to sleep before an important examination) (Berglas & Jones, 1978; Jones & Berglas, 1978). Situational influences on self-handicapping behaviors are not well understood, even though a person's experiences in a learning or work environment are likely to be influential (Urdan & Midgley, 2001). In a similar fashion, a person's psychological and emotional states, which are also influenced by environmental factors, are also likely to influence the degree to which a person self-handicaps in an effort to self-protect.

Because self-handicapping occurs before an actual performance opportunity arises, this self-defeating behavior and cognition is more complex than a simple form of attribution manipulation. Instead, self-handicapping serves as a "*basis* for an attribution" (Urdan & Midgley, 2001, p. 116, italics in original). For this reason, self-handicapping is especially likely to develop within environments where performance goals are emphasized and evaluated, such as learning and work environments (Urdan & Midgley, 2001). Central to the phenomenon of self-handicapping is the person's desire to avoid negative feedback about his/her performance. The fear here is that such feedback might reflect true incompetence or low ability (Berglas & Jones,

1978). Thus, the connection between stress and self-handicapping appears to exist, even if it has not yet been documented as such.

Self-handicapping can be seen as a process by which an individual creates an "attributional shield" (Berglas & Jones, 1978, p. 406), allowing them to have a ready excuse if failure occurs (i.e., "I failed because I did not get enough sleep."), but to also experience increased feelings of ability/success/skill if success occurs (i.e., "Even though I was tired, I still succeeded!"). Interestingly, as with procrastination, self-handicapping may not be detrimental to performance in the immediate short-term (Rhodewalt & Hill, 1995).

However, if continued over time self-handicapping may create difficulties for the individual because it may lead them to believe their competence cannot be improved, linking with a deflated sense of confidence (e.g., Zuckerman & Tsai, 2005). Zuckerman and Tsai (2005) go on to highlight that certain self-handicapping behaviors are directly debilitating (e.g., alcohol consumption), some eventually impeded performance and affect well-being via that pathway, and some involve self-deception, which is damaging if chronically present (p. 414).

Self-handicapping can become counterproductive or self-defeating if it increases the negative reactions a person receives from other observers within the workplace (i.e., a person repeatedly seen as "self-handicapping" is likely to be viewed negatively, regardless of his/her actual performance; e.g., Ferrari & Thompson, 2006). The negative effects of self-handicapping also may transcend the person (especially if this individual is a high-level executive), leading to negative impression formation of the larger organization (e.g., Siegel & Brockner, 2005).

Self-handicapping is especially relevant to the present study of occupational stress and need for recovery because it tends to arise when individuals are chronically exposed to rewards and failures that lack clear rationales or explanations (Berglas & Jones, 1978), and when anxiety

and perceived threat are high (e.g., Zuckerman & Tsai, 2005). These psychological experiences often arise with the presence of heavy and ambiguous work demands and expectations.

Hypothesis 3. (a) A positive relationship will be found between stress and self-handicapping behaviors and (b) need for recovery will mediate the relationship between stress and self-handicapping behaviors.

Inability to Delay Gratification: Impulsivity in Attention and Action

A fourth self-defeating behavior and cognition is an inability to delay gratification. At its heart, this reflects a tendency toward impulsivity in thought and action and a lack of control over one's motivation to accept a more immediate source of reward, rather than waiting for a potentially larger reward in the future (echoed in clinical studies of impulsivity; e.g., White et al., 1994). In the present study, this is exactly how this self-defeating behavior and cognition was evaluated. Such an approach extends from research that has shown that employee fatigue and work environment conditions may increase a worker's tendency to engage in impulsive choice making (e.g., Reynolds & Schiffbauer 2004a; 2004b) and that impulsivity in decision making may increase when a person's ability to self-manage behaviors decreases (cf., Hinson, Jameson, & Whitney, 2003).

Research on the effects of emotional distress has shown that affect regulation drains critical resources that would otherwise be engaged for impulse control (i.e., the ability to delay immediate reward while focusing on obtaining a more distant, but possible larger reward in the future; e.g. Tice et al., 2001). Support for this can be found in the varied literature on emotional distress as a predictor of impulsive consumption of food, nicotine, alcohol, gambling, and

aggression/violence (as summarized by Tice et al., p. 54). This same research has also shown that impulsive behaviors (i.e., eating snack foods, inability to delay gratification) may develop as a means of improving one's emotional state when emotional distress has reduced a person's self-regulatory resources.

Additional support for the link between resource depletion and impulsive behavior can be gleaned from consumer research. For example, self-control failure has been shown to predict impulsive purchasing behaviors (e.g., Baumeister, 2002). Because "resisting an impulse depends on the person's capacity for self-control" (Baumeister, 2002, p. 671), it is easy to see how a reduced capacity for self-control brought on by a reduction of attention and energy-related resources (as characterized by need for recovery) may help to predict impulsive choices and other actions.

Baumeister (2002) suggested that although there are several reasons a person's self-control may fail, the most important is a person's capacity for change. Maintaining this ability has also been identified as a sort of inner strength, a cognitive process, or a specific skill (fully reviewed by Baumeister, Heatherton, & Tice, 1994). Of these conceptualizations, the strength model of change capacity has received the most support (as shown by Muraven et al., 1998; but see Murtagh & Todd, 2004, who suggested that self-regulatory failure reflects difficulty in organizing cognitive resources, rather than actual resource depletion).

For example, in a series of four experiments, Baumeister et al. (1998) found that participants who engaged in active self-regulation, choice, or other volitional tasks requiring self-control demonstrated a reduced capacity for such self-control in a follow-up task. These results highlighted the impact of "ego depletion" (i.e., temporary reduction in a person's capacity to

engage in additional acts requiring self-control; p. 1253) on such relevant outcomes as continued self-control and task performance.

Several additional studies have replicated this finding, that engaging in self-regulatory activities may leave an individual less capable of enacting additional efforts at regulation. Extending this knowledge a bit further, Muraven et al. (1998) suggested and found that, as with muscular strength, repeated depletion and rebuilding of self-regulatory resources may actually lead to an increased capacity for change over time (i.e., a building of regulatory resource strength; also Muraven, Baumeister, & Tice, 1999).

This perspective on self-regulatory resources is strikingly similar to the principles of Conservation of Resources theory. As summarized by Baumeister (2002), the general conclusion from these and other studies was that performing acts that required self-control, including that required when making decisions, reduces a person's ability to exercise the same level of self-control on future tasks (see also Vohs & Heatherton, 2000). Thus there appears to be a process of resource depletion and rebuilding similar to that discussed in the introduction when linking Conservation of Resources and need for recovery.

Whether identified as a depletion of energy, strength, or "ego" (e.g., Baumeister et al., 1998), need for recovery may serve well as a marker of resource drain and as a predictor of self-control failure exemplified in impulsive behaviors. Extending directly from the strength model developed by Baumeister and colleagues over multiple studies already discussed, a logical expectation is that, "[w]hen the self is depleted by prior exertions, behavior should become more impulsive" (p. 675), but that such loss of self-control should "presumably [recover] after a period of rest" (Baumeister et al., 1998, p. 1253). The first portion of this statement is the relationship to be tested in the present study.

Hypothesis 4. Positive relationships will be identified between stress and (a) attentional impulsivity and (b) behavioral impulsivity, and (c) need for recovery will mediate the relationships between stress and both forms of impulsivity.

Escalation of Commitment

The fifth self-defeating behavior and cognition can be thought of as excessive and misguided persistence. From a rational decision making perspective, the best decision about a future course of action is the one based on the expected future returns that would result if these actions were carried out. Contrary to this rational approach to decision making, escalation of commitment is observed in decisions that are guided by a person's sunk costs (i.e., resources already expended on a project tin the past; Arkes & Blumer, 1985), a tendency to cognitively weight losses more heavily than gains (e.g., Kahneman & Tversky, 1979; Tversky & Kahneman, 1991), and a desire to avoid being perceived as wasteful (e.g., Arkes & Ayton, 1999). As such this self-defeating behavior and cognition is a form of irrational decision processing.

The research literature on escalation of commitment has arrived at a definition of escalation of commitment when: (1) resources have been invested in a course of action, (2) negative feedback about that course of action (and its potential for future success) is received, and (3) the decision maker needs to decide whether to invest more resources in continuing (presumably to recover sunk costs) or to disengage (e.g., Wong, Yik, & Kwong, 2006). Following these rules, escalation of commitment is identified if the person decides to continue investing resources to regain sunk costs, despite the knowledge that he/she is unlikely to be successful (e.g., Brockner, 1992).

Within a work setting, this sort of excessive commitment or persistence can become counterproductive when withdrawal or starting anew would be a more rational and better option, but, "psychological inertia prevents them from abandoning a defective course of action" (Renn et al., 2005, p. 664). This type of inertia may develop with an inflated sense of personal accountability or perceived risk of failure (i.e., feeling trapped in defending course of action; cf., Fox & Staw, 1979), as is common when a project is well-underway and psychological and social factors become increasingly influential on a person's decisions regarding that project (e.g., Brockner, 1992). This puts the individual in a difficult decision situation in which they may turn to the simplest option, which is often the status quo and would in this type of scenario result in escalation of commitment (e.g., Simonson & Staw, 1992).

A powerful example of this can be seen in the area of new product development, where close to 40% of products brought to market fail soon after their introduction. Escalation of commitment to those products during their development may be to blame (e.g., Schmidt & Calantone, 2002). Similar negative effects of this self-defeating behavior and cognition have been identified in the realm of massive overspending on large-scale projects (e.g., Staw, Barsade, & Koput, 1997; Ross & Staw, 1993).

In the present context, escalation of commitment may be expected to increase with need for recovery because of the positive relationship between momentary or state negative affect that follows negative feedback and escalation of commitment (e.g., Wong et al., 2006). Negative affect and mood are common consequences of work stress (e.g., Glomb, Steel, & Arvey, 2002; Spector, Zapf, Chen, & Frese, 2000), and it is possible that escalation of commitment is not increased by negative affect, but rather by the depletion of resources that would have otherwise

allowed a person to make a more rational decision when faced with negative feedback and a continuation decision.

Hypothesis 5. (a) A positive relationship will exist between stress and a person's tendency toward escalation of commitment, and (b) need for recovery will mediate the relationship between stress and escalation of commitment.

Tendency to Delay Decision Making

There is a sixth form of self-defeating cognitive phenomenon that I also feel is relevant in the present study. This involves a person's tendency to delay or avoid the making of decisions. Depletion of self-regulatory resources has been shown to increase the likelihood that a person will increase the tendency to delay decision making, but this is not identical to the self-defeating behavior and cognition of procrastination, where an intention to act exists, but the actual behavior chosen runs contrary to that intention (e.g., Anderson, 2003, citing also Sabini & Silver, 1982).

Instead, a person may delay making a decision in an effort to conserve remaining energy-related resources (e.g., Anderson, 2003). As with procrastination, delaying a decision could potentially be helpful in the short-term, if the likelihood is high that better information can be gathered with which to form a better decision later. However, when a decision needs to be made in a timely manner, before an opportunity passes or a deadline arrives, delaying or avoiding decision making can be highly counterproductive. In some high risk work settings, an inability to make a quick decision could result in harm to oneself or a coworker (e.g., Anderson, 2003).

The relationship between resource depletion and decision delay has been empirically demonstrated. In one such study, resource-depleted individuals demonstrated a preference for extreme options rather than a more complex compromise option that would have required greater cognitive effort to understand as a more rationally superior alternative (e.g., Pocheptsova, Amir, Dhar, & Baumeister, 2007). In part this type of preference may be explained by the fact that trade-offs are difficult to deal with and because of this, people tend to avoid them when possible (e.g., Payne, Bettman, & Johnson, 1993).

Additionally, this preference for extreme options may be explained by the compromise effect. This decision making phenomenon suggests that consideration of a compromise option will not be made until a thorough consideration of choice alternatives is first made and found to result in a failure of a trade-off analysis (e.g., Simonson, 1989). Related to the compromise effect, it has also been suggested that although eventually choosing a compromise option may be viewed as the safest approach, it may also be acknowledged by the person as especially difficult to justify (Simonson, 1989).

For these reasons, people with a high need for recovery can be expected to avoid a full consideration of trade-offs and minimize their chances of having to justify a compromise decision by delaying the making of such a decision. A trade-off situation arises when no single option is clearly better than any other option in terms of all relevant features (e.g., Anderson, 2003, p. 159). Making decisions between multiple options requires the effortful consideration of multiple factors (e.g., cost, possible regret, emotional values). Pocheptsova et al. (2007) demonstrated this may be especially difficult for resource depleted individuals and also showed that non-depleted individuals would in fact choose the more complex compromise option more

often. These same individuals also took less time to make these decisions than their resource-depleted counterparts.

Other research on decision making has identified several other forms of decision responses that may be influenced by resource depletion (cf., Anderson, 2003). The first is a form of unreflective decision making in which a person accepts the status quo when under pressure to make a decision, as long as no new significant risk is observed (Anderson, 2003, citing also Janis & Mann, 1977). Another related form of decision making, defensive avoidance, when the status quo is maintained, despite apparent risks, because no better alternatives are easily identified (Anderson, 2003, p. 140).

Separate experiments by Pocheptsova et al. (2007) have also demonstrated that resource depletion may increase a person's tendency to prefer the status quo versus a potentially more rewarding investment opportunity that would require more effort to understand (i.e., the status quo bias; e.g., Samuelson & Zeckhauser, 1988) and to opt for a choice option that requires no immediate action. This latter preference can be seen as an illustration of choice deferral, which could include searching for better alternatives or avoiding responsibility for a particular decision (e.g., Anderson, 2003).

The relationship of these phenomena to stress or need for recovery has not been clearly established, but relevant research suggests the tendency to opt for the status quo or defer decision making until a later time may be predicted by negative emotion and or a desire to maintain an emotional state or remaining emotional resources (e.g., Luce, 1998). In effect, individuals may seek to reduce negative emotions including those associated with a high need for recovery, by avoiding decision making (i.e., a trade-off avoidance hypothesis; e.g., Anderson, 2003).

Hypothesis 6. (a) A positive relationship will be observed between stress and a tendency to delay decision making, and (b) need for recovery will mediate the relationship between stress and a tendency to delay decision making.

New Need for Recovery Measure Validation

A final purpose of the present study was to validate a measure of NFRR as a new and more comprehensive assessment of need for recovery. A limitation of existing recovery measures is that they do not take advantage of the full theory base that has developed around recovery processes. Conservation of Resources and Effort-Recovery theories (as already discussed) provide the most comprehensive perspective on the resource draining and rebuilding that occurs as part of the stress and recovery cycle, but recovery studies continue to focus mainly on fatigue as the sole indicator of resource levels (e.g., Rook & Zijlstra, 2006).

To account for a larger proportion of the variance in recovery needs than is possible with fatigue measures alone, I developed a new measure of NFRR, broadening its focus with a more complete resource perspective. To initially validate this new measure, I planned to demonstrate its nomological validity with other stress and need for recovery variables. The emphasis was on demonstrating the relatedness and distinctiveness of the NFRR measure from other stress-related constructs and general fatigue. I also expected the NFRR measure to account for unique variance in self-defeating behavior and cognition over and above that accounted for by general work stress, specific work stressors, and/or fatigue.

METHOD (Pilot Study)

Because several new measures were developed and used in the present study, it was important to pilot test the measurement materials to ensure retention of the best items and the use of appropriate response formats. All dependent variables were measured with newly developed behavioral or situation-based items. These measures were designed to move away from typical attitude-based measures and to also avoid common measurement bias concerns associated with retrospective self-reported information traditionally collected in this type of research.

Participants

Participants came from introductory psychology courses in the fall 2006 and spring 2007 semesters. For exploratory factor analysis purposes, extra participants were recruited to complete the NFRR and general stress measures at this pilot stage (total $n = 159$). For the new situational judgment measures of self-defeating behaviors and cognitions, a smaller set of participants were used to provide an initial look at the functioning of these measures ($n = 45$). In return for participation students were given a chance to earn a small amount of course credit as well as an entry into a raffle for one of three $25 gift certificates to an online retailer.

Procedure

Participants were contacted during classes and told of the general purpose of the pilot test. Approximately one third of the participants ($n = 50$) completed the survey packet at the end of one of their classes in the last month of the semester. The remainder ($n = 109$) attended one of several data collection sessions during the last week of the fall semester and the first two weeks of the subsequent spring semester. All participants were provided with a detailed informed consent letter describing their role in the study and following their signing of this form they received a survey packet. The survey packet for all participants included the NFRR and general

stress measures. The scenario-based self-defeating behavior and cognition measures were provided to the smaller subset. All pilot study measures are provided in Appendix B.

Measures

Details on the revision of the measures following the pilot study for the actual study are provided in Appendix A along with the final versions of the measures and scoring guides from the actual study. In this section a description of each pilot-tested measure is provided.

Need for resource recovery. Following the main tenets of Conservation of Resources theory, I developed eight new items to address resource depletion needs beyond energy and fatigue. I added these items to an existing set of 11 items that I adapted from Jansen et al.'s (2002) need for recovery scale. To improve the sensitivity and reliability of this scale the response format was changed from its original dichotomous "Yes/No" to a five-point rating scale of agreement with each of the 19 descriptive statements (Weng, 2004).

Given the overarching theory of Conservation of Resources, this new measure was expected to have a unidimensional factor structure. Summing across responses to all items was expected to yield scores for which higher values would reflect a higher NFRR. In previous studies (e.g., Jansen et al., 2002; Jansen, Kant, van Amelsvoort, Nijhuis, & van den Brandt, 2003) the 11-item need for recovery scale demonstrated sound psychometric functioning in terms of convergent and divergent validity as well as acceptable internal consistency ($\alpha = .78$).

General work stress. Thirteen items from Cohen, Kamarck, and Mermelstein (1983) were adapted for the present sample and purpose. My adaptation was made to better fit the student sample (i.e., wording changes to reflect experiences likely among undergraduate students). Responses were made on a five-point scale of frequency ranging from Never to Very often, such that higher scores reflected a greater perceived general sense of stress. In their original form

these 11 items were part of a 14-item scale that achieved adequate internal consistency ($\alpha > .82$ across multiple samples).

Situational procrastination. A tendency toward procrastination was evaluated with five newly created situational items based on Van Eerde's (2003) avoidance reaction scale, Ferrari, Johnson, and McCown's (1995) discussion of academic procrastination, and Schouwenburg's (1995) three dimensions of academic procrastination (lack of promptness, preference for competing activities, and intention-behavior discrepancy). Participants selected one of three behavioral options following the statement of a brief scenario. Each response option was coded as reflecting either procrastination (a value of 1) or non-procrastination (a value of 0) and a total score was calculated by summing across these items. Higher scores were expected to reflect a stronger tendency toward procrastination.

Self-handicapping. Within academic contexts, self-handicapping behaviors might take the form of procrastination on studying or straightforward reduction of effort (e.g., Strube, 1986; Urdan & Midgley 2001), but the intent of these actions is on building a future excuse if later performance evaluation is unfavorable. Other forms of self-handicapping behaviors would include allowing other commitments to monopolize study time, not taking good notes despite knowledge of the consequences, or purposefully missing lectures.

Two measurement techniques for self-handicapping were tested in this initial pilot study, with each designed to provide a separate, but related indication of a person's tendency to self-handicap. The first measurement approach involved a series of four scenarios (adapted from Rhodewalt, 1990) in which participants were confronted with performance evaluation situations and asked how they would respond. Response options following each scenario were coded to represent either self-handicapping (1) or non-self-handicapping (0) and a total score was the sum

across the coded responses to each scenario. The second measure presented participants with a performance evaluation scenario and a set of 10 statements describing various self-handicapping behaviors. Participants were asked to indicate their likelihood of engaging in each of these behaviors given how they were feeling at that moment.

Inability to delay gratification: Impulsive attention and action. The measurement of impulsivity involved measures of attentional and behavioral impulsivity. For the first I developed four items to address attentional impulsivity (focus and concentration), adapting content from the well-established Barratt Impulsiveness Scale Version 11 (BIS-11), a revision of Barratt's (1959) original scale by Patton, Stanford, and Barratt (1995). Participants rated their agreement with each descriptive statement such that higher scores reflected a higher degree of attentional impulsivity.

The second measure was comprised of four situational items developed to assess behavioral impulsivity. Content for these situations was adapted from Rook and Fisher's (1995) Buying Impulsiveness Scale and Baumeister's (2002) description of impulsive behavior as, "not regulated and…[resulting] from an unplanned, spontaneous impulse" (p. 670). Each scenario was followed by a series of response options and each of these options was coded to reflect either impulsive (coded 1) or non-impulsive (coded 0) behavior. The sum of these coded responses was the participant's score, and higher scores reflected a higher degree of behavioral impulsivity.

As a third measure of impulsivity in cognition and behavior, participants' inability to delay gratification was measured by presenting them with five choices between a smaller, immediate lottery prize and a larger, but more distal lottery prize (adapting a technique used by Leith & Baumeister, 1996). All pairings were constructed so that the second choice (Option B) had a higher expected value than the first choice (Option A). Expected value is defined as the

probability or chance of winning multiplied by the amount of money in the final prize (it is denoted in the appendix for each option). The total score on this measure was the sum of the Option A choices, such that higher scores reflected a greater inability to delay gratification (i.e., a stronger preference for immediate, albeit smaller rewards).

Escalation of commitment. Escalation of commitment is identified when an individual decides to continue with a course of action that is likely to be headed for failure. The commitment is believed to be connected to the previous investment of resources into that course of action and also the desire to not appear wasteful. Three situational items were included to measure this self-defeating behavior and cognition. The first was an adaptation of the classic "blank radar plane" scenario from Arkes and Blumer (1985). The other two scenarios were created for this sample by adapting stimuli used by Moon (2001), Thames (1996), and Wong et al. (2006).

Response options following each scenario were coded to reflect escalation (coded 1) or non-escalation (coded 0). Summing across the coded response provided a score for this measure and higher scores reflected a stronger tendency toward escalation. As a second indicator of this self-defeating behavior and cognition, participants' degree of willingness to continue with the existing course of action was also averaged across the three scenarios, with higher percentages reflecting a stronger tendency toward continued involvement in a failing course of action (i.e., escalation of commitment).

Tendency to delay decision making. Two measurement approaches were used in assessing this self-defeating behavior and cognition. The first approach involved gathering participant responses to a series of four scenarios. All response options were coded to represent either delaying (coded 1) or non-delaying (coded 0) and higher scores on the summated total reflected a

higher degree of decision delaying. As a manipulation check, participants were also asked to rate the difficulty of each decision after making their response choice.

The second measure was developed by modifying the choice deferral manipulation used in the fifth study by Pocheptsova et al. (2007). Participants were presented with three separate difficult (i.e., cognitively demanding) decision situations. Response options were coded to reflect avoidance of a decision (coded 1) or non-avoidance (coded 0). Summing across coded responses provided a score such that higher values reflected a stronger tendency to avoid decision making.

RESULTS AND DISCUSSION (Pilot Study)

The goal of the pilot study was to initially evaluate the functioning of the new measures needed for the actual study. A primary step was to evaluate the factor structure of the NFRR measure. An exploratory factor analysis (EFA) was run with the 19 items of this scale (results presented in Appendix A). It is important to note that the sample size for this analysis is slightly less than commonly recommended for a factor analysis involving 19 elements (typically at least 10 cases per element is the suggestion). For this reason, these pilot results must be viewed as tentative.

The initial EFA results identified three sub-factors to the NFRR measure: a psycho-physical resource drain component (NFRR: Psycho-physical), an attention/concentration impairment element (NFRR: Attention/concentration), and a social/activities exclusion component (NFRR: Social/activities exclusion). Scores were computed for each of these dimensions and descriptive statistics for all pilot-tested measures are summarized in Table 2.

These preliminary results illustrated that the new measures demonstrated the desired range and variability in responses as well as relatively normal frequency distributions (with the exception of the inability to delay gratification scale). In addition, relatively high internal consistencies were observed for the three NFRR scales, general stress, self-handicapping (scale), and attentional impulsivity. Unfortunately, internal consistency estimates were either far below standard acceptable levels of .70 or could not be computed for several of the situational judgment measures of self-defeating behaviors and cognitions. Variables not demonstrating the least internal consistency were excluded from the correlation analysis summarized in Table 3.

Table 2. Descriptive Statistics for Pilot Study Variables

Variable	*n*	# items	*M*	*SD*	Min	Max	Skew ratio	α
1. NFRR: Psycho-physical	156	8	23.98	6.957	8	40	-1.03	.84
2. NFRR: Attention/concentration	156	4	8.564	4.045	4	19	4.37	.82
3. NFRR: Social/activities exclusion	155	4	8.703	3.984	4	18	3.05	.78
4. General stress	157	13	23.73	6.678	6	39	-0.17	.81
5. Situational procrastination	45	5	2.267	1.232	0	5	-0.23	.40
6. Self-handicapping (scenario)	45	4	0.756	0.609	0	2	0.48	n/a
7. Self-handicapping (scale)	45	10	23.82	6.088	12	41	0.92	.75
8. Attentional impulsivity	45	4	10.71	3.533	4	17	0.24	.85
9. Behavioral impulsivity	45	4	1.089	0.793	0	3	1.97	n/a
10. Inability to delay gratification	43	5	1.605	1.365	0	9	10.77	n/a
11. Escalation of commitment	45	3	2.467	0.661	1	3	-2.44	n/a
12. % willingness to escalate	45	3	73.7	18.53	15	100	-3.37	n/a
13. Delay of decision making	45	4	0.444	0.725	0	2	3.75	.35
14. Decision making avoidance	45	3	1.889	0.682	0	3	-0.88	n/a

Note. NFRR = Need for resource recovery; Skew ratio = skewness/standard error of skewness; n/a for α indicates scales for which no internal consistency > 0 could be calculated.

Table 3. Intercorrelations between Pilot-Tested Variables Demonstrating Some Internal Consistency.

	1.	2.	3.	4.	5.	6.	7.
1. NFRR: Psycho-physical							
2. NFRR: Attention/concentration	.58 **						
3. NFRR: Social/activities exclusion	.56 **	.63 **					
4. General stress	.57 **	.50 **	.63 **				
5. Situational procrastination	.25	.09	-.04	.20			
6. Self-handicapping (scale)	.72 **	.59 **	.56 **	.72 **	.32 *		
7. Attentional impulsivity	.55 **	.38 **	.41 **	.32 *	-.22	.29	
8. Delay of decision making	.26	.27	.07	.14	-.14	.17	.28

Note. N ranges from 152-157 for variables #1.-4., and 43-45 for variables #5.-8. ** $p < .01$, * $p < .05$ (2-tailed).

The pilot study results were not meant to stand by themselves as tests of the main study's hypotheses, but rather to guide additional measure revisions before the actual study was conducted. Viewed holistically, these results suggested that improvements were needed to all of the situational judgment measures to improve their internal consistency if possible. Secondly, the relationships among the three NFRR subscales, general stress, self-handicapping, and attentional impulsivity were moderate to strong (as shown in Table 3). This suggested that there may be redundancy among these variables, although the precise relationship estimates were taken as tentative given the relatively small sample size for some of the variables. This redundancy was an issue to be evaluated carefully in the actual study.

To address the issue of low internal consistencies in the situational judgment measures I modified the response scales from a *"What would you most likely do (choose one)"* format to a *"Rate the likelihood that you would do each of these"* format. This decision was based on recent research that has shown this type of likelihood rating format to improve internal consistencies on situational judgment tests often to α greater than .60 (e.g., Ployhart & Ehrhart, 2003). A second benefit of gathering likelihood ratings for each behavioral option following each scenario is that it may reduce participants' feelings of having to make a correct or socially desirable choice, as they must rate their likelihood of engaging in all available response options. This provides a more detailed and perhaps more accurate picture of each participant's actual tendencies.

During the pilot study phase, I also confirmed the scoring rules for all situational items. Recall that each response option to each item in the situational scales was coded as either representing or not-representing the target behavior. Initially these codings were based on the theoretical dimensions underlying these constructs. To confirm these codings, two advanced undergraduate students were asked to provide their interpretation of each response option. First I

provided them with a brief description of each of the constructs measured by the situational items. I then asked them to indicate whether each response option to each situational judgment item adequately reflected the target behavior.

Working from their responses, any ambiguous response options were removed. All remaining response options were reworded to clearly reflect either a target behavior or its opposite behavior for each of the situational judgment scenarios. This process continued until we reached consensus on the scoring codes. Thus, the qualitative and quantitative analyses of data collected in two pilot studies allowed for substantial revision and improvements to the new measures before the actual study occurred. In the following section the method for the actual study is outlined, including details on the final set of measures.

METHOD (Actual Study)

Participants

Participants were contacted in seven separate classes (six at a large Midwestern university and one at a medium-sized university in the eastern United States). Invitations to participate were emailed to 407 undergraduate students who indicated an initial willingness to participate after being informed of the study in lecture or via email. Of the 311 participants at Time 1 (response rate of 76%), 35.7% were Male. The average age was about 21 years. At Time 2, 274 participants responded at least partially (response rate of 67%). Most participants were upper-year undergraduates as the sampling strategy had targeted (1.9% Freshman, 12.9% Sophomore, 31.5% Junior, and 53.7% Senior). All participation was voluntary, though completion of both surveys earned participants a small amount of course credit and an entry into a raffle for one of several Amazon.com gift certificates ($25 each).

Procedure

To facilitate the collection of data from students in a variety of locations, both surveys were administered via the internet. The surveys were maintained on departmental servers and monitored daily by the researcher. Data were collected during restricted time windows (i.e., students had a week from invitation to participate and then 48 hours to respond to the follow-up after they were contacted seven days post initial survey completion). The initial survey took between 30 and 40 minutes to complete and the follow-up survey required about five minutes of time (all materials are visible in Appendix C with scoring guidelines in bold). A brief follow-up survey (Appendix D) was administered seven days after participants responded with their initial survey.

Measures

An overarching modification to the measures from the paper-based pilot study was the conversion to an internet-based format. The following sections outline the measures used in the actual study along with a few details about any other modification from the pilot study.

Inaccurate self-assessment (planning and overconfidence). This form of self-defeating cognition was measured with respect to participants' planned work-tasks (adapted from an approach used by Buehler et al., 1994). In the initial survey, participants were asked to report three schoolwork-related goals that they held for the upcoming seven-day period (one week). For each of these goals, participants predicted how long (rounded to the nearest hour) they expected it would take them to reach the goal and their degree of confidence (between 0 and 100%) that they could achieve this goal within that amount of time. Reported goals and predicted times were removed if they were clearly inaccurate or unattainable within a one-week period (i.e., "to Graduate on time", predicted time = "100 hours"; "attend all my classes", predicted time = "120 hours").

One week after the primary data collection, participants were contacted with a follow-up survey (Appendix D) that asked them to briefly reflect on the three goals they had initially described. The questions in this follow-up survey evaluated whether each goal was reached, how long it took to reach each goal, and the participant's satisfaction with the finished product. This information made it possible to establish the degree of inaccurate time planning and overconfidence present for each individual.

To establish the degree of inaccurate planning for each participant, the difference between a person's average predicted time to complete goals at Time 1 and his/her average actual time needed to complete those goals by Time 2 (based only on completed goals) was

calculated (similar to a technique used by Kruger & Evans, 2004). Following this calculation, a positive score reflected overestimation of needed time, a 0 indicated accurate estimation, and a negative score reflected underestimation (the typically expected form of evidence for the planning fallacy). Before entering into the regression analysis, the absolute value of this difference score was computed so that higher scores would reflect a higher absolute degree of planning inaccuracy.

Overconfidence is typically demonstrated by identifying a discrepancy or miscalibration between a person's confidence ratings for a prediction and the actual outcome of that prediction (i.e., whether that prediction actually happens as predicted). In the present study a calibration score was created by calculating the mean difference between the average confidence rating for each goal set at time 1 and the percentage of correct predictions (i.e., number of completed goals divided by the number of goals set at time 1) at time 2 (Pallier et al., 2002). This bias score indicated overconfidence if it was greater than 0, accurate confidence if equal to 0, and underconfidence if less than 0. Thus, higher scores on this measure reflected a higher degree of overconfidence.

Tendency to delay decision making. Following the pilot study, the difficulty of the decision scenarios was increased to reduce the likelihood of one response option appearing more "right" or preferable. The response format was also changed so that participants were asked to rate the likelihood (on a five-point scale) that they would do each of three things: Choose the first option, choose the second option, or wait/delay the decision for later. Guidelines from a similar application of this response format by Ployhart and Ehrhart (2003) were adapted for use with this measure. For each item, the ratings on the two choice options were reverse-coded and summed with the rating on the delay response option. The scale score was the sum of these

calculated item scores and higher scale scores reflected a greater tendency toward delaying a decision rather than making a choice between options immediately.

A similar response scale and scoring modification was applied to the related measure of decision making avoidance. For each of the three items in this scale participants were asked to rate the likelihood that they would either make a choice regarding the scenario, or opt for either the status quo or some other form of decision making avoidance. Responses to the choice options were reverse coded and summed with responses to the delay options. This information was then summed across items yielding a scale score such that higher values reflected a greater tendency toward avoiding decision making.

Inability to delay gratification: Impulsive attention and action. The expected values for each set of choices were adjusted to be less transparent than in the pilot study. For each of the modified five items, Option A reflected a smaller, more immediate award and Option B reflected a larger, but more distal reward. Summing the number of Option A's selected resulted in a scale score such that higher values indicated a stronger inability to delay gratification.

While the attentional impulsivity measure remained unchanged from the pilot study, modifications were made to the response options and format for the behavioral impulsivity measure. As with the other situational judgment measures, participants were asked to rate each response item on a five-point scale, indicating the likelihood that they would engage in both an impulsive and non-impulsive behavioral response to each scenario. Responses to the non-impulsive option were reverse coded and summed with responses to the impulsive options, yielding a score for which higher values reflected a greater likelihood of behavioral impulsivity.

Situational procrastination. For each of the five scenarios in this measure, participants were asked to rate the likelihood (on a five-point scale) that that would engage in a

procrastination or non-procrastination related behavior or form of cognition. Responses to the non-procrastination options were reverse coded and when summed with the responses to the other options yielded a scale score. Higher values on this scale reflected a greater likelihood of engaging in procrastination.

Escalation of commitment. Response scales were modified for each of the three scenarios. First, participants were asked to rate the likelihood (on a five-point scale) that they would quit/change course or continue the project as originally planned. Continuing the project as originally planned reflected escalation given the nature of the scenarios, so responses to the quitting option were reverse coded and summed with likelihood ratings to the continuing option. This information was summed across items so that higher values reflected a greater likelihood of escalating commitment in the face of impending failure. A second measure of escalation of commitment was afforded by participant responses to an additional question, "*To what degree would you be willing to continue this project as initially planned?"* The percentage willingness to continue as initially planned indicated their tendency toward escalation of commitment.

Self-handicapping. Response options were changed for each of the four scenarios in this measure to reflect likelihood ratings (on a five-point scale) of either a self-handicapping or non-self-handicapping behavior or cognition. Reverse coded non-self-handicapping options were summed with self-handicapping option responses to yield a score for which higher values reflected a greater likelihood of self-handicapping. The second measure of self-handicapping (i.e., the scale) was not changed from the pilot study format.

Need for resource recovery. No modifications were made to this measure despite the pilot study finding that several items might not have been especially strong contributors. Given the small sample size in the pilot study I decided to re-evaluate the factor structure of this measure

using the actual study data. This measure was also included in the follow-up survey to test for its sensitivity over time.

General work stress. No modifications were made from its pilot study format.

Fatigue. A measure of fatigue was included as a commonly used separate indicator of need for recovery. Participants responded to the 10-item Fatigue Assessment Scale (FAS; Michielson, De Vries, Van Heck, Van de Vijver, & Sijtsma, 2004). The items in this measure were culled from four existing, valid measures of fatigue and reduced to this core set of 10 items following an evaluation of dimensionality and redundancy among these items. Responses to each descriptive item were made on a five-point scale of perceived accuracy such that higher scores indicated a higher level of perceived fatigue. In its initial psychometric evaluation this scale demonstrated unidimensionality and a high internal consistency ($\alpha = .87$).

Interpersonal conflict. The Interpersonal Conflict at Work Scale (Spector & Jex, 1998) was adapted for the student population (e.g., item stems changed to fit the five-point response format and "nasty" replaced with "mean" in one item). This measure evaluated participants' perceived frequency of conflicts with other people in the school setting. Responses were made on a five-point frequency scale (Never to Very Often) and higher scale scores indicated higher levels of conflict. In previous studies this measure has consistently demonstrated adequate internal consistency ($\alpha > .80$).

Quantitative workload. The five-item Quantitative Workload Inventory (Spector & Jex, 1998) was adapted for the student sample (e.g., item content shifted to focus on coursework and the college environment) and used to measure the perceived amount of work and the speed with which it must be completed. Responses were on a five-point frequency scale (Never to Very

Often) and higher scores will reflect a higher prevalence of quantitative workload. In previous studies this scale has demonstrated adequate internal consistency ($\alpha > .75$).

Demographics and personality. Single items were used to gather information regarding participants' gender, age, and level in college (i.e., Freshman through Senior). Participants' general personality traits were evaluated with a 50-item mini-marker measure of the five main personality traits of Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Intellect (International Personality Item Pool, 2006). Each dimension of this measure is composed of 10 descriptive items rated on a five-point scale of agreement and higher scores on the dimensions reflect a stronger self-association with that particular Big 5 trait. Existing evidence suggests that the internal consistencies of all five dimensions are adequate by traditional standards (α =.87, .82, .79, .86, .84, in order as listed above).

Gender and these personality traits were included to serve as covariates in all analyses to be consistent with previous research and to help allay possible concerns about the influence of underlying dispositions on the self-defeating behaviors and cognitions. In other research in this area, gender and negative affectivity (evaluated here in terms of neuroticism) have been shown to covary with need for recovery (e.g., Jansen et al., 2002; Sonnentag & Zijlstra, 2006). Participant gender may be a particularly salient difference factor given findings that self-regulation strategies may differ between males and females (i.e., women may stop tasks earlier than males to avoid failure, e.g., Murtagh & Todd, 2004; Nolen-Hoeksema & Corte, 2004).

Participants' extraversion and conscientiousness may also overlap with impulsive behavioral tendencies (Verplanken & Herabadi, 2001) and tendency toward procrastination (e.g., Ferrari et al., 1995). Neuroticism was included because it may represent a general tendency to experience and report distress and negative mood (i.e., akin to the potential influence of negative

affectivity; e.g., Watson, Clark, & Tellegen, 1988). Such a personality characteristic can be expected to influence perceptions of need for recovery and potentially the negative self-defeating behaviors and cognitions. These relationships between individual characteristics and the other study variables were treated as exploratory issues in the present study.

RESULTS (Actual Study)

In preparation for the analyses, all responses to the situational items were recoded following the steps outlined in the Methods section for the actual study. The first series of analyses focused on evaluating the psychometric properties of the multiple new measures. A combination of factor analysis and traditional item analysis was conducted for each set of measures. Details on this process and the identification of final measures and scores for the analyses are presented in Appendix A.

Table 4 summarizes the basic descriptive statistics for the final set of stress and need for recovery variables. Four measures of stress (coping/control failure, emotional stress reaction, interpersonal conflict, and quantitative workload) were included in the analyses as stress-related predictors. Physical and mental fatigue, psycho-social resource drain (Time 1), and need for rest/break (Time 1) were included as indicators of need for recovery and as mediators in all analyses. Sub-scale scores from the NFRR measure at Time 2 were used for the test-retest evaluation.

Table 4. Descriptive Statistics for the Stress and Need for Recovery Variables

	α	***M***	***SD***	**Min**	**Max**	**Skew/SE**
1. Coping/control failure	.82	9.31	3.75	0	24	0.47
2. Emotional stress reaction	.84	12.46	4.76	0	24	-0.97
3. Interpersonal conflict	.80	1.79	1.83	0	15	15.00
4. Quantitative workload	.80	11.82	3.55	0	20	-2.33
5. Physical fatigue (Time 1)	.86	8.18	3.52	3	15	2.21
6. Mental fatigue (Time 1)	.81	10.14	4.13	4	20	3.71
7. Psycho-social resource drain (Time 1)	.88	21.38	8.38	9	44	3.42
8. Need for rest/break (Time 1)	.85	19.49	6.57	7	35	0.92
9. Psycho-social resource drain (Time 2)	.91	20.66	8.65	9	42	3.27
10. Need for rest/break (Time 2)	.89	17.93	7.17	7	35	2.65

Note. $N = 311$ except for #9. ($n = 271$) and 10. ($n = 270$).

Table 5 summarizes the descriptive statistics for the final self-defeating behavior and cognition measures. It is important to note that although the internal consistencies for some of the situational judgment measures are low compared to traditional standards, this is common when situational judgment type measures are used (e.g., Ployhart & Ehrhart, 2003). This is an issue discussed more fully in the next section of this manuscript. It is also important to note that the distribution of inaccurate planning scores was severely positively skewed. A square root transformation was applied to improve its normality.

Table 5. Descriptive statistics for the Self-Defeating Behavior and Cognition Variables

	α	***M***	***SD***	**Min**	**Max**	**Skew/SE**
1. DM Delay	.48	29.37	4.43	16	42	0.81
2. DM Avoidance	n/a	4.65	2.04	2	10	5.17
3. Inability to Delay Gratification	n/a	3.38	1.29	0	5	-3.37
4. Attentional Impulsivity	.92	11.46	3.99	4	20	1.18
5. Behavioral Impulsivity	n/a	5.84	2.38	2	10	-0.66
6. Procrastination	.71	22.58	6.44	8	40	0.55
7. Escalation of Commitment	.33	10.51	3.19	4	20	0.48
8. Willingness to Escalate (avg. %)	n/a	0.54	0.19	0	1	-0.49
8. Self-handicapping (scenario)	.59	9.79	2.72	6	23	8.65
9. Self-handicapping (scale)	.71	9.30	3.71	5	25	8.96
10. Overconfidence (bias score)	n/a	0.20	0.28	-0.68	1	1.78
11. Inaccurate planning (square root)	n/a	1.04	0.84	0	5.83	10.61

Note. $N = 311$ for all except #8. (n = 310), #10. (n = 274), #11. (n = 254).

As described in the Methods section, several demographic variables (age, sex, and personality traits) were included as covariates in the analyses for the sake of consistency with existing recovery research. Table 6 presents the descriptive statistics for age and the personality traits, while the breakdown for gender was reported in the description of participants.

Table 6. Descriptive Statistics for Demographic and Personality Variables

	α	***M***	***SD***	**Min**	**Max**	**Skew/SE**
1. Age	n/a	21.38	2.00	18	34	21.55
2. Extraversion	.91	30.42	7.71	11	45	-4.34
3. Agreeableness	.87	35.86	5.87	13	45	-7.22
4. Conscientiousness	.85	35.71	7.14	14	50	-1.99
5. Neuroticism	.88	26.93	8.01	11	50	-4.50
6. Openness	.75	35.07	5.56	18	48	-1.50

Note. $N = 311$.

Intercorrelations between the demographic and personality, stress, need for recovery, and self-defeating behavior and cognition variables are presented in Table 7.

Table 7. Intercorrelations between All Study Variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Age														
2. Gender	-.20 **													
3. Extraversion	-.08	-.02												
4. Agreeableness	-.22 **	.44 **	.17 **											
5. Conscientiousness	-.09	.12 *	.00	.22 **										
6. Neuroticism	.04	.16 **	-.29 **	-.01	-.07									
7. Openness	-.02	-.03	.22 **	.24 **	.07	-.02								
8. Coping/control failure	.00	.01	-.05	-.06	-.37 **	.28 **	-.14							
9. Emotional stress reaction	.00	.21 **	-.08	.07	-.13 *	.50 **	-.12 *	.27 **						
10. Interpersonal conflict	-.02	-.05	-.14 *	-.19 **	-.20 **	.22 **	-.01	.10	.24 **					
11. Quantitative workload	-.02	.24 **	-.14 *	.09	.08	.32 **	.05	.03	.58 **	.11				
12. Physical fatigue (Time 1)	.06	.13 *	-.16 **	.06	-.17 **	.42 **	-.05	.22 **	.46 **	.16 **	.33 **			
13. Mental fatigue (Time 1)	.05	.02	-.17 **	.00	-.26 **	.41 **	-.06	.29 **	.50 **	.15 **	.36 **	.66 **		
14. Psycho-social resource drain (Time 1)	.12 *	.05	-.16 **	-.06	-.14 *	.37 **	-.01	.19 **	.53 **	.23 **	.41 **	.63 **	.55 **	
15. Need for rest/break (Time 1)	.00	.13 *	-.03	.07	-.08	.35 **	.01	.12 *	.49 **	.13 *	.41 **	.64 **	.54 **	.76 **
16. Psycho-social resource drain (Time 2)	.04	.09	-.16 **	.00	-.05	.42 **	.02	.22 **	.51 **	.23 **	.44 **	.47 **	.44 **	.62 **
17. Need for rest/break (Time 2)	.07	.08	-.07	.07	.00	.31 **	.01	.14 *	.45 **	.13 *	.40 **	.44 **	.45 **	.54 **
18. DM Delay	-.04	.13 *	-.08	.07	.02	.09	.01	.05	.10	.05	.12 *	.10	-.01	-.06
19. DM Avoidance	.00	.00	.12 *	-.01	-.11	-.16 **	.08	.03	-.06	.04	-.07	-.11	-.11	-.10
20. Inability to Delay Gratification	-.10	.10	-.12 *	.00	.05	.00	.03	-.05	-.10	.08	-.02	.07	.01	-.02
21. Attentional Impulsivity	-.03	.16 **	.03	.05	-.10	.21 **	-.08	.18 **	.27 **	.17 **	.09	.29 **	.28 **	.29 **
22. Behavioral Impulsivity	.01	.09	-.04	.00	-.12 *	.09	-.13 *	.05	.15 *	.04	.05	.20 **	.16 **	.15 **
23. Procrastination	.05	-.14 *	.04	-.12 *	-.35 **	.00	-.08	.26 **	-.04	-.04	-.17 **	.12 *	.19 **	.03
24. Escalation of Commitment	.04	-.19 **	-.11 *	-.17 **	-.05	-.09	-.20 **	.10	-.08	-.07	-.13 *	-.01	.02	-.01
25. Willingness to Escalate (avg. %)	.04	-.18 **	.01	-.12 *	-.03	-.08	-.15 **	.08	.00	-.07	-.04	.02	.06	.04
26. Self-handicapping (scenario)	.01	-.06	.01	-.19 **	-.16 **	.06	-.17 **	.22 **	.12 *	.11 *	-.02	.18 **	.15 *	.21 **
27. Self-handicapping (scale)	.04	-.14 *	.03	-.10	-.24 **	.22 **	-.08	.21 **	.31 **	.16 **	.15 **	.35 **	.33 **	.37 **
28. Overconfidence (bias score)	-.06	-.01	.12 *	.01	-.07	.03	.04	.01	-.03	-.03	-.03	-.02	-.04	-.11
29. Inaccurate planning (square root)	-.01	.04	.01	.00	.06	.01	.09	-.04	.06	.04	.15 *	-.03	.06	.09

	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.
15. Need for rest/break (Time 1)														
16. Psycho-social resource drain (Time 2)	.56 **													
17. Need for rest/break (Time 2)	.61 **	.83 **												
18. DM Delay	-.03	.06	.05											
19. DM Avoidance	-.15 **	-.04	-.09	-.03										
20. Inability to Delay Gratification	.04	.04	.08	.02	-.09									
21. Attentional Impulsivity	.31 **	.24 **	.24 **	.03	-.09	-.02								
22. Behavioral Impulsivity	.15 **	.06	.06	.03	-.17 **	.00	.14 *							
23. Procrastination	.05	-.06	-.03	-.09	-.10	-.02	.18 **	.24 **						
24. Escalation of Commitment	-.02	-.09	-.04	-.03	.01	.01	.01	.06	.24 **					
25. Willingness to Escalate (avg. %)	.00	-.05	.00	-.11 *	.00	-.10	.02	-.02	.11	.59 **				
26. Self-handicapping (scenario)	.16 **	.13 *	.10	.06	.03	-.05	.12 *	.09	.09	.16 **	.09			
27. Self-handicapping (scale)	.32 **	.34 **	.31 **	-.11	.00	.04	.17 **	.15 *	.22 **	.17 **	.24 **	.27 **		
28. Overconfidence (bias score)	-.04	-.08	-.06	.03	-.01	.01	.00	.02	.06	-.15 *	.00	-.04	.02	
29. Inaccurate planning (square root)	.12 *	.07	.06	.03	-.19 **	-.02	.04	-.02	.04	-.16 *	-.06	.03	.03	.02

Note. ** $p < .01$, * $p < .05$; N = 310-311 for all except correlations involving # 16., 17., 28., or 29. (n from 254-274).

Tests of Hypotheses

Given the nature of the specific hypotheses for this initial study, correlational and hierarchical regression techniques were appropriate for testing the hypotheses. Main effects between stress-related predictors and self-defeating behaviors and cognitions were identified by significant regression weights. Evidence for mediation of the relationship between stress and self-defeating behaviors and cognitions by need for recovery (fatigue and NFRR) was identified if the strength of the relationship between stress and the multiple self-defeating behaviors and cognitions decreased when need for recovery was included in the model. More specifically, evidence for complete mediation would be if the following four conditions were met (Baron & Kenny, 1986; Judd & Kenny, 1981): (1) stress significantly predicted a self-defeating behavior or cognition, (2) need for recovery also significantly predicted the self-defeating behavior or cognition in a separate regression model, (3) stress predicted need for recovery, and (4) entering need for recovery in a hierarchical regression eliminated (for complete mediation) or reduced (for partial mediation) the previously significant relationship between stressors and a given self-defeating behavior or cognition.

Complete results of the hierarchical regression analyses are presented in Table 8 and discussed in the following paragraphs. For each analysis, the demographic covariates (age, gender, and personality traits) were entered on step one, followed by the stress-related variables, and the need for recovery variables on step three. If this analysis supported conditions (1) and (4) above, separate regression analyses were performed to test conditions (2) and (3).

Table 8. Hierarchical Regression Analyses for Self-Defeating Behaviors and Cognitions Predicted by Stress and Need for Recovery

	Procrastination			Inaccurate Planning			Overconfidence		
	β			β			β		
Predictors	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Age	0.00	0.00	0.00	-0.01	0.00	0.01	-0.06	-0.06	-0.05
Gender	-0.11	-0.08	-0.06	0.06	0.03	0.05	-0.02	-0.01	-0.03
Extraversion	0.06	0.04	0.05	0.00	0.02	0.00	0.14 *	0.14 *	0.12
Agreeableness	0.01	-0.01	-0.04	-0.06	-0.06	-0.05	0.00	0.00	-0.01
Conscientiousness	-0.33 **	-0.29 **	-0.25 **	0.06	0.05	0.05	-0.07	-0.09	-0.10
Neuroticism	0.01	0.03	-0.02	0.01	-0.04	-0.04	0.07	0.11	0.12
Openness	-0.08	-0.05	-0.04	0.10	0.09	0.08	0.02	0.01	0.02
Coping/control failure		0.16 **	0.15 *		-0.01	0.00		-0.02	-0.01
Emotional stress response		-0.04	-0.09		0.01	-0.02		-0.07	-0.02
Interpers. Conflict		-0.10	-0.10		0.04	0.04		-0.04	-0.03
Quantitative Workload		-0.10	-0.14 *		0.14	0.11		0.00	0.03
Physical fatigue			0.08			-0.24 **			0.06
Mental fatigue			0.17 *			0.11			-0.05
Psycho-social resource drain			-0.08			0.02			-0.18
Need for rest/break			0.07			0.18			0.05
ΔR^2	0.14	0.05	0.03	0.01	0.02	0.03	0.03	0.01	0.02
ΔF	7.02 **	4.16 **	3.19 *	0.51	1.26	2.08	1.08	0.40	0.99
Adjusted R^2	0.12	0.16	0.18	0.00	0.00	0.01	0.00	0.00	0.00
F	7.02 **	6.17 **	5.51 **	0.51	0.79	1.14	1.08	0.83	0.87

	Attentional Impulsivity			Behavioral Impulsivity			Inability to Delay		
	β			β			β		
Predictors	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Age	-0.01	0.00	-0.02	0.00	0.00	-0.01	-0.09	-0.08	-0.08
Gender	0.13 *	0.12	0.14 *	-0.08	-0.07	-0.06	0.12	0.14 *	0.14 *
Extraversion	0.11	0.10	0.11	0.03	0.02	0.04	-0.14 *	-0.12 *	-0.13 *
Agreeableness	0.02	0.02	0.01	0.02	0.01	-0.01	-0.07	-0.05	-0.07
Conscientiousness	-0.10	-0.03	0.01	-0.42 **	-0.41 **	-0.38 **	0.03	0.02	0.04
Neuroticism	0.22 **	0.10	0.05	0.02	0.03	-0.01	-0.06	0.00	-0.04
Openness	-0.09	-0.06	-0.07	-0.01	0.00	0.01	0.07	0.04	0.05
Coping/control failure		0.07	0.06		-0.01	-0.02		-0.02	-0.02
Emotional stress response		0.19 *	0.08		0.02	-0.01		-0.15	-0.18 *
Interpers. Conflict		0.12 *	0.11 *		0.00	0.00		0.11	0.11
Quantitative Workload		-0.08	-0.14		-0.08	-0.09		0.01	-0.01
Physical fatigue			0.04			0.16			0.13
Mental fatigue			0.10			0.08			0.03
Psycho-social resource drain			0.09			0.00			-0.14
Need for rest/break			0.12			-0.08			0.14
ΔR^2	0.09	0.04	0.06	0.19	0.00	0.02	0.04	0.02	0.02
ΔF	4.25 **	3.49 **	4.95 **	9.85 **	0.38	2.15	1.89	1.73	1.93
Adjusted R^2	0.07	0.10	0.14	0.17	0.16	0.17	0.02	0.03	0.04
F	4.25 **	4.06 **	4.46 **	9.85 **	6.36 **	5.31 **	1.89	1.84 *	1.88 *

Table continues next page…

Table 8. (cont'd) Hierarchical Regression Analyses for Self-Defeating Behaviors and Cognitions Predicted by Stress and Need for Recovery

	Self-handicapping (scenario)			Self-handicapping (scale)			DM Delay		
	β			β			β		
Predictors	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Age	-0.04	-0.03	-0.05	-0.01	-0.01	-0.04	-0.02	-0.02	-0.01
Gender	0.00	0.01	0.01	-0.17 **	-0.20 **	-0.19 **	0.11	0.10	0.07
Extraversion	0.09	0.08	0.09	0.12 *	0.11 *	0.13 *	-0.08	-0.07	-0.08
Agreeableness	-0.16 *	-0.16 *	-0.17 *	0.03	0.02	0.01	0.02	0.02	0.00
Conscientiousness	-0.12 *	-0.04	-0.02	-0.20 **	-0.16 **	-0.13 *	0.01	0.03	0.02
Neuroticism	0.08	-0.01	-0.05	0.27 **	0.13 *	0.08	0.06	0.01	0.01
Openness	-0.15 *	-0.11	-0.12 *	-0.09	-0.07	-0.08	0.03	0.03	0.05
Coping/control failure		0.16 *	0.15 *		0.05	0.04		0.05	0.06
Emotional stress response		0.11	0.02		0.20 **	0.09		0.02	0.10
Interpers. Conflict		0.05	0.04		0.04	0.03		0.04	0.04
Quantitative Workload		-0.06	-0.09		0.06	0.01		0.06	0.10
Physical fatigue			0.09			0.15			0.27 **
Mental fatigue			-0.02			0.02			-0.16
Psycho-social resource drain			0.17			0.18 *			-0.23 *
Need for rest/break			0.01			0.01			-0.06
ΔR^2	0.08	0.03	0.04	0.14	0.05	0.06	0.03	0.01	0.05
ΔF	3.79 **	2.63 *	3.07 *	7.12 **	4.60 **	6.34 **	1.30	0.62	4.36 **
Adjusted R^2	0.06	0.08	0.10	0.12	0.16	0.22	0.01	0.00	0.04
F	3.79 **	3.42 **	3.40 **	7.12 **	6.42 **	6.73 **	1.30	1.04	1.96 *

	% Willigness to Escalate			Escalation of Commitment			DM Avoidance		
	β			β			β		
Predictors	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Age	0.00	0.00	-0.01	-0.01	-0.01	-0.01	0.00	0.01	0.01
Gender	-0.17 **	-0.18 **	-0.17 *	-0.17 **	-0.15 *	-0.15 *	0.07	0.07	0.07
Extraversion	0.03	0.02	0.03	-0.10	-0.12	-0.12	0.06	0.06	0.07
Agreeableness	-0.01	-0.03	-0.03	-0.03	-0.05	-0.06	-0.05	-0.04	-0.03
Conscientiousness	0.00	0.02	0.04	-0.02	0.01	0.03	-0.12 *	-0.09	-0.11
Neuroticism	-0.05	-0.09	-0.10	-0.09	-0.09	-0.11	-0.16 **	-0.18 **	-0.16 *
Openness	-0.16 **	-0.14 *	-0.14 *	-0.18 **	-0.15 *	-0.15 **	0.08	0.09	0.09
Coping/control failure		0.08	0.07		0.11	0.12		0.06	0.06
Emotional stress response		0.06	0.02		0.00	-0.03		0.00	0.05
Interpers. Conflict		-0.08	-0.09		-0.09	-0.08		0.06	0.06
Quantitative Workload		0.02	0.00		-0.07	-0.09		-0.02	0.02
Physical fatigue			0.01			0.00			0.02
Mental fatigue			0.07			0.04			-0.05
Psycho-social resource drain			0.10			-0.02			0.02
Need for rest/break			-0.06			0.09			-0.16
ΔR^2	0.06	0.01	0.01	0.09	0.02	0.01	0.06	0.01	0.02
ΔF	2.77 **	1.14	0.63	4.47 **	1.84	0.48	2.50 *	0.45	1.37
Adjusted R^2	0.04	0.04	0.04	0.07	0.08	0.08	0.03	0.03	0.03
F	2.77 **	2.18 *	1.76 *	4.47 **	3.54 **	2.71 **	2.50 *	1.74	1.65

Note. $N = 311$ for all except Inaccurate Planning ($n = 254$), Overconfidence ($n = 274$), and % Willingness to Escalate ($n = 310$). * $p < .05$, ** $p < .01$. Gender coded 0 = Male, 1 = Female.

Hypothesis 1 was that stress would positively predict procrastination and that this relationship would be mediated by need for recovery. Procrastination was positively related to coping/control failure ($r = .26$, $p < .01$), but negatively related to quantitative workload ($r = -.17$, $p < .01$). Procrastination was also positively correlated with physical and mental fatigue ($r = .12$, $p < .05$ and $r = .19$, $p < .01$, respectively). The hierarchical regression analysis identified conscientiousness ($\beta = -.29$, $p < .01$) and coping/control failure ($\beta = .16$, $p < .01$) as significant predictors. Upon entry of the need for recovery variables, mental fatigue emerged as a significant positive predictor ($\beta = .17$, $p < .05$), but so did quantitative workload ($\beta = -.14$, $p < .05$). Coping/control failure remained significant, though its regression weight decreased slightly. In total, there was some support for Hypothesis 1a, but not for Hypothesis 1b.

The second hypothesis stated that stress (measured at Time 1) would positively predict inaccuracy in planning and overconfidence (both established at Time 2), and that these relationships would be mediated by need for recovery (measured at Time 1). In terms of correlations, inaccurate planning was significantly correlated with quantitative workload ($r = .15$, $p < .05$) and need for a rest/break at Time 1 ($r = .12$, $p < .05$). Overconfidence demonstrated no significant relationships with stress or need for recovery variables. For the sake of completeness, however, two hierarchical regressions were conducted (one for each of the two self-defeating cognitions).

The first analysis showed that inaccurate planning was not significantly predicted by any of the variables, except physical fatigue ($\beta = -.24$, $p < .01$). In the second analysis, only extraversion emerged as a significant predictor of overconfidence before entry of the need for recovery predictors ($\beta = .14$, $p < .05$). No support was therefore obtained for Hypothesis 2.

Hypothesis 3 was supported; a positive relationship between stress and self-handicapping behaviors was identified (3a) and mediated by need for recovery (3b). Multiple significant positive correlations between the scenario and scale-based self-handicapping scores, and the stress and need for recovery predictors were observed (see Table 7). Two hierarchical regression analyses further clarified these relationships.

The first analysis, using the situational judgment measure of self-handicapping as the dependent variable, showed that without including the need for recovery variables, self-handicapping was predicted by agreeableness ($\beta = -.16$, $p < .05$) and coping/control failure ($\beta = .16$, $p < .05$), supporting Hypothesis 3a. After including the need for recovery variables, agreeableness remained a significant predictor ($\beta = -.17$, $p < .05$), joined by openness ($\beta = -.12$, $p < .05$), and coping/control failure (reduced slightly to $\beta = .15$, $p < .05$). However, none of the need for recovery variables emerged as significant predictors, nullifying the test for mediation. Thus, Hypothesis 3b was not supported with the situational judgment measure scores.

The second test of this hypothesis regressed scores from the scale-based measure of self-handicapping on the same predictors. Before entry of the need for recovery variables, significant predictors included gender ($\beta = -.20$, $p < .01$), extraversion ($\beta = .11$, $p < .01$), conscientiousness ($\beta = -.16$, $p < .01$), neuroticism, ($\beta = .13$, $p < .05$), and emotional stress response ($\beta = .20$, $p < .01$). After entry of the hypothesized mediators, the remaining significant predictors were gender ($\beta = -.19$, $p < .01$), extraversion ($\beta = .13$, $p < .05$), conscientiousness ($\beta = -.13$, $p < .05$), and psycho-social resource drain ($\beta = .18$, $p < .05$). The regression weight for emotional stress response was reduced to a non-significant $\beta = .09$.

With conditions (1) and (4) confirmed, a final set of regressions was performed to evaluate the remaining two conditions. The first regressed the scale-based self-handicapping scores on the demographic covariates and need for recovery variables. The full model accounted for 22% of the variance in self-handicapping scores, $F(11, 310) = 8.96$, $p < .01$, and psycho-social resource drain emerged as the lone significant need for recovery predictor (over and above the demographic covariates), $\beta = .22$, $p < .05$. These results supported condition (2).

To evaluate condition (3), psycho-social resource drain was regressed on the demographic covariates and stress-related predictors. Results showed that this model accounted for 32% of the variance in psycho-social resource drain, $F(11, 310) = 14.36$, $p < .01$. Emotional stress response and quantitative workload emerged as the significant stress predictors over and above demographic covariates, $\beta = .36$, $p < .01$ and $\beta = .17$, $p < .01$, respectively. These results supported condition (3). Thus, with all four conditions for mediation met, need for recovery (specifically psycho-social resource drain) appeared to mediate the relationship between stress and self-handicapping, supporting Hypothesis 3b.

Hypothesis 4a was supported by the multiple positive relationships observed in the correlations between attentional impulsivity and the stress and need for recovery variables (see Table 7). The regression analysis further revealed that prior to entry of the need for recovery predictors, emotional stress response and interpersonal conflict were significant predictors of attentional impulsivity, $\beta = .19$, $p < .05$ and $\beta = .12$, $p < .05$, respectively. After entering the need for recovery variables, the remaining significant predictors were gender ($\beta = .14$, $p < .05$) and interpersonal conflict ($\beta = .11$, $p < .05$).

Although the regression coefficient for emotional stress response was reduced to a nonsignificant β = .08, none of the need for recovery predictors reached significance.

With respect to behavioral impulsivity, the only positive correlation with a stress variable was with emotional stress response, $r = .15$, $p < .05$. All need for recovery variables from Time 1 were significantly correlated with behavioral impulsivity. In this regression analysis, however, only conscientiousness emerged as a significant predictor of behavioral impulsivity in the full model, β = -.38, $p < .01$. The second measure of behavioral impulsivity, inability to delay gratification, was significantly predicted by emotional stress response in the full model, but the relationship was negative, β = -.18, $p < .05$. Gender and extraversion were also significant predictors, β = .14, $p < .05$ and β = -.13, $p < .05$, respectively. Together these results support Hypothesis 4a, but fail to support 4b or 4c.

Hypothesis 5 was that a positive relationship between stress and a state-like tendency toward escalating commitment would exist (5a) and be mediated by need for recovery (5b). A tendency toward escalation of commitment was assessed in two ways in the present study. Only the scenario-based score was significantly correlated with a stress-related variable, quantitative workload, and this relationship was negative ($r = -.13$, $p < .05$). The results of the two initial hierarchical regression analyses were very similar. Prior to entry of the need for recovery variables, only gender (β = -.18, $p < .01$ and β = -.16, $p < .05$) and openness (β = -.14, $p < .05$ and β = -.15, $p < .05$) emerged as significant predictors of participants' (1) average willingness to continue with an initial course of action despite negative feedback and (2) scores on the situational measure of escalation

of commitment. Inclusion of the need for recovery predictors had no substantive impact on these relationships. Thus, no support was found for Hypothesis 5.

For the final hypothesis, I expected (6a) stress to be positively related to a tendency toward delay or avoidance of decision making and (6b) need for recovery to mediate this relationship. From the correlations, only decision making delay was significantly related to a stress variable, quantitative workload ($r = .12$, $p < .05$). Regressing decision making delay on the full set of stress and need for recovery variables resulted in physical fatigue and psycho-social resource drain emerging as significant predictors, $\beta = .27$, $p < .01$ and $\beta = -.23$, $p < .05$. With respect to decision making avoidance, only neuroticism emerged as a significant predictor of this self-defeating cognition when regressed on the full set of predictors, $\beta = -.16$, $p < .05$. Thus, only weak support was obtained for Hypothesis 6a (from the correlations with decision making delay), but Hypothesis 6b was completely not supported.

Supplementary Goal

The final supplemental goal of the present study was to provide initial validation evidence for the new measure of NFRR. There were multiple approaches to take when considering this issue. The identification of this measure two-factor structure has already been discussed. The next psychometric element to consider was the sensitivity of this measure to changes in a person's recovery needs state. One way to illustrate this is by comparing the test-retest correlations with the observed internal consistencies for this measure. For the psycho-social resource drain dimension, the Time 1 – Time 2 correlation was .62, $p < .01$. For the need for rest/break dimension the test-retest correlation was .61, $p < .01$. Although both are significant, they are less than the observed internal consistencies for these dimensions at Time 1

and Time 2 (see Tables 4 and 7). This difference can be seen as an initial indication of the sensitivity of the NFRR measure to fluctuations in a person's state (Nunnally & Bernstein, 1994).

The next piece of support for the NFRR measure's validity was to highlight its relationship with other related variables. In the present study these variables were coping/control failure, emotional stress reaction, interpersonal conflict, quantitative workload, and physical and mental fatigue. A primary goal of this initial validation was to emphasize how the NFRR dimensions differed from the constructs measured by these other scales. Primary support for this distinction can be found in the stress-related measures factor analysis results (Appendix A, Table A4), where the loadings illustrate a distinction between the two NFRR measure dimensions and the other similar variables.

Additional evidence can be found in the results from the hypothesis tests. For example, all correlations between the NFRR dimensions and the stress and fatigue variables were less than .70, suggesting that although closely related, they are not fully redundant. Also, in the regression analyses tolerance and variance inflation factor indices demonstrated that the complete set of stress and need for recovery variables did not violate multicollinearity standards. Finally, regressing psycho-social resource drain and need for rest/break on the other demographic covariates, and stress and fatigue variables accounted for less than 50% of the variance in each of these two sub-dimensions of the NFRR measure (full results in Table 9). Combined, these results suggested that the NFRR measure was evaluating a construct that was at least partially distinct from perceived stress or general feelings of fatigue.

Table 9. Hierarchical Regression Predicting NFRR Dimensions with Personal and Stress-Related Variables

	Psycho-social resource drain		Need for rest/break	
	β		β	
Predictors	Step 1	Step 2	Step 1	Step 2
Age	0.10	0.07	0.01	-0.03
Gender	0.04	-0.02	0.06	0.01
Extraversion	-0.06	-0.03	0.07	0.10 *
Agreeableness	-0.03	-0.09	0.05	-0.03
Conscientiousness	-0.11 *	0.02	-0.07	0.03
Neuroticism	0.34 **	-0.02	0.36 **	0.03
Openness	0.03	0.07	0.00	0.03
Coping/control failure		0.01		-0.06
Emotional stress response		0.22 **		0.15 *
Interpers. Conflict		0.07		0.00
Quantitative Workload		0.10		0.12 *
Physical fatigue		0.42 **		0.46 **
Mental fatigue		0.13 *		0.15 *
ΔR^2	.16	.35	.14	.36
ΔF	8.48 **	35.86 **	7.06 **	35.13 **
Adjusted R^2	.15	.49	.12	.48
F	8.48 **	24.27 **	7.06 **	22.59 **

Note. $N = 311$, * $p < .05$, ** $p < .01$.

DISCUSSION

The present study represents a novel approach to studying the effects of work-related stress and recovery. Integrating occupational health and judgment and decision making psychology literatures, I developed and tested new measurement techniques for evaluating the impact of work stress on individuals' self-management capabilities via the development of need for resource recovery (NFRR). The theoretical underpinnings for this study involved Effort-Recovery and Conservation of Resource theories, as well as a recent model self-defeating behaviors and cognitions from Renn et al. (2005).

Using this final framework I developed and utilized measures of several self-management impairing (i.e., self-defeating) behaviors and cognitions, including decision making delay/avoidance, impulsivity, procrastination, escalation of commitment, and self-handicapping. The new measures were designed as scenario-based situational judgment tests, to which participants responded by indicating their likelihood of engaging in specific behavioral responses to situational cues. Participants responded based on how they were feeling at the time they completed the surveys, thereby reflecting any negative effects of resource depletion. Linking these responses with self-reported ratings of stress (general stress, interpersonal conflict, and quantitative workload), and need for recovery (fatigue and NFRR), I was able to evaluate the impact of work-related stress on an individual's ability to effectively self-manage critical work-related behaviors and cognitions. Although the results did not perfectly match initial expectations, the findings do merit careful discussion.

Primary Findings

Viewing procrastination as a motivational phenomenon, I expected the resource drain associated with stress and increased recovery needs to reduce a person's motivation to actively

engage a challenging task. My expectation stated in Hypothesis 1, was that stress be positively associated with procrastination and that this relationship would be mediated by a person's need for recovery state. This seemed to be a reasonable proposition given indirect support from studies that have linked multiple stress-related work environment features such as feelings of frustration and boredom, perceptions of low autonomy, and task aversiveness with procrastination (e.g., Ackerman & Gross, 2005; Blunt & Pychyl, 2000; Lonergan & Maher, 2000). Additional research with students has also shown that self-regulatory capabilities may be a significant predictor of procrastination tendencies (e.g., Senécal et al., 1995).

The results provided partial support for this hypothesis. Higher levels of perceived coping/control failure were associated with stronger tendency toward procrastination. This was seen in the correlations and hierarchical regression results. The latter also showed, however, that entry of the need for recovery variables did not significantly reduce the significance of the stress-related predictors. It would seem then that procrastination is jointly affected by stress and mental fatigue, but that this relationship is not mediational, as I had originally hypothesized.

An interesting finding that emerged in the regression analysis was that participants reporting higher levels of quantitative workload were less likely to demonstrate a tendency toward procrastination in their responses to the situational judgment items. In part this may be explained by considering the nature of this specific stressor. For most people, quantitative workload arises from work-related demands, which emanate from a domain in which procrastination is likely to develop. Procrastination is more likely to develop, however, when the demands are distal and can be avoided without serious consequence. If the pressure is high enough though, procrastination is more likely to cease in favor of meeting the particular demand.

This possibility is in line with a recent perspective on procrastination presented by Steel (2007), who suggests that procrastination reflects a motivational issue linked with a person's perceived utility (borrowing from expectancy theory and theories of temporal discounting, among others). Applying this notion of perceived utility, the negative relationship between quantitative workload and procrastination may be explained by realizing that if a person is already experiencing a high level of demands, their response to scenarios that are also built around impending deadlines may be enough to motivate that person to select any response other than procrastination.

In other words, the positive utility associated with completing a proximal task is likely to be especially high for individuals who are already managing a high level of quantitative workload demands. For these individuals then, the motivation to finish a task put before them is stronger than the motivation to avoid working on it. This conclusion is supported by research that has shown students are less likely to procrastinate as the deadline for a task nears (Schouwenburg & Groenewoud, 2001; Strongman & Burt, 2000). In the present study, all but two of the present situational judgment scenarios included very short time frames (less than one day). It is possible that this may have limited the amount of procrastination that would emerge with situational judgments about scenarios with more distal deadlines.

A final noteworthy finding regarding procrastination was that although need for recovery did not mediate the relationship between stress and procrastination, mental fatigue was a significant predictor over and above all other variables. This is important in that it establishes a link between fatigue and procrastination. Extending from Conservation of Resources theory (Hobfoll, 1989), the lack of resources that accompanies a need for recovery may be sufficient to

increase the perceived aversiveness of new tasks (Steel, 2007), increasing the likelihood that highly mentally fatigued individuals will procrastinate.

The second form of self-defeating behavior and cognition evaluated in the present study was a person's inability to make accurate self-assessments. Borrowing from judgment and decision making research literatures, I operationalized this form of precursor to ineffective self-management in terms of inaccurate time planning (i.e., the planning fallacy; Buehler et al., 2002; Kruger & Evans, 2004) and overconfident estimation of personal goal achievement (i.e., the overconfidence effect; Dunning et al., 1990; Pallier et al., 2002). Although both of these phenomena have been shown to be rather widespread, some evidence suggests their prevalence will increase as processing effort increases.

Within the present theoretical framework of resource depletion and recovery, a logical extension of these existing findings was that individuals with a high need for recovery (and therefore a substantial resource drain) would be less likely to accurately plan and estimate their achievement. Therefore, Hypothesis 2 was that stress would be positively associated with inaccurate planning and overconfidence and that need for recovery would mediate this relationship. Although inaccurate planning was positively correlated with quantitative workload (Hypothesis 2a), this was the only observed positive relationship with a stress-related variable. In the regression analyses, physical fatigue was identified as a significant, but negative predictor of inaccurate planning and no stress or need for recovery variables predicted overconfidence. No mediation was identified (Hypothesis 2b).

The negative relationship between physical fatigue and inaccurate assessment is difficult to interpret and there is no developed literature to pull from in this area. It is possible that physically fatigued individuals will be more careful with their time

estimation as a way of conserving energy and other resources, but this is speculation that will need to be substantiated with future research. This odd relationship and the absence of other relationships among the study variables may also be due to construct validity and measure deficiency issues. Future research in this area would benefit from developing and testing additional assessment techniques for inaccurate self-assessment.

Self-handicapping was the third form of self-defeating behavior and cognition incorporated into the present study. The general consensus on this phenomenon is that it emerges when a person desires to protect his/her self-image. This has been shown to be especially true when a person faces an evaluation situation and wishes to avoid appearing truly incompetent or of a low ability (Berglas & Jones, 1978). The relationship between stress and self-handicapping comes from the inherently stressful nature of impending performance evaluation situation. In addition, perceptions of ambiguous expectations (Berglas & Jones, 1978) or anxiety and/or perceived threat (Zuckerman & Tsai, 2005) have also been shown to predict the development of self-handicapping behavior. These are common elements to the occupational stress experience. Thus, the expectation in Hypothesis 3 was that a positive relationship would be identified between stress and self-handicapping and this relationship would be mediated by need for recovery.

Results of the tests for this hypothesis were supportive, using both a scenario- and scale-based measure of self-handicapping. Stress predicted self-handicapping (Hypothesis 3a) and this relationship was partially mediated by need for recovery (specifically, psycho-social resource drain), supporting Hypothesis 3b. Despite the small magnitude of the mediation effect, the full predictive model of covariates, stress-related variables, and need for recovery indicators accounted for 22% of the variance in scale-based score of self-handicapping tendencies.

These findings are important, because they are among the first to demonstrate that self-handicapping may be influenced at least in part by situational (stressors) and dispositional (need to recover and personality) factors. This confirms expectations by other self-handicapping researchers that these types of factors, which are present in learning and work environments, are likely to influence self-handicapping behavior (Urdan & Midgley, 2001). Future research may be able to extend the study of stress, need for recovery, and self-handicapping to shed light on the increasing poor lifestyle choices (e.g., drug use, inactivity, unhealthy eating) associated with a cycle of perceived incompetence and deflating confidence that is common among chronic self-handicappers (Zuckerman & Tsai, 2005).

The fourth self-defeating behavior and cognition I considered was a person's impulsivity (in attention and behavior). My expectations, as stated in Hypothesis 4, were that stress would be positively associated with this form of self-defeating behavior and cognition. I also expected a person's need for recovery state to mediate this relationship, given that self-regulatory resource depletion has already been shown to reduce a person's general self-control (e.g., Baumeister, 2002; Baumeister et al., 1998; Vohs & Heatherton, 2000). These expectations stemmed from research that has shown decisional impulsivity to increase as a person's self-management abilities decrease (Hinson et al., 2003). Other research also suggested that employee fatigue and work environment conditions could predict impulsive choice making (Reynolds & Schiffbauer 2004a; 2004b). Extensive research has also shown that resource depletion may lead to impulsive decision making and a loss of attentional focusing abilities.

Despite these relevant existing findings, the present results did not strongly support all parts of Hypothesis 4. The positive relationship between stress and attentional impulsivity was

most strongly supported (4a). In the final full predictive models, interpersonal conflict was the lone stress-related predictor of attentional impulsivity. No strong positive relationship between behavioral impulsivity and stress was identified (4b), nor was there solid evidence for mediation by need for recovery (4c).

In part these mixed findings may be due to differences in the measurement approaches, attentional impulsivity with a more traditional rating scale and behavioral impulsivity with a brief scenario-based measure. It is also possible that the behavioral impulsivity scenarios may have engendered more socially desirable responses than the attentional impulsivity items given the stronger stigma associated with being unable to control one's own behavior versus having difficulty maintaining focus and concentration. This is clearly an area for further study, because establishing the link between stress and impulsive thought and action could be critically important to future efforts to identify at risk workers and prevent accidents, injuries, and poor decisions from arising out of impulsivity within the workplace (Reynolds & Schiffbauer 2004a; 2004b).

Escalation of commitment was the fifth self-defeating behavior considered to be a symptom of poor self-management. Escalation requires a person to go against rational decision making norms and to continue the pursuit of a specific plan or course of action despite feedback that suggests that particular plan will fail. The negative consequences of escalation of commitment within a work setting and for an individual are clear, but little is known about factors that might trigger this type of self-defeating action. Although the research base is thin with respect to non-trait triggers of escalation, some research has suggested that a person in a negative affective state (a common experience for those under stress; Spector et al., 2000) may be more likely to engage in escalation of commitment (Wong et al., 2006). For the purposes of

testing this relationship a bit more directly, I expected stress to be positively related to a person's tendency to escalate, and I expected this relationship to be mediated by a person recovery needs (Hypothesis 5).

Results did not support this hypothesis. Indeed, the only relationship with a stress-related variable was a negative one between responses to the scenarios and quantitative workload. Need for recovery played no role as a correlate or predictor of escalation of commitment in this study. This complete lack of support for Hypothesis 5 was disappointing, even though the proposed theoretical linkages between stress, need for recovery, and escalation were more tenuous than those tested in the other hypotheses. Based on the present results, there does not appear to be a relationship between stress and escalation of commitment.

To round out the set of self-defeating behaviors and cognitions, I added decision making delay and avoidance as a sixth possible outcome to which stress and need for recovery were expected to contribute (Hypothesis 6). I expected stress to increase a person's need for recovery and I expected those with a high need for recovery to be less willing to make up their minds about complex decisions. More specifically, I expected individuals with a high need for recovery to choose to delay a decision if given the chance or to choice to stick with the status quo rather than weighing the pros and cons of a new option. One other study has demonstrated such a relationship between resource depletion and decision delay (Pocheptsova et al., 2007) and I hoped to replicate their findings with a new methodology.

The present results demonstrated a positive correlation between decision making delay and quantitative workload (Hypothesis 6a), but in the regression analyses, only physical fatigue and psycho-social resource drain (two indicators of need for recovery) were significant predictors of this self-defeating form of cognition. Decision making avoidance was not predicted

by any of the stress-related or need for recovery variables, though need for rest/break approached significance as a predictor in the full model ($\beta = -.16$, $p < .10$). No evidence for mediation by need for recovery was identified for either delay or avoidance of decision making. Overall, it did not seem that stress was a predictor of decision making delay or avoidance, but that a person's need for recovery may be.

One particularly interesting finding from the tests of Hypothesis 6 was the negative relationship between psycho-social resource drain and decision making delay. This may be due, in the present study, to the lack of real consequences linked to the scenarios in that particular measure. More specifically, participants were asked to either choose between two options or select a third choice, which was a delay option. Given there were no real consequences for a poor decision, it is possible that participants experiencing a greater depletion of resources (i.e., those higher in various forms of need for recovery) would simply have chosen the simplest option, one of the clear choices, rather than expending the resources to more completely evaluate the choice delay option. Adaptation of these particular situational measures for use within a working adult population can be expected to yield findings more in line with this hypothesis as long as the scenarios are constructed to include real and important consequences for which delaying could be problematic.

Apart from the hypothesis tests, the final set of analyses evaluated the new need for recovery measure (NFRR). The expected unidimensional factor structure was not supported by the factor analyses conducted at the pilot and actual study stages. In the end a two-factor structure was accepted, representing psycho-social resource drain and a perceived need for a rest/break. The internal consistencies of these two dimensions were

strong at both Time 1 and Time 2. The test-retest correlations between these dimensions were weaker than the internal consistencies, suggesting some degree of sensitivity to changes in participant's recovery needs.

From a construct validity standpoint, the two NFRR dimensions were correlated with the stress and other need for recovery variables, as would be expected given the theoretical similarities underlying these measures. Additional evidence, however, supported the distinctiveness of the NFRR construct measure from the other measures, showing that these two NFRR dimensions added something above and beyond the other stressors and need for recovery predictors in the hypotheses tests and also that the other variables accounted for less than half the variance in each of these two NFRR dimensions in a separate regression analysis.

Secondary Findings

Several new measures were developed to allow me to accomplish the research goals in the present study. The details pertaining to the revision and refinement of these measures are presented in Appendix A, but there are a few other findings that are important to note from a construct validation standpoint. These findings involve the individual characteristics (age, gender, personality) that were included as covariates when testing the hypotheses. I report them here to offer some additional support for the construct validity of several of the measures and to also as a statement of exploratory findings that future research can extend.

Apart from their established influence on stress variables, individual characteristics have also been shown to relate to several of the phenomenon studied as self-defeating behaviors and cognitions in the present study. For example, the finding that conscientiousness was a significant and negative predictor of participant's tendency toward procrastination is in line with previous

procrastination research (Ferrari et al., 1995). A recent meta-analysis in that area found an average uncorrected *r* of -.62, $p < .01$ between this personality trait and procrastination, which is also typically measured as a trait (Steel, 2007). These meta-analytic findings are significantly stronger than what was observed in the present study, perhaps demonstrating that the present situational measure of procrastination may be less influenced by personality traits than other existing measures and more sensitive to variation in procrastination tendencies depending on a person's state at the time of response.

The present measure of overconfidence was also supported by its significant relationship with extraversion. This personality trait has been shown to be the only five factor model personality trait to consistently predict overconfidence (e.g., Pallier et al., 2002; Schaefer, Williams, Goodie, & Campbell, 2004). Given that overconfidence reflects a disconnect between reality and a person's expectations, perhaps highly extraverted people maintain inflated confidence expectations, which translated in the present study, into a higher degree of overconfidence once actual project completion was considered (Schaefer et al., 2004). This line of thought is also supported by findings of a close relationship between optimism and extraversion (e.g., Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992; Williams, 1992).

Personality traits also were associated with responses to the self-handicapping measures. With the situational judgment measure, agreeableness and openness were significant negative predictors. Perhaps more agreeable individuals are less likely to admit to self-handicapping out of a desire to avoid criticism associated with making excuses (a self-image protecting relationship; Ferrari & Thompson, 2006). A similar

explanation may apply for those with high levels of openness, who perhaps would rather be associated with demonstrating high intellect, rather than an ability to make excuses.

Predicting scores on the scale-based self-handicapping measure, gender, extraversion, conscientiousness, and neuroticism were identified as predictors of self-handicapping tendencies. On the surface, at least, it seems that male students were more likely to self-handicap than female students, as were individuals with higher levels of extraversion and lower levels of conscientiousness. Isolating one of these characteristics, extraversion, perhaps this observed relationship is due to the inflated expectations commonly held by highly extraverted individuals (e.g., Schaefer et al., 2004). More specifically, perhaps highly extraverted individuals are more likely to report a high likelihood of self-handicapping than less extraverted individuals. Although plausible, there is insufficient evidence in this area to adequately interpret each of these relationships. There is certainly need for future research along these lines.

With regard to impulsivity an in inability to delay gratification, individual characteristics were again important predictors. Responses to the attentional impulsivity scale and inability to delay gratification choice sets were higher among females than males, while highly conscientious participants were less likely to indicate a tendency toward behavioral impulsivity on its situational judgment measure (consistent with the relationships between this trait and self-defeating behaviors and cognitions in general; Costa & McCrae, 1992; Whiteside & Lynam, 2001).

Escalation of commitment was also shown to be predicted by two individual characteristics. More specifically, males were more likely than females to escalate, and high openness was associated with lower levels of escalation. The finding regarding

gender is in line with other research on self-regulation, which suggests that women are more likely to stop tasks than males in the face of impending failure (Murtagh & Todd, 2004; Nolen-Hoeksema & Corte, 2004). There is no established literature on the relationship between openness and this judgment and decision making phenomenon, but this appears to be another area for future research and extension.

Finally, neuroticism was identified as a significant and negative predictor of decision making avoidance. Although there is little existing research to guide the interpretation of this finding, it is possible that individuals high in neuroticism may also be less likely to avoid a decision because of their tendency to worry or agonize over making the best decision. This may push these individuals to consider all options rather than simply making an easy choice of the status quo option. Future research will need to more carefully examine this and other relationships with individual characteristics, preferably using additional measurement techniques beyond the single decision making avoidance scenario used in the final analyses in the present study.

Implications

Several new measurement techniques and strategies were developed for and incorporated into the present study. The results, albeit preliminary, point the way toward several important implications for both occupational stress and recovery research and application of these findings to improving workers recovery.

For stress and recovery research. Substantial existing research suggests that continuing unmet recovery needs will contribute to more serious health issues including burnout (e.g., De Croon et al., 2003; Jansen et al., 2002; Sluiter et al., 1999). For these reasons, a healthy life is one in which a person is able to recovery from daily strains imposed by work and the tolls of

daily living (Zijlstra & Sonnentag, 2006). The present study highlights an additional set of criteria that can be considered when studying the impact of work stress and recovery needs on the functioning of workers.

The observed relationships between stress, need for recovery and the specific self-defeating behaviors and cognitions of procrastination, self-handicapping, and impulsivity illustrate a complex web of relationships by which stress may lead to negative outcomes for people working in organizations. In the work stress literature, the relationship between occupational stress and job-related performance has been difficult to isolate and this may be due to individual differences in need for recovery as a mediating factor left out of these previous models. It may well be that instead of chasing stress as the culprit for employee health problems we should instead be focusing on improving employees' recognition of and response to personal perceptions of need for recovery. Also, instead of attempting to link stress directly to performance, it seems that intermediary elements linked to self-management capabilities may be especially important to consider.

On a separate issue, much of the existing recovery research places a strong emphasis on recovery as equivalent to fatigue reduction (Zijlstra & Sonnentag, 2006; Rook & Zijlstra, 2006). While fighting fatigue will likely improve a person's energy at work, full effectiveness requires other resources as well, such as attention, concentration and focus, physical control, self-confidence, and creative thinking. These resources, as manifestations of a person's self-regulatory strength, are likely to be enhanced with exercise (e.g., Muraven et al., 1999), but not with rest alone, highlighting the notion that recovery is an active process. Framing recovery as a means for fatigue reduction contradicts the view that physical exercise and other active pursuits that engage other resources not tapped by work can be even more beneficial forms of recovery

than low-effort options (Sonnentag & Jelden, 2005). Continued development of the NFRR construct and its measurement can help to push this message to a wider audience.

For recovery enhancing interventions. The present research is preliminary, but the possibility of treating an individual's NFRR as a marker of early strain development does set the stage for a host of promising new interventions. Among the first of these interventions would be the training of workers to more accurately recognize their own recovery needs. Perhaps, with further revision, a tool such as the present NFRR measure could be used as a quick screening device for this purpose. A good guide for this type of intervention is the work of Landsman-Dijkstra, van Wijck, and Groothoff (2006), who found that enhancing peoples' awareness of personal recovery needs and responses to stress could improve their ability to identify discrepancies between actual and desired states. This in turn was then used by study participants as motivation to engage in recovery related activities to resolve the discrepancy.

Apart from its use as a marker of need for recovery, the present NFRR measure could be helpful in gauging the effectiveness of various forms of recovery enhancing interventions. Among the most promising avenues for interventions of this variety would be efforts to improve a person's mindset and choice of activities so that he/she perceives his/her behaviors as recovery enhancing (e.g., Sonnentag & Natter; similar to power of mindset over exercise benefits, Crum & Langer, 2007). There is likely to be a great deal of variability among people as to what constitutes an effective break (e.g., Strongman & Burt, 2000), and a consistent measurement of NFRR might be helpful in evaluating actual recovery as it takes place. Helping people to identify their own most effective recovery strategies would be an invaluable contribution given the limited time people have to devote to actual recovery or leisure once work is set aside (e.g.,

Bureau of Labor Statistics, 2006; CareerBuilder.com, 2006; Cotte, Ratneshwar, & Mick, 2004; Expedia.com, 2006; Feldman & Hornik, 1981).

Limitations

The present study was not without limitations. First, concerns could be raised about the generalizability of the findings given the student sample. Given the general nature of the phenomena studied, however, a certain degree of wider applicability is still expected. Indeed, the present findings may well underestimate the impact of stress and need for recovery on self-defeating behaviors and cognitions, given that the severity of consequences associated with all the scenarios was mild compared to what would be the case in a working adult population (where the consequences could include lost wages or a job). Student participants were not confronted with these potential consequences though every attempt was made to tailor the scenarios so they would adequately represent academic and social pressures common to a college environment. I expect to translate several of the present measures to a working adult format for additional research in the near future.

Second, in terms of measurement error limitations, common method variance may be an issue in the present study given that all scores used in the analyses came from self-reported responses to the various measures. I took several steps to minimize the influence of this complex form of bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). For example, data for several of the measures were collected at two time points. Multiple measurement formats were used for most of the self-defeating behaviors and cognitions. Respondent's confidentiality was assured through all phases of the study (to reduce bias entering into response patterns). All items were carefully pilot tested to maximize clarity and reduce the likelihood of any social desirability. In the analyses I also controlled for multiple demographic characteristics that have been identified

as possible influences on stress-related variables in other research. Thus, although it is impossible to prevent all measurement error from influencing the data and results, many steps were taken to minimize its impact in the present study (efforts supported by the absence of inflated intercorrelations among all the study variables.

Third is the issue of the low observed internal consistencies among most of the situational judgment items used to measure the self-defeating behaviors and cognitions. The internal consistency estimates were somewhat disconcerting, but not out of the ordinary for situational judgment measures (e.g., Ployhart & Ehrhart, 2003). In the present study there are several likely explanations for these low reliability estimates.

The first is that although these measures were designed to be brief (for the sake of efficiency), perhaps they were too brief (i.e., including too few items to establish an accurate estimate of internal consistency). The second is that when using situational judgment tests, it is very difficult to isolate a single construct for measurement. In other words, although I developed three situational items to assess decision making avoidance, it is difficult to know whether participants' responses to those items reflected this specific self-defeating cognition only, or some more complex combination of decision making avoidance and other personal characteristics that could have influenced their response.

Reliability is indeed an important feature of good measurement methods, especially when they are newly developed (Nunnally & Bernstein, 1994). The Cronbach α, however, is based on a domain-sampling theory of test development, which may not be appropriate when situational judgment or scenario-based items are being. In part this is because α is based on observed correlations among items, and between items and the overall test score.

A domain-sampling model implies that all items should come from the same domain and have the same distributions, but this may not be the case when the items are encapsulated into a situational judgment type measure. If α is low, it may be due to items having different distributions from one another, but still being relevant to the underlying construct being measured (Nunnally & Bernstein, 1994, p. 265). Thus, the appropriateness of an internal consistency reliability estimate for certain types of scales (especially situational judgment items) can be debated. They were reported here to be consistent with other research.

Certainly it would be worthwhile to try to improve the reliabilities of the situational self-defeating behavior and cognition measures for future research. One option is to develop additional scenarios to lengthen the shorter situational measures. Given the present observed α levels, I estimate that these situational measures would need to be lengthened to the following number of items (using the Spearman-Brown prophecy formula): decision making delay (eight items), escalation of commitment (10 items), and self-handicapping (five items). While the benefits of increasing these measures to these lengths might not outweigh the costs (e.g., extended completion time), it does seem reasonable to create two or three additional situational items for the self-handicapping measure and at least three more scenarios each for the other situational measures.

Future Research

The present melding of occupational health and judgment and decision making psychology opens a number of doors for future research. One of the first major next steps is to revise the situational self-defeating behavior and cognition measures taking into account the various issues of reliability, time frame, and consequence severity discussed in the preceding discussion. A second important step is to then adapt the revised measures for use in a full-time

working adult population. This adaptation will require the changing of item stems and contextual information, but the bulk of these measures should remain the same, especially the measures of the stress-related and need for recovery variables. With these tools in place it will be possible to conduct replication and extension studies within non-student populations.

A second broad area for future inquiry involves the continued development of a nomological network for the NFRR construct. The present study speaks to a focused subset of antecedent and outcome variables, but there are many other areas to extend into including possible physiological markers of recovery needs such as glucose (e.g., Fairclough & Houston, 2004; Gailliot et al., 2007) or allostatic load (von Thiele, Lindfors, & Lundberg, 2006; McEwen, 2000), indicators of physical health, and other related psychological constructs. Further development is also needed on the other side of equation, studying variables that NFRR may help to predict, including forms of performance and long-term physiological, psychological, and behavioral strains.

A third future research area pertains to the actual recovery process. The present results suggest that it is important to broaden the criteria used to evaluate recovery beyond basic measures of perceived fatigue. The present measure of NFRR may be one tool to use in future research, as it was shown in the present study to be sufficiently distinct from a comprehensive fatigue measure.

More important is the way in which the present NFRR measure can be used in future research. If viewed as a self-reported marker of a person's broad recovery needs, regular measurement across multiple time points could grant researchers a better baseline and evaluation tool for evaluating the effectiveness of various recovery activities (e.g., physical, social, low-effort, sleep; Rook & Zijlstra, 2006; Sonnentag & Jelden, 2003; Sonnentag & Natter, 2004).

Without demonstrating a change in NFRR or other need for recovery measures from pre- to post-recovery it is impossible to say with any certainty that recovery is actually occurring.

A fourth and final direct extension of the present research could examine individual differences associated with need for recovery. It is not simply the case that more hours spent at work leads automatically to a higher need for recovery or feelings of fatigue (e.g., Rook & Zijlstra, 2006; Taris et al., 2006). Indeed, there seems to be a great deal of individual variability in the development of NFRR-related constructs and this variability is likely linked to personality characteristics, motivational tendencies, and situational factors. It was impractical to evaluate any more of these factors in the present study, but rewarding strides were made in this direction and future research can continue this inquiry.

Conclusion

Need for recovery is an important, but often ignored element in the occupational stress process. The present research lays the foundation for continued research into the behavioral and cognitive impacts of need for recovery. Such research should help to better clarify the true impact of occupational stress on personal and organizational outcomes.

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APPENDIX A: Measure Development

PILOT STUDY

The EFA results and measure revision steps for the new NFRR measure are presented in this section. Initial EFA results are summarized in Table A1, where it is visible that the NFRR items did not load cleanly onto a single factor as initially expected. Using factor loading magnitude (only considered if > .40) and item content as interpretational guides, a careful review of these results suggested the presence of three main sub-factors in the NFRR scale. The first related to a person's mental and physical break needs (items 2, 4, 5, 11, 16-19), the second to the intensity of recovery needs (in terms of exclusion of social and other nonwork activities; items 12-15), and the third to focus and concentration recovery needs (items 7-15). Three items (1, 3, and 6) did not load onto these factors and were marked for careful evaluation following the larger data collection in the actual study. A second EFA was performed, excluding these three items and the three factor structure was retained (Table A2).

Table A1. Factor Loadings for the Need for Resource Recovery Scale Items (pilot test)

Item	1.	2.	3.	4.	5.
1. If I stopped working on my schoolwork right now, I would find it hard to relax.	-.01	.05	.01	-.10	**.89**
2. I feel like I need to take a mental break or rest soon.	**.52**	.34	.10	.26	.24
3. If I stopped working on my schoolwork right now I would feel really worn-out.	.24	.10	.18	.48	**.42**
4. If I could take some time away from my schoolwork, my energy would return.	**.80**	.16	-.03	-.04	-.15
5. Trying to finish my schoolwork on time is causing me to feel exhausted today.	**.43**	.34	.28	.29	.12
6. When I am finished working on schoolwork today I will still feel fresh. **(Reverse)**	-.06	-.11	-.05	**-.90**	.15
7. I have been working so hard today that I am losing my ability to concentrate on what I am doing.	.11	.19	**.82**	.13	.01
8. Right now I feel as though I could only relax if I had more than one day away from school.	.39	.22	**.61**	-.07	-.08
9. I have been so busy with schoolwork today that I am beginning to feel I am losing control over all the work I have to do.	.13	.31	**.77**	.09	.12
10. If my schoolwork were finished for today, I would still have trouble concentrating on other things.	-.08	.48	**.48**	.07	.24
11. Physically, my body needs a rest soon.	**.48**	.41	.34	.14	.05
12. It will be difficult for me to show interest in other people when I finish working on schoolwork today.	.18	**.63**	.33	.06	.03
13. When I stop my schoolwork for today I will need more than an hour to begin feeling recovered.	.22	**.78**	.18	.16	.13
14. When I stop my schoolwork for today, I hope other people will leave me alone for a little while.	.16	**.82**	.11	-.02	-.15
15. After working on my schoolwork today I will be too tired to start on other activities.	.10	**.59**	.40	.18	.29
16. I am having difficulty working on my schoolwork effectively today because I am feeling very tired.	**.47**	.25	.35	.27	.03
17. I would benefit from doing something un-related to my school work soon.	**.75**	.06	-.01	.03	.09
18. My ability to reach my schoolwork-related goals for today would increase if I could take a break first.	**.71**	.02	.32	.09	.06
19. I will lose my ability to stay focused on my schoolwork today unless I take a break soon.	**.58**	.12	.46	.12	-.04

Note. N = 152, extraction method = Principal Component Analysis with Varimax rotation and Kaiser Normalization. Accounted for 62.5% of the variance among these items. Loadings in **bold** reflect the final accepted factor structure based on loading magnitude and item content.

Table A2. Revised Factor Loadings for the Need for Resource Recovery Scale Items (pilot test)

Item	1.	2.	3.
2. I feel like I need to take a mental break or rest soon.	**.53**	.42	.12
4. If I could take some time away from my schoolwork, my energy would return.	**.80**	.13	-.05
5. Trying to finish my schoolwork on time is causing me to feel exhausted today.	**.45**	.41	.29
7. I have been working so hard today that I am losing my ability to concentrate on what I am doing.	.10	.23	**.81**
8. Right now I feel as though I could only relax if I had more than one day away from school.	.37	.20	**.58**
9. I have been so busy with schoolwork today that I am beginning to feel I am losing control over all the work I have to do.	.12	.35	**.77**
10. If my schoolwork were finished for today, I would still have trouble concentrating on other things.	-.09	.53	**.48**
11. Physically, my body needs a rest soon.	**.48**	.45	.33
12. It will be difficult for me to show interest in other people when I finish working on schoolwork today.	.19	**.62**	.33
13. When I stop my schoolwork for today I will need more than an hour to begin feeling recovered.	.22	**.81**	.17
14. When I stop my schoolwork for today, I hope other people will leave me alone for a little while.	.16	**.77**	.08
15. After working on my schoolwork today I will be too tired to start on other activities.	.10	**.65**	.42
16. I am having difficulty working on my schoolwork effectively today because I am feeling very tired.	**.50**	.30	.37
17. I would benefit from doing something un-related to my school work soon.	**.74**	.09	-.01
18. My ability to reach my schoolwork-related goals for today would increase if I could take a break first.	**.71**	.02	.35
19. I will lose my ability to stay focused on my schoolwork today unless I take a break soon.	**.59**	.09	.49

Note. N = 152, extraction method = Principal Component Analysis with Varimax rotation and Kaiser Normalization. Accounted for 58.3% of the variance in NFRR items. Loadings in **bold** reflect the final accepted factor structure based on loading magnitude and item content.

ACTUAL STUDY

The following sections describe the measure development steps followed using the data from the actual study.

Need for Resource Recovery Measure

A primary issue was to perform a secondary evaluation of the factor structure of the NFRR measure. Although a unidimensional factor structure was initially hypothesized, the pilot study revealed a three-factor solution. However, this structure was identified in an EFA using a relatively small sample of participants for that type of analysis. Using the actual study data (a larger sample), an initial EFA similarly identified items 1, 3, and 6 as being unassociated with the other items in the measure (consistent with the results of the pilot study analysis). A second EFA was run with these items removed; Table A3 summarizes these results.

From this analysis the NFRR measure appeared to consist of two factors, the first reflecting a combination of psychological and physical resource drain (psycho-physical resource drain) and the second reflecting a subjective need for a break or rest (need a rest/break). These two factors conform to the theoretical background for need for recovery and recovery research, so separate sub-scale scores were calculated for each of these factors going into the analyses.

Table A3. Factor Loadings for NFRR Items (actual study)

Items	1.	2.
2. I feel like I need to take a mental break or rest soon.	.35	**.59**
3. If I stopped working on my schoolwork right now I would feel really worn-out.	.09	**.69**
4. If I could take some time away from my schoolwork, my energy would return.	**.60**	.41
5. Trying to finish my schoolwork on time is causing me to feel exhausted today.	**.52**	.45
8. Right now I feel as though I could only relax if I had more than one day away from	.45	**.52**
9. I have been so busy with schoolwork today that I am beginning to feel I am losing control over all the work I have to do.	**.74**	.26
10. If my schoolwork were finished for today, I would still have trouble concentrating on other things.	**.62**	.16
11. Physically, my body needs a rest soon.	.44	**.55**
12. It will be difficult for me to show interest in other people when I finish working on schoolwork today.	**.80**	.17
13. When I stop my schoolwork for today I will need more than an hour to begin feeling recovered.	**.72**	.28
14. When I stop my schoolwork for today, I hope other people will leave me alone for a little while.	**.80**	.16
15. After working on my schoolwork today I will be too tired to start on other	**.78**	.23
16. I am having difficulty working on my schoolwork effectively today because I am feeling very tired.	**.53**	.49
17. I would benefit from doing something un-related to my school work soon.	.15	**.73**
18. My ability to reach my schoolwork-related goals for today would increase if I could take a break first.	.17	**.83**
19. I will lose my ability to stay focused on my schoolwork today unless I take a break soon.	.29	**.73**

Note. $N = 311$, extraction method = Principal Component Analysis with Varimax rotation; Factor structure accounted for 55.99% of the variance. Loadings in **bold** reflect the final accepted factor structure based on loading magnitude and item content.

Stress and Need for Recovery

The next task was to demonstrate the distinctiveness of the multiple stress and need for recovery measures from one another. A series of EFAs were performed including all items from the stress and need for recovery scales. Items were retained only if they loaded onto a factor with a loading greater than .40 and/or if they were clearly conceptually linked to the construct being measured. The final set of factor loadings is presented in Table A4.

These results suggested that the adapted scales were not as clearly unidimensional as had been intended or suggested by the original authors of the general stress and fatigue measures. For the present purposes the following factor breakdown was used to construct scales for the analyses and hypothesis tests. Need for resource recovery was represented by factors 1 and 2, which reflected psycho-social resource drain and need for a rest/break, respectively. The general stress measure was split over factors 3 and 4, which reflected failed control and coping (once reversed) and emotional reactions to stress. The fatigue measure was also split across factors 6 and 7, into a physical and mental fatigue sub-factors. Finally, interpersonal conflict and quantitative workload loaded as expected onto separate factors (factors 8 and 5, respectively). Scale scores were computed for each of these factors and used in all analyses.

Self-Defeating Behaviors and Cognitions

A series of EFAs were also run on the scale and situational judgment items for the self-defeating behaviors and cognitions. The initial factor loadings indicated a need for item reduction and scale revision. The delay of decision making items loaded well together on a single factor. The avoidance of decision making items, however, were split across two factors.

One possible explanation for this is that the third item/scenario involved making a decision about an emergency kidney donation, while the other two scenarios were focused on choosing dinner and deciding what to do with an upcoming weekend, respectively. This drastic difference in severity (not identified in the previous pilot studies) led me to remove the third decision making avoidance scenario. In addition, the weekend scenario also did not directly address the issue of decision avoidance as clearly as the dinner choice scenario. To adhere to the construct of decision making avoidance most directly, I retained that scenario as the indicator of that form of self-defeating behavior and cognition.

Table A4. Revised Factor Loadings for Stress and Need for Recovery Items

Items	1.	2.	3.	4.	5.	6.	7.	8.
2. I feel like I need to take a mental break or rest soon.	.30	**.52**	.02	-.01	.21	.24	.22	.03
3. If I stopped working on my schoolwork right now I would feel really worn-out.	.16	**.66**	.08	.02	.16	.04	.07	-.05
4. If I could take some time away from my schoolwork, my energy would return.	**.57**	.34	-.09	.12	.32	.13	.08	.00
5. Trying to finish my schoolwork on time is causing me to feel exhausted today.	**.50**	.45	-.13	.06	.16	.14	-.01	.06
8. Right now I feel as though I could only relax if I had more than one day away from school.	.39	**.41**	-.11	.26	.09	.26	.07	.02
9. I have been so busy with schoolwork today that I am beginning to feel I am losing control over all the work I have to do.	**.68**	.21	-.18	.29	.16	.07	.08	.04
10. If my schoolwork were finished for today, I would still have trouble concentrating on other things.	**.63**	.19	.03	.20	-.10	-.06	.17	.10
11. Physically, my body needs a rest soon.	.32	**.43**	.01	.01	.13	.57	.13	.09
12. It will be difficult for me to show interest in other people when I finish working on schoolwork today.	**.75**	.11	-.10	.12	.06	.14	.19	.15
13. When I stop my schoolwork for today I will need more than an hour to begin feeling recovered.	**.71**	.24	-.01	.06	.13	.14	.12	.08
14. When I stop my schoolwork for today, I hope other people will leave me alone for a little while.	**.72**	.07	-.04	.05	.11	.31	.12	.15
15. After working on my schoolwork today I will be too tired to start on other activities.	**.77**	.15	-.05	.07	.08	.24	.08	.05
16. I am having difficulty working on my schoolwork effectively today because I am feeling very tired.	**.37**	.31	-.14	.26	.00	.60	.15	.05
17. I would benefit from doing something un-related to my school work soon.	.15	**.71**	-.07	.06	.09	.18	.01	.00
18. My ability to reach my schoolwork-related goals for today would increase if I could take a break first.	.17	**.79**	-.06	.19	.04	.13	.10	-.01
19. I will lose my ability to stay focused on my schoolwork today unless I take a break soon.	.28	**.69**	-.03	.28	-.07	.14	.14	.00
1. Been upset because of something that happened unexpectedly with your coursework?	.18	.08	-.08	**.69**	.18	.21	-.05	.11
2. Felt that you were unable to control the school-related demands in your life?	.17	.22	-.17	**.67**	.29	.07	.15	.08
3. Felt nervous and stressed about your coursework?	.12	.06	-.05	**.61**	.37	.16	.13	.01
4. Dealt successfully with irritating school-work hassles? **(Reverse)**	.06	-.03	**.50**	.15	.27	.33	-.21	.00
5. Felt confident about your ability to handle your coursework challenges? **(Reverse)**	-.13	.05	**.77**	-.21	.16	-.07	-.09	-.07
6. Felt that you were completing your school-work as desired **(Reverse)**	-.05	.06	**.82**	-.08	-.06	-.07	-.09	-.02
7. Found that you could not cope with all the things that you had to do?	.21	.18	-.27	**.56**	.20	-.11	.30	.05
8. Been able to control irritations related to your courses? **(Reverse)**	-.13	-.09	**.63**	-.26	.10	-.15	.08	.01
9. Felt that you were on top of your coursework? **(Reverse)**	-.04	.01	**.77**	-.07	-.09	-.08	-.18	-.04
10. Been angered because of things that happened in classes that were beyond your control?	.05	.08	.04	**.64**	.08	.06	.10	.13
12. Been able to control the way you spend your time on coursework? **(Reverse)**	-.03	-.12	**.74**	.09	-.06	-.01	-.06	-.03
13. Felt course-related difficulties were piling up so high that you could not overcome them?	.28	.13	-.25	**.57**	.27	.06	.33	.09
1. I am bothered by my fatigue (tiredness).	.24	.23	-.11	.16	.12	**.74**	.27	.07
2. I feel as though I get tired very quickly.	.29	.18	-.15	.25	.09	**.55**	.36	.06
5. I feel physically exhausted.	.22	.25	-.06	.06	.05	**.68**	.37	.00
6. I am having problems starting things.	.10	.05	-.21	.15	.07	.14	**.74**	.05
7. I am having problems thinking clearly.	.29	.22	-.08	.18	.08	.20	**.58**	.11
8. I feel no desire to do anything.	.16	.04	-.10	.12	.01	.23	**.74**	-.03
9. I feel mentally exhausted.	.24	.34	-.09	.09	.25	.37	**.56**	.05
1. People are rude to me on campus.	.11	-.07	-.03	.01	.17	.06	.04	**.71**
2. People do mean things to me on campus.	.07	.01	-.06	.10	.03	.15	-.04	**.86**
3. I get into arguments with other people on campus.	.03	.03	.04	.15	-.12	-.01	.12	**.75**
4. People yell at me as a student on campus.	.18	.03	-.10	.06	-.02	-.06	-.01	**.80**
5. My coursework requires me to work very fast.	.08	.15	.05	.12	**.66**	.07	-.01	.16
6. My coursework requires me to work very hard.	.05	-.01	.16	.31	**.72**	.15	-.04	-.15
7. My coursework leaves me with little time to get things done.	.14	.13	-.13	.25	**.67**	.08	.17	.06
8. There is a great deal of work to be done in college.	.11	.07	.11	.11	**.80**	.03	.06	-.09
9. I have more work than I can do well as a college student.	.19	.29	-.22	.21	**.52**	-.13	.29	.15

Note. $N = 311$; extraction method = Principal Component Analysis with Varimax rotation; Factor structure accounted for 62.65% of the variance. Loadings in **bold** = final factor structure.

The attentional impulsivity items loaded well together on a single factor, but this was not the case with the behavioral impulsivity items. The fourth behavioral impulsivity item was more complex than the other three and its loading reflected its unique status. This item was removed for being too distant from the construct of interest. Similarly, the second and third scenarios were too similar to the procrastination scenarios in terms of content (also reflected in the initial factor loadings). This left the first item, a decision between eating candy or sticking to one's diet, as the lone item measuring this self-defeating behavior.

For the procrastination measure, the first scenario failed to match the underlying construct as well as was initially hoped (i.e., checking email before starting work is a very common behavior and not likely to be strongly linked to a more pervasive tendency to avoid work itself unless carried to the extreme). The other four scenarios, however, loaded cleanly onto a single factor and they were retained.

Although the first escalation of commitment scenario was one commonly used in escalation research (e.g., Arkes & Blumer, 1985), this scenario and its response options were rather extreme and did not fit well with the other two scenarios, which were focused more directly on student academic work demands and projects. Thus, the first scenario was removed and the second and third were retained for the measure of escalation of commitment. This decision was validated by the moderate correlation ($r = .59$, $p < .01$) between this measure score and the second measure of escalation (i.e., participants' percentage ratings of willingness to continue on with the original course of action).

With respect to the self-handicapping scenarios, the fourth item failed to load with the other three scenarios. A review of its content revealed that it was more abstract and distant from the definition of self-handicapping than was initially intended. It was also more likely to be

misinterpreted by participants (as indicated by its negative loading, despite the fact that it was not negatively valenced). For these reasons the first three items in the scenario-based self-handicapping measure were retained.

The factor loadings for the scale measure of self-handicapping also led to item deletions. Several items were associated with potentially legitimate barriers to effective studying and it was felt upon review of the loadings, that these items should be removed for their indirect association with the phenomenon of self-handicapping. This left a set of five items for this scale, all of which loaded cleanly onto a single factor.

The final factor structures including the retained items described in the preceding paragraphs are outlined in Table A5. Clearly several of the scenarios did not function as well as expected. Where necessary the number of items indicating a construct was trimmed to the single best (i.e., most closely related to underlying theory) scenario. In Table A5, the letters along the left side indicate the specific self-defeating behavior and/or cognition that the items to its right represented: A = decision making delay, B = decision making avoidance, C = attentional impulsivity, D = behavioral impulsivity, E = procrastination, F = escalation of commitment, G = self-handicapping (scenario), and H = self-handicapping (scale).

Table A5. Final Factor Loadings for the Self-Defeating Behavior and Cognition Items

	Item	1.	2.	3.	4.	5.	6.	7.
A	1. Apartment decision	.01	-.04	.09	.10	**.67**	.08	-.05
	2. Car decision	-.01	.01	-.03	.02	**.75**	-.02	.05
	3. Opportunity decision	.04	-.07	-.21	-.08	**.63**	-.04	.02
B	1. Dinner decision	-.08	.03	.04	.08	-.02	-.02	**-.72**
C	1. It is difficult for me to stay focused on these questions right now.	**.91**	.09	.06	.07	.03	-.02	.09
	2. My thoughts are wandering a great deal as I try to finish this survey.	**.92**	.06	.05	.00	.02	.01	.06
	3. I am having difficulty concentrating on this	**.93**	.10	.07	.03	.00	-.01	.03
	4. I feel restless right now.	**.80**	.04	.05	.07	.01	.02	.01
D	1. Candy vs. diet	.09	.27	.08	.11	.06	-.17	**.59**
E	2. Study vs. television	.03	**.62**	.10	.09	-.14	.16	.12
	3. Reading plan vs. when necessary	.10	**.73**	.04	.03	.04	-.08	-.01
	4. Paper now vs. later	.01	**.81**	.07	.00	-.05	-.02	.02
	5. Chat vs. work	.15	**.64**	.03	-.07	.03	.29	.15
F	2. Class project	-.05	.15	.02	.04	-.10	**.50**	.48
	3. Team project	-.02	.09	.10	.09	.06	**.77**	-.12
G	1. Computer troubles	.11	.11	.07	**.56**	.18	.36	-.12
	2. Grades posted	.00	.12	.04	**.77**	.04	-.18	.08
	3. Class presentation	.08	-.12	.08	**.76**	-.12	.22	-.07
H	5. I missed an important lecture and this made it difficult to study fully.	.01	.33	**.64**	.07	-.07	-.04	-.04
	7. I do not get enough sleep to study well or take the test well.	.07	.02	**.52**	.48	.05	-.07	.27
	8. My roommate(s) and neighbors are so loud it prevents me from studying.	.01	-.06	**.65**	.13	.14	-.11	.10
	9. I usually study the wrong material for the test, and I was not sure where to start studying for this one.	.13	-.01	**.71**	.09	-.13	.21	-.03
	10. I did not take good notes in the class since the last exam.	.08	.12	**.75**	-.12	-.14	.17	-.07

Note. $N = 311$, extraction method = Principal Component Analysis with Varimax rotation.

Loadings in **bold** = final factor structure.

APPENDIX B: Pilot Study Materials

December 1, 2006

Dear Participant,

Thank you for considering participation in this study of work stress and its positive and negative effects. Before we begin, you should know that your participation is completely voluntary, meaning you have the right to withdraw at any time. This also means that your course grades or general standing within BGSU will not be affected by your decision to participate or not participate. However, you should also know that your responses are considered highly valuable to me. As a small token of my appreciation, your participation in this study will earn you an entry into a raffle for several prizes (e.g., gift certificates to local stores or online retailers). In addition, if you are participating as part of a class requirement, you will also earn course credit, as determined by your instructor.

Your participation in this study will require you to respond to a series of items in the following pages. Completing this questionnaire should take you less than 40 minutes. In responding to the items in this questionnaire you will be asked about your current feelings and perceptions of your behaviors and thoughts. When you are finished with this questionnaire you may either return it directly to me (if this is a group collection session) or you may return it to my campus mailbox in the second-floor Psychology office (labeled "Cunningham").

By signing your name on the line at the bottom of this letter and by completing and handing in this questionnaire, you are indicating your full consent to participate in this study. You are also indicating your permission for me to study your responses carefully as I work to answer my research questions and share these findings with other researchers. Please note that at no time will your name or identification number ever be associated with your responses to the questions asked of you here. Because your confidentiality is protected, I ask that you respond honestly and fully to all of the items in this questionnaire. Without this kind of information, I will be unable to answer the questions this research is designed to address.

I sincerely thank you for your help with this study. If you have any questions, comments, or concerns about this project please contact me by email or phone (information listed below). If you should have questions about the conduct of this study or your rights as a participant in this research, you may also contact the Chair of Bowling Green State University's Human Subjects Review Board at hsrb@bgsu.edu or (419) 372-7716.

Kind regards,

Christopher J. L. Cunningham, MA
E-mail: ccunnin@bgsu.edu
Phone: 419-372-4396
Department of Psychology
Bowling Green State University

I _____ agree to participate in this study, _____
(print your name here) **(your signature)**

NEED FOR RESOURCE RECOVERY

For all of the items on this survey please remember that the only "right" answer is the one that accurately and honestly describes you or reflects how you would respond in each situation. Please write-in any comments you might have about any of the items as you are working your way through this packet. Your feedback will help me to develop these items for future use. Thank you!

- In the following items, "schoolwork" refers to any tasks or responsibilities you have related to your classes and general progress toward your college degree.

How accurate is each of the following statements at describing you *right now*? (Check the appropriate response for each item)

	Not at all accurate	Somewhat accurate	Moderately accurate	Mostly accurate	Completely accurate
1. If I stopped working on my schoolwork right now, I would find it hard to relax.	☐	☐	☐	☐	☐
2. I feel like I need to take a mental break or rest soon.	☐	☐	☐	☐	☐
3. If I stopped working on my schoolwork right now I would feel really worn-out.	☐	☐	☐	☐	☐
4. If I could take some time away from my schoolwork, my energy would return.	☐	☐	☐	☐	☐
5. Trying to finish my schoolwork on time is causing me to feel exhausted today.	☐	☐	☐	☐	☐
6. When I am finished working on schoolwork today I will still feel fresh.	☐	☐	☐	☐	☐
7. I have been working so hard today that I am losing my ability to concentrate on what I am doing.	☐	☐	☐	☐	☐
8. Right now I feel as though I could only relax if I had more than one day away from school.	☐	☐	☐	☐	☐
9. I have been so busy with schoolwork today that I am beginning to feel I am losing control over all the work I have to do.	☐	☐	☐	☐	☐
10. If my schoolwork were finished for today, I would still have trouble concentrating on other things.	☐	☐	☐	☐	☐
11. Physically, my body needs a rest soon.	☐	☐	☐	☐	☐
12. It will be difficult for me to show interest in other people when I finish working on schoolwork today.	☐	☐	☐	☐	☐
13. When I stop my schoolwork for today I will need more than an hour to begin feeling recovered.	☐	☐	☐	☐	☐
14. When I stop my schoolwork for today, I hope other people will leave me alone for a little while.	☐	☐	☐	☐	☐
15. After working on my schoolwork today I will be too tired to start on other activities.	☐	☐	☐	☐	☐
16. I am having difficulty working on my schoolwork effectively today because I am feeling very tired.	☐	☐	☐	☐	☐
17. I would benefit from doing something un-related to my school work soon.	☐	☐	☐	☐	☐
18. My ability to reach my schoolwork-related goals for today would increase if I could take a break first.	☐	☐	☐	☐	☐
19. I will lose my ability to stay focused on my schoolwork today unless I take a break soon.	☐	☐	☐	☐	☐

Note: Reverse item 6.

GENERAL STRESS

For each of the following items, please indicate (by checking in the appropriate box) how often <u>in the last month</u> you have done or experienced each of the following:

	Never	Almost never	Sometimes	Fairly often	Very often
1. Been upset because of something that happened unexpectedly with your coursework?	☐	☐	☐	☐	☐
2. Felt that you were unable to control the school-related demands in your life?	☐	☐	☐	☐	☐
3. Felt nervous and stressed about your coursework?	☐	☐	☐	☐	☐
4. Dealt successfully with irritating school-work hassles?	☐	☐	☐	☐	☐
5. Felt confident about your ability to handle your coursework challenges?	☐	☐	☐	☐	☐
6. Felt that you were completing your school-work as desired?	☐	☐	☐	☐	☐
7. Found that you could not cope with all the things that you had to do?	☐	☐	☐	☐	☐
8. Been able to control irritations related to your courses?	☐	☐	☐	☐	☐
9. Felt that you were on top of your coursework?	☐	☐	☐	☐	☐
10. Been angered because of things that happened in classes that were beyond your control?	☐	☐	☐	☐	☐
11. Found yourself thinking about course-related goals you still have to accomplish?	☐	☐	☐	☐	☐
12. Been able to control the way you spend your time on coursework?	☐	☐	☐	☐	☐
13. Felt course-related difficulties were piling up so high that you could not overcome them?	☐	☐	☐	☐	☐

Note: Reverse items 4, 5, 6, 8, 9, 12

PROCRASTINATION

<u>Instructions</u>: As you read each of the following scenarios, try to clearly visualize each situation. With each situation in mind, respond *honestly* to all questions, selecting the most accurate response for you *right now*.

1) You have just returned to your room and found a voice-mail waiting for you from your project partner in one of your classes. She needs to talk to you as soon as possible about a mistake she found in the report you have both been preparing. The report has to be submitted in four hours (online). **Code: 1, 0, 1**

Based on how you are feeling right now, which of the following would you <u>most likely</u> do?

____ a) I would check my e-mail first and relax for a minute before calling her back.

____ b) I would call her back immediately to find out what the problem is and I would work with her to generate a solution.

____ c) I would catch up with my friends or roommate first and then call her back later.

2) You have an exam tomorrow that you need to study for, but your favorite television shows are on until you usually go to sleep. **Code: 1, 0, 1**
Based on how you are feeling right now, which of the following would you <u>most likely</u> do?

____ a) I would watch all my regular television shows like normal and then try to study afterwards.

____ b) I would focus on studying and plan on talking to my friends about what I missed on television later.

____ c) I would try to study while watching my television shows.

3) You are behind in your reading for one of your toughest classes and you know you need to start catching up soon (the next test is only five days away). You have finally finished all of your work that is due tomorrow. **Code: 1, 1, 0**
Based on how you are feeling right now, which of the following would you <u>most likely</u> do next?

____ a) I would play a computer game or watch TV for awhile and then think about what work to do next.

____ b) I would make a mental note of my reading plan and intend to start reading later.

____ c) I would pull out the textbook for that class and start reading while I was still focused on getting work done.

4) In two weeks you have an important writing assignment due in your least favorite class. You have been meaning to start this assignment for several days now, but you have not made any progress yet. In class your professor reminds everyone that they should be working on this paper already if they hope to finish it on time and to a high degree of quality. **Code: 0, 1, 1**
Based on how you are feeling right now, which of the following would you <u>most likely</u> do?

____ a) I would get started on that paper right away.

____ b) I would think about the paper, but plan on starting actual writing over the next few days.

____ c) I would write the due date in my planner and worry about it when the due date gets closer.

5) You have an assignment to finish today and hand in first thing tomorrow morning. You know this assignment will take you at least three hours to finish. This assignment needs to be you priority right now, but you know it will take a lot of effort to finish it well. **Code: 1, 0, 1**
Based on how you are feeling right now, which of the following would you <u>most likely</u> do when you get back to your room?

____ a) I would check my e-mail or chat with friends for a few minutes.

____ b) I would work on that assignment and finish it before moving on to other activities or assignments.

____ c) I would choose to work on and try to finish another, easier assignment first.

SELF-HANDICAPPING (SCENARIO)

Instructions: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the most accurate response for you *right now*.

1) You are working on a paper for a class and your computer starts freezing up on you repeatedly. You have spent at least five hours on this paper, but are still trying to make sure your points are clear before you hand it in tomorrow. You are very concerned that your grade on this paper will not reflect the amount of time you have spent on it. **Code: 1, 0, 1**

Based on how you are feeling right now, which of the following would you most likely do?

____ a) I would continue to work on this computer and tell my professor that I had technical difficulties while I was working on the paper.

____ b) I would save my files and try to finish on a different computer.

____ c) I would just print what I have finished and hand it in as is; better something than nothing I always say.

2) Grades have just been posted for the exam you took yesterday morning. You notice you did not do nearly as well as you had hoped. **Code: 1, 0, 1**

Based on how you are feeling right now, which of the following would you most likely do?

____ a) I would blame my poor performance on a lack of sleep the night before.

____ b) I would realize that I need to study more for the next exam, because that is probably why I did so poorly on this one.

____ c) I would likely blame the bad grade on the fact I did not understand the material that I was supposed to study.

3) You are giving a presentation in front of your class and you start to forget the points you are supposed to make. You know this is going to reduce your score on this presentation. **Code: 0, 1, 1**

Based on how you are feeling right now, which of the following would you most likely do?

____ a) I would set my pride aside and look at my notes.

____ b) I would start clearing my throat and apologize to the audience about not "feeling well today", and hope that this reduced their eventual criticism.

____ c) I would blame technical difficulties with my presentation equipment for throwing me off-track.

4) You are getting close to the end of the semester and you are starting to evaluate where your grades will be in each of your courses. You are concerned that you will not achieve the grades you had wanted. **Code: 1, 1, 0**

Based on how you are feeling right now, which of the following are you most likely to think?

____ a) I would assume that I am not reaching the grades I had wanted because I simply did not try hard enough and I would use this to explain my final course grades.

____ b) I would think that my low grades are due to a lack of clear instruction by the professors that teach my classes and I would just hope this situation would improve before the semester's end.

____ c) I would realize that my low grades are due to my lack of understanding and that I should try to get my questions answered between now and the end of the semester.

SELF-HANDICAPPING (SCALE)

Assume you have to prepare for a very difficult test that you will be taking tomorrow morning. Your plan is to study for this test after you are done with this questionnaire, but you are worried you may not perform as well on the test as you would like to when the time comes.

Based on how you are feeling right now, how likely is it that you might use each of the following behaviors to explain your eventual test performance **(please check or mark the appropriate response for each item).**

	Not at all likely	Rarely	Sometimes	Fairly likely	Very likely
1. Heavy schoolwork for other courses prevented me from studying more.	☐	☐	☐	☐	☐
2. I had other exams to study for at the same time.	☐	☐	☐	☐	☐
3. I was not feeling well (sickness).	☐	☐	☐	☐	☐
4. Other commitments prevented me from getting enough study time.	☐	☐	☐	☐	☐
5. I missed an important lecture and this made it difficult to study fully.	☐	☐	☐	☐	☐
6. I have a demanding part-time work schedule off-campus that prevented me from studying more.	☐	☐	☐	☐	☐
7. I do not get enough sleep to study well or take the test well.	☐	☐	☐	☐	☐
8. My roommate(s) and neighbors are so loud it prevents me from studying.	☐	☐	☐	☐	☐
9. I usually study the wrong material for the test, and I was not sure where to start studying for this one.	☐	☐	☐	☐	☐
10. I did not take good notes in the class since the last exam.	☐	☐	☐	☐	☐

ATTENTIONAL IMPULSIVITY

The following items require you to evaluate your thoughts and behaviors at the present moment. ***Please answer each item honestly. The only "right" response is the one that accurately reflects the choice you would make in each situation.***

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
1) It is difficult for me to stay focused on these questions right now.	☐	☐	☐	☐	☐
2) My thoughts are wandering a great deal as I try to finish this survey.	☐	☐	☐	☐	☐
3) I am having difficulty concentrating on this survey.	☐	☐	☐	☐	☐
4) I feel restless right now.	☐	☐	☐	☐	☐

BEHAVIORAL IMPULSIVITY

Instructions: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling *right now* (use a check or mark).

1) You are trying to cut back on the amount of sugar you eat every day because it makes you cranky when you are working with other people. Tonight you are heading to a group work meeting for one of your difficult classes. You are bringing some pretzels, but you know there will be plenty of your favorite candy and soda (or pop) at the meeting as well. **Code: 1, 1, 0**

Based on how you are feeling right now, if you were in this situation, which of the following would you most likely do?

____ a) I would eat a large amount of candy.

____ b) I would drink at least one can of soda (or pop).

____ c) I would ignore the candy and remember my diet.

2) You have a 5-10 page essay due tomorrow morning in one of your least favorite classes. As you are working on it, two of your friends stop by to ask you if you want to get some ice cream and then watch a movie. **Code: 0, 1, 0**

Based on how you are feeling right now, if you were in this situation, which of the following would you most likely do?

____ a) I would say, "Sorry, but I need to finish this paper. I will catch up with you both later."

____ b) I would save my work and head out the door for some ice cream.

____ c) I would tell them no to ice cream, but that I would consider a movie if I finished my paper.

3) Tomorrow is going to be a very busy day for you. You know you have three class meetings and a presentation at 1:00 pm, and you would like to fit in some time for exercise or hanging out with friends, plus your meals, then there is your friend's performance at night, and the test that is coming up in two days... **Code: 0, 1, 1**

Based on how you are feeling right now, if you were in this situation, which of the following would you most likely do?

____ a) I would sit down and make a schedule or plan for tomorrow so that everything that I can actually get everything done.

____ b) I would not worry about this list of things to do; I will tackle them as they come up tomorrow.

____ c) I would just mentally plan on getting as much of that done as possible tomorrow.

4) You have a test tomorrow in one of your classes. There are six tests through the semester and you have done fairly well on all of them so far, but the ones coming up will be harder than the ones you have already taken. Two of your friends have decided to skip the test tomorrow to catch a concert in Cleveland. Your favorite band is performing. There is no way to make-up the class exam. **Code: 1, 0, 0**

Based on how you are feeling right now, if you were in this situation, which of the following would you most likely do?

____ a) I would go with my friends and deal with the consequences later.

____ b) I would carefully weigh the consequences of getting a 0 on this test before I made my choice.

____ c) I would talk to the professor first to see what my options would be if I missed this test.

INABILITY TO DELAY GRATIFICATION

Instructions: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling *right now*.

Picture for a moment that you have been given enough money to purchase five lottery tickets...To purchase each ticket you must make a choice between an Option A (awarded tonight) and Option B (not awarded until the end of next month). **Code: A = 1, B = 0**

***For each of the 5 following pairings, please select whether you would pick Option A or B if you needed to buy these tickets right now* (check the Option you choose):**

	Option A (drawing is tonight)	*Option B (drawing is next month)*
1)	☐ 40% chance of winning $500	☐ 80% chance of winning $550
2)	☐ 55% chance of winning $25	☐ 70% chance of winning $30
3)	☐ 10% chance of winning $1000	☐ 20% chance of winning $1500
4)	☐ 75% chance of winning $700	☐ 70% chance of winning $800
5)	☐ 63% chance of winning $10,000	☐ 74% chance of winning $20,000

ESCALATION OF COMMITMENT

Instructions: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling *right now*.

1) You are the Vice President of Operations for a midsized high-tech manufacturing firm. You have spent 5 million dollars of the 10 million dollars in your budget on a research project to develop a radar-scrambling device that would make a ship undetectable by conventional radar. The engineering department has informed you that the project is 90% complete. However, you have just discovered that another firm has already begun marketing another similar product with a much better design (cheaper and easier to operate than yours). **Code: 0, 1**

If you faced this situation right now, which of the following would you most likely choose:

____ a) Quit this project

____ b) Authorize the next 1 million dollars to continue the current project.

Please indicate the degree to which you are willing to continue this project, on a scale from* 0 (No way) to 100% (Absolutely) *willing to continue (fill in the blank):

If I had to make this decision right now, I would be _____ % willing to continue this project.

How confident are you* (between 50% and 100% confident) *that this decision is the right one for your company

I am _____ % confident that this decision is the best one for this company.

2) Imagine you started working on a class project for your most difficult, but favorite class about two weeks ago. You are looking forward to finishing this project soon. The night before it is due you discover that the argument you are making in your written summary of the project does not make logical sense and is likely to earn a low grade. **Code: 1, 1, 0**

If you faced this situation right now, which of the following choices would you <u>most likely</u> make?

____ a) I would just finish the paper the way I started it and hope the professor can understand my points.

____ b) I would try to restate my argument so that my main points were clearer and hope that this would sufficiently clean things up.

____ c) I would start over from scratch and hand in an entirely new paper as soon as I was finished, even if I were to lose a few points for lateness.

Please indicate the degree to which you are willing to continue this project as initially planned on a scale* from 0 (No way) to 100% (Absolutely) *willing to continue (fill in the blank):

If I had to make this decision right now, I would be _____ % willing to continue this project.

How confident are you* (between 50% and 100%) *that this decision is the right one based on this situation?

I am _____ % confident that this decision is the best one for me in this situation.

3) You are leading a group project and you just recently received some negative feedback from your professor about an initial draft of your group's proposed project. You know that everyone in the group put a lot of effort into the original proposal, and they were excited about finishing it as initially planned. You professor says that based on the current work your group has only a 45% chance of getting a good grade on the project when it is finished. **Code: 0, 1, 1**

If you faced this situation right now, which of the following would you <u>most likely</u> do as the project leader?

____ a) I would share the feedback with my team and suggest it is time to start over with a new idea.

____ b) I would share the feedback with my team, but suggest that we continue with our initial idea, but work extra hard to pull it off well.

____ c) I would simply tell the team that the professor is concerned about our idea, and I would ask them to come to the next meeting with ideas for how we can improve our existing idea.

Please indicate the degree to which you are willing to continue this project as you and your team had initially planned on a scale* from 0 (No way) to 100% (Absolutely) *willing to continue (fill in the blank):

If I had to make this decision right now, I would be _____ % willing to continue this project.

How confident are you* (between 50% and 100%) *that this decision is the right one for your team?

I am _____ % confident that this decision is the right one for this team.

DECISION MAKING DELAY

Instructions: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling right now.

1) The deadline for choosing your housing for next year is rapidly approaching. Already you know of two student housing options that fit your price range and offer the following amenities: **Code: 0, 0, 1**

Apartment A	Apartment B
Laundry off-site	Laundry on-site
New carpet	Carpet is 6 years old
All utilities included in rent	No utilities included (you pay for water, gas, electric)
Old kitchen appliances	New kitchen appliances

If you were asked to make your housing decision right now, which of the following would you most likely choose?

____ a) I would sign a lease for Apartment A right now.

____ b) I would sign a lease for Apartment B right now.

____ c) This decision is too difficult right now; I would rather wait and make it later.

How difficult was it for you to make this decision?

Very easy	Somewhat easy	Neither easy nor difficult	Somewhat difficult	Very difficult
☐	☐	☐	☐	☐

2) You need to buy a new car sometime soon and thankfully you just inherited enough money from a rich uncle to make this purchase. After speaking with a local used car dealer you have learned of two options that you could afford with this inheritance: **Code: 0, 0, 1**

Car 1	Car 2
Power doors, windows	Power everything (doors, windows, seats)
Brand new tires	Tires need to be replaced within 8000 miles
< 20 miles per gallon of gas	30 miles per gallon of gas
Stereo with CD player	AM/FM radio only

If you had the option of making this decision right now, which of the following would you most likely choose?

____ a) I would purchase Car 1 right now.

____ b) I would purchase Car 2 right now.

____ c) I would not be able to choose between these two options right now, but I would try to make a choice in the near future.

How difficult was it for you to make this decision?

Very easy	Somewhat easy	Neither easy nor difficult	Somewhat difficult	Very difficult
☐	☐	☐	☐	☐

3) You just won a local radio station's contest and have eight days to decide where to go for an all-expenses-paid Spring Break vacation to an exotic location! **Code: 0, 0, 1**

Location 1	Location 2
Sunny 90% of the time	Sunny 100% of the time
Oceanfront hotel	Lakefront cottage
Exciting nightlife 3 nights a week	Nightlife really on 4 nights of the week

If you faced this choice right now, which of the following would you <u>most likely</u> choose?

____ a) I would choose Location 1 right now.

____ b) I would choose Location 2 right now.

____ c) I would choose to wait and make my choice at a later time.

How difficult was it for you to make this decision?

Very easy	Somewhat easy	Neither easy nor difficult	Somewhat difficult	Very difficult
☐	☐	☐	☐	☐

4) Two opportunities to potentially make a large amount of money have just emerged. You have been asked to make a decision regarding these opportunities: **Code: 0, 0, 1**

Opportunity X	Opportunity Y
High effort required (9 on a 1-10 scale)	Moderate effort required (7 on a 1-10 scale)
Demands at least 15 hours per week	Demands at least 10 hours per week
75% chance you will make a moderate profit	65% chance you will make a large profit

If you faced this situation right now, which of the following would you <u>most likely</u> choose?

____ a) I would go for Opportunity X right now.

____ b) I would go for Opportunity Y right now.

____ c) I would rather think about both opportunities a bit more before deciding.

How difficult was it for you to make this decision?

Very easy	Somewhat easy	Neither easy nor difficult	Somewhat difficult	Very difficult
☐	☐	☐	☐	☐

DECISION MAKING AVOIDANCE

Instructions: We all make lots of decisions on a daily basis. Sometimes these decisions are big and sometimes these decisions are relatively small. The following scenarios challenge you to make a decision right now. Try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling right now.

1) It is dinner time and you are hungry. You go to your regular dining area with friends and need to make a selection. **Code: 0, 1, 1**
Considering how you are feeling right now, what would you most likely do?

____ a) I would search for something totally new that looks interesting to me.

____ b) Instead of searching I would get the same thing that one of my friends chooses.

____ c) I would choose what I usually eat for dinner at the food court.

2) The weekend is rapidly approaching and two of your friends have invited you to join them for a visit to their hometowns. **Code: 0, 1, 1**
Considering how you are feeling right now, what would you most likely do?

____ a) I would carefully consider the positive and negative aspects of spending the weekend with each friend before making a decision.

____ b) I would flip a coin to decide (heads I go the first friend, tails I go with the second friend).

____ c) Choose to stay put for the weekend rather than deciding between the two friends' invitations.

3) You have just been asked to donate a kidney to someone you have never met. This person needs a transplant as soon as possible or death is the likely consequence. **Code: 1, 0, 1**
Considering how you are feeling right now, what would you most likely do?

____ a) I would collect as much information as possible about the risks of donating an organ and then make a decision.

____ b) I would choose to help out immediately.

____ c) I would ask to "sleep on it" and make my decision tomorrow.

Thank you for your participation!

APPENDIX C: Actual Study Materials

February 2007

Dear fellow student,

Thank you for considering participation in this study of work stress and need for recovery. Your participation in this study is voluntary, meaning you may withdraw at any time. This also means that your course grades and general academic standing will not be affected by your involvement with this study. However, your responses are highly valuable to me as a researcher and as a small token of my appreciation your participation in both parts of this study will earn you an entry into a raffle for one of ten $25 gift certificates to online retailers. In addition, if you are participating through a scheduled course, you may also earn extra course credit, as determined by your instructor.

Below is a link to an internet-based survey. If you click this link (or copy it into your web browser), you will be taken to the first page of the first of two surveys for this study. *If you choose to begin this study you are indicating your willingness and consent to participate.* As you work through the first internet survey you will be faced with several decision-making scenarios and situational judgment questions. You will also be asked to make several simple future predictions about your behavior. Finally, you will be asked questions about your personality and general emotions. It will take you less than 45 minutes to complete this first survey. ***You have 48 hours from receipt of this email to complete the first survey. You may do so at any time via the link I have provided you.***

Approximately one week following your completion of the first survey you will receive a personalized email with instructions and a link to the second, final internet survey. PLEASE, DO NOT DELETE THIS SECOND EMAIL until you have completed the second survey. The second survey will be very brief (less than 5 minutes to complete) and will ask you some follow-up information about your earlier predictions. When you submit this second survey your participation in this study will be considered complete. ***The follow-up survey must be completed within 48 hours of receiving the second email with the second survey link.***

When I have your responses to both surveys your name and email address will be entered into a reward raffle (drawing to be held in April 2007). Your name and email information will only be used for this raffle drawing (and it will be deleted when the raffle is complete). All the information you provide can only be accessed by me and the survey itself is administered via a secure departmental server. Given this promise of confidentiality and data security, I ask that you respond honestly and fully to all of the items in these two surveys. I cannot complete this research without your honest and complete responses.

As mentioned above, ***your decision to complete and submit these internet surveys is considered an indication of your willingness to participate in this study.*** If you have any questions, comments, or concerns about this project please contact me by email or phone (information listed below). If you should have questions about the conduct of this study or your rights as a participant in this research, you may also contact the Chair of Bowling Green State University's Human Subjects Review Board at hsrb@bgsu.edu or (419) 372-7716.

Here's the link to the first survey:

http://psych.bgsu.edu/initialsurvey.htm

Kind regards,

Christopher J. L. Cunningham, MA
E-mail: ccunnin@bgsu.edu
Phone: 419-372-4396
Psychology Department
Bowling Green State University
Bowling Green, OH 43403

BGSU HSRB – Approved for Use ID#: H07D114GE7
Effective: 2/16/07 to 11/15/07

PLEASE NOTE: Detailed scoring instructions are given in the manuscript; response options are labeled in this appendix. Details regarding which items were retained for the final analysis are provided in Appendix A

Thank you for agreeing to participate in my study of stress and the ability to work effectively. This survey packet represents the first of two parts to this study. In a week (7 days) you will be contacted regarding this study. This contact will either be in person at one of your classes or via email. At that time you will be asked to share follow-up details regarding the plans you outline below. *Your participation in this study will only be considered complete when your responses to both phases of this study are received. At this point you will receive course credit (if permitted by your instructor) and you will be entered into a raffle drawing for one of several gift certificates at local merchants.*

Please type in your university e-mail address:

Please type in your full name:

INACCURATE PLANNING AND OVERCONFIDENCE

Instructions: For all of the items on this survey please remember that the only "right" answer is the one that accurately and honestly describes you or reflects how you would respond in each situation. In the following items, "schoolwork" refers to any tasks or responsibilities you have related to your classes and general progress toward your college degree.

(1) Please type in one schoolwork-related goal that you intend to finish, complete, or reach within the next week (7 days):

a) How much time (round to nearest hour) do you think it will take you to reach this goal?

b) How confident are you (between 0 and 100%) that you will achieve this goal within this amount of time?

(2) Please identify a second schoolwork-related goal that you intend to finish, complete, or reach within the next week (7 days):

a) How much time (round to nearest hour) do you think it will take you to reach this goal?

b) How confident are you (between 0 and 100%) that you will achieve this goal within this amount of time?

(3) Finally, please identify a third schoolwork-related goal that you intend to finish, complete, or reach within the next week (7 days):

a) How much time (round to nearest hour) do you think it will take you to reach this goal?

b) How confident are you (between 0 and 100%) that you will achieve this goal within this amount of time?

DECISION MAKING DELAY

<u>Instructions</u>: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling right now.

1) The deadline for choosing your housing for next year is rapidly approaching. Already you know of two student housing options that fit your price range and offer the following amenities:

<u>Apartment A</u>
Laundry off-site
New carpet
Cost of water (only) is included in rent
Old kitchen appliances

<u>Apartment B</u>
Laundry on-site
Carpet is 6 years old
Cost of gas (only) is included in rent
New kitchen appliances

If you were asked to make your housing decision right now, <u>how likely would you be to do each of the following</u>?

	Not likely	**Somewhat likely**	**Moderately likely**	**Very likely**	**Completely likely**
A) Sign a lease for Apartment A right now					
B) Sign a lease for Apartment B right now					
C) Wait until later to make this decision					

Non-Delay = A, B; Delay = C

	Very easy	**Somewhat easy**	**Neither easy nor difficult**	**Somewhat difficult**	**Very difficult**
1a) How difficult would this decision be to make right now?					

---

2) You need to buy a new car sometime soon and thankfully you just inherited enough money from a rich uncle to make this purchase. After speaking with a local used car dealer you have learned of two options that you could afford with this inheritance:

<u>Car 1</u>
New tires
Less than 15 miles per gallon of gas
CD player

<u>Car 2</u>
Tires need to be replaced within 8000 miles
More than 30 miles per gallon of gas
AM/FM radio only

If you were asked to make this purchase decision right now, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Purchase Car 1 right now					
B) Purchase Car 2 right now					
C) Try to make a choice in the near future, after I could think about it some more					

Non-Delay = A, B; Delay = C

	Very easy	Somewhat easy	Neither easy nor difficult	Somewhat difficult	Very difficult
2a) How difficult would this decision be to make right now?					

---

3) Two opportunities to potentially make a large amount of money have just emerged. You have been asked to make a decision regarding these opportunities:

Opportunity X
High effort required (9 on a 1-10 scale)
Demands at least 15 hours per week
75% chance you will make a moderate profit

Opportunity Y
Moderate effort required (7 on a 1-10 scale)
Demands at least 10 hours per week
65% chance you will make a large profit

If you faced this situation right now, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Choose Opportunity X right now					
B) Choose Opportunity Y right now					
C) I would rather think about both opportunities some more before deciding					

Non-Delay = A, B; Delay = C

	Very easy	Somewhat easy	Neither easy nor difficult	Somewhat difficult	Very difficult
3a) How difficult would this decision be to make right now?					

DECISION MAKING AVOIDANCE

<u>Instructions</u>: We all make lots of decisions on a daily basis. Sometimes these decisions are big and sometimes these decisions are relatively small. The following scenarios challenge you to make a decision right now. Try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling right now.

1) It is dinner time and you are hungry. You go to your regular dining area with friends and need to make a selection.

Considering how you are feeling right now, <u>how likely would you be to do each of the following</u>?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Search for something totally new that looks interesting to me.					
B) Choose what I usually eat for dinner at the food court.					

Avoid = A, Non-Avoid = B

2) The weekend is rapidly approaching and two of your friends have invited you to join them for a visit to their hometowns.

Considering how you are feeling right now, <u>how likely would you be to do each of the following</u>?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Choose to stay put for the weekend rather than deciding between the two friends					
B) Carefully consider the positive and negative aspects of spending the weekend with each friend before making a decision.					

Avoid = B, Non-Avoid = A

3) You have just been asked to donate a kidney to someone you have never met. This person needs a transplant as soon as possible or death is the likely consequence.

Considering how you are feeling right now, <u>how likely would you be to do each of the following</u>?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Choose to help out immediately					
B) Ask for more time to think about the risks and benefits and make my decision tomorrow					

Avoid = B, Non-Avoid = A

INABILITY TO DELAY GRATIFICATION

<u>Instructions</u>: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling *right now*.

Picture for a moment that you have been given enough money to purchase five lottery tickets. To purchase each ticket you must make a choice between an Option A (awarded tonight) and Option B (not awarded until the end of next month). You are told your chances of winning the amount for each Option.

For each of the 5 following pairings, please select whether you would pick Option A (the first one) or B (the second one) if you needed to buy these five tickets right now:

	Option A (drawing is tonight)	Option B (drawing is next month)
(1) 65% chance of $500 vs. 61% chance of $550	**EV = $325**	**EV = $335.50**
(2) 55% chance of $25 vs. 50% chance of $30	**EV = $13.75**	**EV = $15**
(3) 40% chance of $1000 vs. 35% chance of $1500	**EV = $400**	**EV = $525**
(4) 75% chance of $700 vs. 70% chance of $800	**EV = $525**	**EV = $560**
(5) 10% chance of $10,000 vs. 6% chance of $20,000	**EV = $1000**	**EV = $1200**

ATTENTIONAL IMPULSIVITY

Instructions: The following items require you to evaluate your thoughts and behaviors at the present moment. Please answer each item honestly. The only "right" response is the one that accurately reflects how you are feeling right now.

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
1) It is difficult for me to stay focused on these questions right now.					
2) My thoughts are wandering a great deal as I try to finish this survey.					
3) I am having difficulty concentrating on this survey.					
4) I feel restless right now.					

BEHAVIORAL IMPULSIVITY

Instructions: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling *right now* (use a check or mark).

1) You are trying to cut back on the amount of sugar you eat every day because it makes you cranky when you are working with other people. Tonight you are heading to a group work meeting for one of your difficult classes. You are bringing some pretzels, but you know there will be plenty of your favorite candy and soda (or pop) at the meeting as well.

Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Eat at least some candy or drink at least one can of soda (or pop)					
B) Ignore the candy and remember my diet					

Behavioral Impulsivity = A, Non-impulsivity = B

2) You have a 5-10 page essay due tomorrow morning in one of your least favorite classes. As you are working on it, two of your friends stop by to ask you if you want to get some ice cream and then watch a movie.

Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Say, "Sorry, but I need to finish this paper. I will catch up with you both later"					
B) Stop what I was doing and head out the door for some ice cream					

Behavioral Impulsivity = B, Non-impulsivity = A

3) Tomorrow is going to be a very busy day for you. You know you have three class meetings and a presentation at 1:00 pm, and you would like to fit in some time for exercise or hanging out with friends, plus your meals, then there is your friend's performance at night, and the test that is coming up in two days.
Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Sit down and make a schedule for tomorrow to finish everything on time					
B) Not worry about planning anything; just try to get as much done as possible tomorrow					

Behavioral impulsivity = B, Non-impulsivity = A

4) You have a test tomorrow in one of your classes. There are six tests through the semester and you have done fairly well on all of them so far, but the ones coming up will be harder than the ones you have already taken. Two of your friends have decided to skip the test tomorrow to catch a concert in Cleveland. Your favorite band is performing. There is no way to make-up the class exam.
Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Go with my friends and deal with the consequences later					
B) Carefully consider the consequences of getting a 0 on this test before I made my choice					

Behavioral impulsivity = A, Non-impulsivity = B

PROCRASTINATION

Instructions: As you read each of the following scenarios, try to clearly visualize each situation. With each situation in mind, respond *honestly* to all questions, selecting the most accurate response for you *right now*.

1) You have just returned to your room and found a voice-mail waiting for you from your project partner in one of your classes. She needs to talk to you as soon as possible about a mistake she found in the report you have both been preparing. The report has to be submitted in four hours (online).
Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Check e-mail first and relax for awhile before calling her back					
B) Call her back immediately to find out what the problem is and work with her to generate a solution					

Procrastination = A, Non-procrastination = B

2) You have an exam tomorrow that you need to study for, but your favorite television shows are on until you usually go to sleep.
Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Focus on studying and plan on talking to my friends about what I missed on television later					
B) Watch all my regular television shows like normal and then try to study afterwards					

Procrastination = B, Non-procrastination = A

3) You are behind in your reading for one of your toughest classes and you know you need to start catching up soon (the next test is only five days away). You have finally finished all of your work that is due tomorrow.
Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Make a mental note of my reading plan and intend to start reading later					
B) Pull out the textbook for that class and start reading while I was still focused on getting work done					

Procrastination = A, Non-procrastination = B

4) In two weeks you have an important writing assignment due in your least favorite class. You have been meaning to start this assignment for several days now, but you have not made any progress yet. In class your professor reminds everyone that they should be working on this paper already if they hope to finish it on time and to a high degree of quality.
Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Get started on that paper right away					
B) Think about the paper, but plan on starting the actual writing over the next few days					

Procrastination = B, Non-procrastination = A

5) You have an assignment to finish today and hand in first thing tomorrow morning. You know this assignment will take you at least three hours to finish. This assignment needs to be your priority right now, but you know it will take a lot of effort to finish it well.

Based on how you are feeling right now, if you were in this situation, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Chat with friends for awhile or work on something else first that was more enjoyable					
B) Work on that assignment and finish it before moving on to other things					

Procrastination = A, Non-procrastination = B

ESCALATION OF COMMITMENT

Instructions: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the response that is most appropriate for you based on how you are feeling *right now*.

1) You are the Vice President of Operations for a midsized high-tech manufacturing firm. You have spent 5 million dollars of the 10 million dollars in your budget on a research project to develop a radar-scrambling device that would make a ship undetectable by conventional radar. The engineering department has informed you that the project is 90% complete. However, you have just discovered that another firm has already begun marketing another similar product with a much better design (cheaper and easier to operate than yours).

If you faced this situation right now, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Quit this project					
B) Authorize the next $1 million to continue the current project as planned					

Escalation = B, Non-escalation = A

1a) To what degree (between 0 and 100%) would you be willing to continue this project as initially planned?

---

2) Imagine you started working on a class project for your most difficult, but favorite class about two weeks ago. You are looking forward to finishing this project soon. The night before it is due you discover that the argument you are making in your written summary of the project does not make logical sense and is likely to earn a low grade.

If you faced this situation right now, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Finish the paper the way I started it and hope the professor will understand					
B) Start over from scratch and hand in an entirely new paper when finished, even if I were to lose a few points for lateness					

Escalation = A, Non-escalation = B

2a) To what degree (between 0 and 100%) would you be willing to continue this project as initially planned?

---

3) You are leading a group project and you just recently received some negative feedback from your professor about an initial draft of your group's proposed project. You know that everyone in the group put a lot of effort into the original proposal, and they were excited about finishing it as initially planned. You professor says that based on the current work your group has only a 45% chance of getting a good grade on the project when it is finished.
If you faced this situation right now, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Share the feedback with my team and suggest it is time to start over with a new idea					
B) Share the feedback with my team, but suggest that we continue with our initial idea and work extra hard to pull it off well					

Escalation = B, Non-escalation = A

3a) To what degree (between 0 and 100%) would you be willing to continue this project as your team had initially planned?

SELF-HANDICAPPING (SCENARIO)

Instructions: Before you begin each of the following scenarios, try to clearly visualize each situation as you read it. Once you have the situation in your mind, respond *honestly* to all items by selecting the most accurate response for you *right now*.

1) You are working on a paper for a class and your computer starts freezing up on you repeatedly. You have spent at least five hours on this paper, but are still trying to make sure your points are clear before you hand it in tomorrow. You are very concerned that your grade on this paper will not reflect the amount of time you have spent on it.
Based on how you are feeling right now, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Save my files and try to finish on a different computer					
B) Call it quits, hand in what I could print, and blame the unfinished product on "technical difficulties"					

Self-handicapping = B, Non-self-handicapping = A

2) Grades have just been posted for the exam you took yesterday morning. You notice you did not do nearly as well as you had hoped.
Based on how you are feeling right now, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Blame my poor performance on a lack of sleep the night before					
B) Realize that I truly need to study more for the next exam					

Self-handicapping = A, Non-self-handicapping = B

3) You are giving a presentation in front of your class and you start to forget the points you are supposed to make. You know this is going to reduce your score on this presentation.
Based on how you are feeling right now, how likely would you be to do each of the following?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Set my pride aside and look at my notes					
B) Start clearing my throat and apologize to the audience about “not feeling well today," hoping that this would reduce their eventual criticism					

Self-handicapping = B, Non-self-handicapping = A

4) You are getting close to the end of the semester and you are starting to evaluate where your grades will be in each of your courses. You are concerned that you will not achieve the grades you had wanted.
Based on how you are feeling right now, <u>how likely would you be to do each of the following</u>?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
A) Explain my poor grades by believing that I did not try hard enough					
B) Realize that my low grades are due to my true lack of understanding in these courses					

Self-handicapping = A, Non-self-handicapping = B

SELF-HANDICAPPING (SCALE)

Assume you have to prepare for a very difficult test that you will be taking tomorrow morning. Your plan is to study for this test after you are done with this questionnaire, but you are worried you may not perform as well on the test as you would like to when the time comes.
Based on how you are feeling right now, <u>how likely is it</u> that you might use <u>each</u> of the following behaviors to explain your eventual test performance?

	Not likely	Somewhat likely	Moderately likely	Very likely	Completely likely
1. Heavy schoolwork for other courses prevented me from studying more.					
2. I had other exams to study for at the same time.					
3. I was not feeling well (sickness).					
4. Other commitments prevented me from getting enough study time.					
5. I missed an important lecture and this made it difficult to study fully.					
6. I have a demanding part-time work schedule off-campus that prevented me from studying more.					
7. I do not get enough sleep to study well or take the test well.					
8. My roommate(s) and neighbors are so loud it prevents me from studying.					
9. I usually study the wrong material for the test, and I was not sure where to start studying for this one.					
10. I did not take good notes in the class since the last exam.					

NEED FOR RESOURCE RECOVERY

How accurate is each of the following statements at describing you right now? (Check the appropriate response for each item)

	Not at all accurate	**Somewhat accurate**	**Moderately accurate**	**Mostly accurate**	**Completely accurate**
1. If I stopped working on my schoolwork right now, I would find it hard to relax.					
2. I feel like I need to take a mental break or rest soon.					
3. If I stopped working on my schoolwork right now I would feel really worn-out.					
4. If I could take some time away from my schoolwork, my energy would return.					
5. Trying to finish my schoolwork on time is causing me to feel exhausted today.					
6. When I am finished working on schoolwork today I will still feel fresh. **(Reverse)**					
7. I have been working so hard today that I am losing my ability to concentrate on what I am doing.					
8. Right now I feel as though I could only relax if I had more than one day away from school.					
9. I have been so busy with schoolwork today that I am beginning to feel I am losing control over all the work I have to do.					
10. If my schoolwork were finished for today, I would still have trouble concentrating on other things.					
11. Physically, my body needs a rest soon.					
12. It will be difficult for me to show interest in other people when I finish working on schoolwork today.					
13. When I stop my schoolwork for today I will need more than an hour to begin feeling recovered.					
14. When I stop my schoolwork for today, I hope other people will leave me alone for a little while.					
15. After working on my schoolwork today I will be too tired to start on other activities.					
16. I am having difficulty working on my schoolwork effectively today because I am feeling very tired.					
17. I would benefit from doing something un-related to my school work soon.					
18. My ability to reach my schoolwork-related goals for today would increase if I could take a break first.					
19. I will lose my ability to stay focused on my schoolwork today unless I take a break soon.					

GENERAL STRESS

For each of the following items, please indicate (by checking in the appropriate box) how often in the last month you have done or experienced each of the following:

	Never	Almost never	Sometimes	Fairly often	Very often
1. Been upset because of something that happened unexpectedly with your coursework?					
2. Felt that you were unable to control the school-related demands in your life?					
3. Felt nervous and stressed about your coursework?					
4. Dealt successfully with irritating school-work hassles? **(Reverse)**					
5. Felt confident about your ability to handle your coursework challenges? **(Reverse)**					
6. Felt that you were completing your school-work as desired? **(Reverse)**					
7. Found that you could not cope with all the things that you had to do?					
8. Been able to control irritations related to your courses? **(Reverse)**					
9. Felt that you were on top of your coursework? **(Reverse)**					
10. Been angered because of things that happened in classes that were beyond your control?					
11. Found yourself thinking about course-related goals you still have to accomplish?					
12. Been able to control the way you spend your time on coursework? **(Reverse)**					
13. Felt course-related difficulties were piling up so high that you could not overcome them?					

FATIGUE

How accurate are each of the statements at describing you right now, at this particular moment?

	Not at all accurate	Somewhat accurate	Moderately accurate	Mostly accurate	Completely accurate
1. I am bothered by my fatigue (tiredness).					
2. I feel as though I get tired very quickly.					
3. I have not done much so far today.					
4. I have enough energy for everyday life. **(Reverse)**					
5. I feel physically exhausted.					
6. I am having problems starting things.					
7. I am having problems thinking clearly.					
8. I feel no desire to do anything.					
9. I feel mentally exhausted.					
10. Right now I feel that when I am doing something, I can concentrate quite well. **(Reverse)**					

INTERPERSONAL CONFLICT (1-4) AND QUANTITATIVE WORKLOAD (5-9)

Instructions: These questions refer to your general graduate school experience, including your experiences with coursework and degree progress issues, as well as any assistantship experiences you may have had.

Please rate the frequency with which each of the following statements occurs or is true by selecting one response. There are no right or wrong answers.

	Never	Rarely	Sometimes	Quite often	Very often
1. People are rude to me on campus.					
2. People do mean things to me on campus.					
3. I get into arguments with other people on campus.					
4. People yell at me as a student on campus.					
5. My coursework requires me to work very fast.					
6. My coursework requires me to work very hard.					
7. My coursework leaves me with little time to get things done.					
8. There is a great deal of work to be done in college.					
9. I have more work than I can do well as a college student.					

Please provide the following information:

How old are you? ☐

Are you

☐ Male

☐ Female

Are you a

☐ Freshman

☐ Sophomore

☐ Junior

☐ Senior

PERSONALITY (5-FACTOR TRAITS)

Instructions: What follows is a list of phrases that describe people's behaviors in general. Please indicate how accurately each statement describes you, as you generally tend to be now and not as you might wish to be in the future. Be honest in your description of yourself. Please read each statement carefully and then choose one of the response options that follows it.

	Not at all accurate	Somewhat accurate	Moderately accurate	Mostly accurate	Completely accurate
1. Am the life of the party.					
2. Don't talk a lot. **(Reverse)**					
3. Feel comfortable around people.					
4. Keep in the background. **(Reverse)**					
5. Start conversations.					
6. Have little to say. **(Reverse)**					
7. Talk to a lot of different people at parties.					
8. Don't like to draw attention to myself. **(Reverse)**					
9. Don't mind being the center of attention.					
10. Am quiet around strangers. **(Reverse)**					
11. Feel little concern for others. **(Reverse)**					
12. Am interested in people.					
13. Insult people. **(Reverse)**					
14. Sympathize with others' feelings.					
15. Am not interested in other people's problems. **(Reverse)**					
16. Have a soft heart.					
17. Am not really interested in others. **(Reverse)**					
18. Take time out for others.					
19. Feel others' emotions.					
20. Make people feel at ease.					
21. Am always prepared.					
22. Leave my belongings around. **(Reverse)**					
23. Pay attention to details.					
24. Make a mess of things. **(Reverse)**					
25. Get chores done right away.					
26. Often forget to put things back in their proper place. **(Reverse)**					
27. Like order.					
28. Shirk my duties. **(Reverse)**					
29. Follow a schedule.					
30. Am exacting in my work.					
31. Get stressed out easily.					
32. Am relaxed most of the time. **(Reverse)**					
33. Worry about things.					
34. Seldom feel blue. **(Reverse)**					
35. Am easily disturbed.					

	Not at all accurate	Somewhat accurate	Moderately accurate	Mostly accurate	Completely accurate
36. Get upset easily.					
37. Change my mood a lot.					
38. Have frequent mood swings.					
39. Often feel blue.					
40. Get irritated easily.					
41. Have a rich vocabulary.					
42. Have difficulty understanding abstract ideas. **(Reverse)**					
43. Have a vivid imagination.					
44. Am not interested in abstract ideas. **(Reverse)**					
45. Have excellent ideas.					
46. Do not have a good imagination.					
47. Am quick to understand things. **(Reverse)**					
48. Use difficult words.					
49. Spend time reflecting on things.					
50. Am full of ideas.					

Extraversion = 1-10, Agreeableness = 11-20, Conscientiousness = 21-30, Neuroticism = 31-40, Openness = 41-50

Thank you for your participation in part 1 of this study!
In approximately 7 days you will receive information about the follow-up survey. Please complete that survey within 48 hours of receiving your personalized email invitation. At that point you will automatically be entered into the raffle drawing and awarded extra course credit (if your instructor has approved).

APPENDIX D: Follow-up Survey Materials

March 2007

Dear fellow student,

Thank you for participating in the first portion of my research on work stress and the need for recovery. Your continued participation is voluntary, but very much appreciated. As a reward and thank you, your name will be entered into a drawing for one of ten $25 gift certificates to online retailers as soon as I receive your complete responses to this follow-up survey.

Below is a link to the second and final survey for this study. If you click this link (or copy it into your web browser), you will be taken to the first page of the first of two surveys for this study. *If you choose to begin this study you are indicating your willingness and consent to continue your participation.* As you work through this survey you will be asked to provide follow-up information and details regarding the three schoolwork-related goals you established approximately a week ago when you completed the first survey in this study. The goals you selected are inserted below for your reference. **When you are responding to the follow-up survey, please refer to these goals as they are listed in order.**

This survey will take you less than 5 minutes to complete. ***You have 48 hours from receipt of this email to complete the first survey. You may do so at any time via the link I have provided you.***

As before, your name and email information will only be used for the raffle drawing (and it will be deleted when the raffle is complete). All the information you provide can only be accessed by me and the survey itself is administered via a secure departmental server. Given this promise of confidentiality and data security, I ask that you respond honestly and fully to all of the items in these two surveys. I cannot complete this research without your honest and complete responses. If you have any questions, comments, or concerns about this project please contact me by email or phone (information listed below). If you should have questions about the conduct of this study or your rights as a participant in this research, you may also contact the Chair of Bowling Green State University's Human Subjects Review Board at hsrb@bgsu.edu or (419) 372-7716.

Here's the link to the second survey: http://www.bgsu.edu/psychology/followup.htm

Here are the three goals you listed on last week's survey. Please respond on the survey to these goals in the order in which they are listed in this email:

**

**

**

Kind regards,

Christopher J. L. Cunningham, MA
E-mail: ccunnin@bgsu.edu
Phone: 419-372-4396
Psychology Department
Bowling Green State University
Bowling Green, OH 43403

BGSU HSRB – Approved for Use ID#: H07D114GE7
Effective: 2/16/07 to 11/15/07

Note: Keep the email that directed you to this link — you will need information in it to finish your participation in this study.

About seven days ago you participated in a study regarding your schoolwork-related performance. The last element of your participation in this study is this brief follow-up survey. You will be asked to provide some information related to the three schoolwork-related goals you set one week ago.

Your participation in this project will be considered final once your responses to the following questions are received. At that point you will receive course credit (if permitted by your instructor) and you will be entered into a raffle drawing for one of several gift certificates at local merchants.

Please type in your university e-mail address so that I can connect your responses to the first survey with your responses to the following questions:

Please type in your full name (for credit reporting and raffle drawing):

INACCURATE PLANNING AND OVERCONFIDENCE FOLLOW-UP

Instructions: To access this survey you followed a link that was sent to you in an email. Please have that email with you as you respond to the following questions.

Please type in the first goal you set (listed first in the email that guided you to this survey):

a) Did you finish this goal within the last seven days as you had predicted?

- ☐ Yes
- ☐ No

b) How much time (round to nearest hour) did you actually spend working toward this goal over the last week/seven days?

c) How satisfied are/were you with the finished result of your work toward this goal?

- ☐ Not at all satisfied
- ☐ Somewhat dissatisfied
- ☐ Neither dissatisfied nor satisfied
- ☐ Somewhat satisfied
- ☐ Completely satisfied

Please type in the second goal you set (listed second in the email that guided you to this survey):

a) Did you finish this goal within the last seven days as you had predicted?

- ☐ Yes
- ☐ No

b) How much time (round to nearest hour) did you actually spend working toward this goal over the last week/seven days?

c) How satisfied are/were you with the finished result of your work toward this goal?

- ☐ Not at all satisfied
- ☐ Somewhat dissatisfied
- ☐ Neither dissatisfied nor satisfied
- ☐ Somewhat satisfied
- ☐ Completely satisfied

Please type in the third goal you set (listed last in the email that guided you to this survey):

a) Did you finish this goal within the last seven days as you had predicted?

- ☐ Yes
- ☐ No

b) How much time (round to nearest hour) did you actually spend working toward this goal over the last week/seven days?

c) How satisfied are/were you with the finished result of your work toward this goal?

- ☐ Not at all satisfied
- ☐ Somewhat dissatisfied
- ☐ Neither dissatisfied nor satisfied
- ☐ Somewhat satisfied
- ☐ Completely satisfied

NEED FOR RESOURCE RECOVERY

How accurate is each of the following statements at describing you right now? (Check the appropriate response for each item)

	Not at all accurate	Somewhat accurate	Moderately accurate	Mostly accurate	Completely accurate
1. If I stopped working on my schoolwork right now, I would find it hard to relax.					
2. I feel like I need to take a mental break or rest soon.					
3. If I stopped working on my schoolwork right now I would feel really worn-out.					
4. If I could take some time away from my schoolwork, my energy would return.					
5. Trying to finish my schoolwork on time is causing me to feel exhausted today.					

	Not at all accurate	Somewhat accurate	Moderately accurate	Mostly accurate	Completely accurate
6. When I am finished working on schoolwork today I will still feel fresh. **(Reverse)**					
7. I have been working so hard today that I am losing my ability to concentrate on what I am doing.					
8. Right now I feel as though I could only relax if I had more than one day away from school.					
9. I have been so busy with schoolwork today that I am beginning to feel I am losing control over all the work I have to do.					
10. If my schoolwork were finished for today, I would still have trouble concentrating on other things.					
11. Physically, my body needs a rest soon.					
12. It will be difficult for me to show interest in other people when I finish working on schoolwork today.					
13. When I stop my schoolwork for today I will need more than an hour to begin feeling recovered.					
14. When I stop my schoolwork for today, I hope other people will leave me alone for a little while.					
15. After working on my schoolwork today I will be too tired to start on other activities.					
16. I am having difficulty working on my schoolwork effectively today because I am feeling very tired.					
17. I would benefit from doing something un-related to my school work soon.					
18. My ability to reach my schoolwork-related goals for today would increase if I could take a break first.					
19. I will lose my ability to stay focused on my schoolwork today unless I take a break soon.					

Thank you for participating in this research! Your name and email will be entered into the raffle (drawing to be held in April). If your instructor and I have worked out a deal, you will also earn a bit of extra course credit. If you have any questions about this research, feel free to contact me at ccunnin@bgsu.edu.