

OVER-TIRED AND UNDER CONTROL? SLEEP DEPRIVATION, RESOURCE  
DEPLETION, AND WORKPLACE DEVIANCE

by

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## ABSTRACT

Organizations are increasingly devoting interest towards understanding the causes of workplace deviance behaviors, which include interpersonal aggression, theft, violence, vandalism and sabotage. These behaviors are particularly relevant to organizations, in that the yearly losses due to theft are estimated at over 40 billion dollars for U.S. businesses (Coffin, 2003), and acts of workplace deviance could cost as much as 200 billion dollars annually (Murphy, 1993).

In this research, I integrated theoretical perspectives from psychology and organizational behavior with neurocognitive evidence in order to examine the effects of sleep deprivation on workplace deviance behavior. In particular, I argue that cognitive resource theories offer explanatory power for the proposed linkage between sleep loss and deviant behaviors. Specifically, sleep deprivation was expected to reduce cognitive capacity and self-regulatory ability, and as a result decrease individuals' self-control, increase hostility, and impair moral decisions, which would in turn increase workplace deviance. Finally, proposed methods are presented for two studies. The first study utilized a field sample of shiftworkers with irregular sleep schedules (i.e., nurses). The second study utilized a lab sample of university students who were subjected to sleep deprivation conditions in a controlled environment.

Results largely supported the model in both samples, with the exception of moral reasoning, which was unrelated to sleep deprivation. Sleep deprivation affected self-control and hostility, which were in turn related to deviance, with the exception of self-control and interpersonal deviance in Study 2.

## CHAPTER 1

### INTRODUCTION

Organizational scholars have explored the multi-faceted nature of job performance, expanding the criterion beyond task performance and citizenship behaviors to include counterproductive – or deviant – behaviors (Robinson & Bennett, 1995; Rotundo & Sackett, 2002). Workplace deviance behavior is “voluntary behavior that violates significant organizational norms, and in so doing, threatens the well-being of the organization and/or its members” (Robinson & Bennett, 1995, p. 556). Workplace deviance behaviors, such as theft, interpersonal aggression, violence, vandalism, and sabotage are increasingly of interest to organizations, given that yearly losses due to theft are estimated at over 40 billion dollars for U.S. businesses (Coffin, 2003), and that acts of workplace deviance could cost as much as 200 billion dollars annually (Murphy, 1993). Moreover, an estimated 35 to 75 percent of employees perform at least one deviant act in the course of their career (Coffin, 2003; Harper, 1990). Further, the toll taken on victims of deviance is costly in human terms, as victims are more likely to experience stress-related problems, low morale, damaged self-esteem, increased fear at work (Griffin, O’Leary-Kelly, & Collins, 1998; O’Leary-Kelly, Griffin, & Glew, 1996), and are ultimately more likely to leave the organization (Giacalone, Riordan, & Rosenfeld, 1997).

As such, a growing body of research is concerned with identifying factors that lead to workplace deviance including various contextual, personality, and attitudinal factors (e.g., Glomb & Liao, 2003; Greenberg, 1990; Judge, Scott, & Ilies, 2006; Lee &

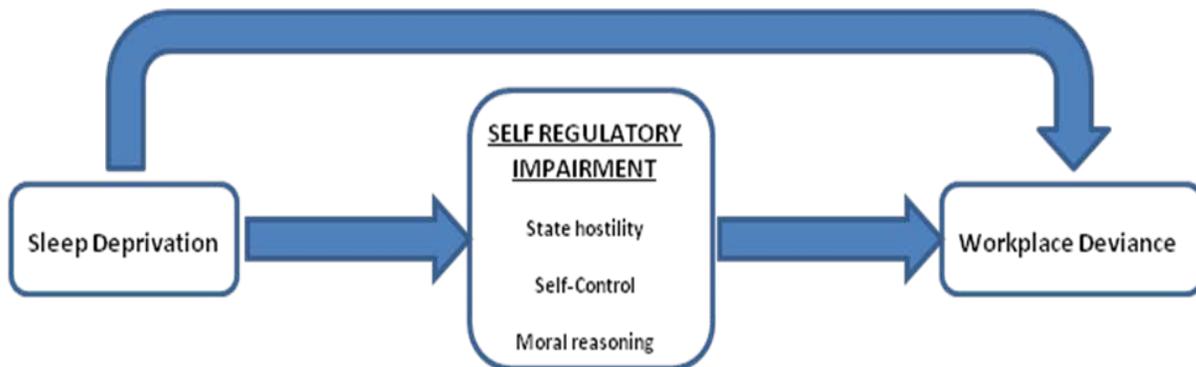
Allen, 2002; Robinson & O'Leary-Kelly, 1998). In this study, I contribute to the literature by examining the effects of sleep deprivation.

Sleep research is becoming increasingly relevant to organizational scholars, as daytime American workers are increasingly required to work late overtime hours or to work at multiple jobs; with the hours worked annually by United States workers increasing steadily over the past several decades (National Institute for Occupational Safety and Health [NIOSH], 2004). Further, people are sleeping less due to rising economic concerns. In 2009 the National Sleep Foundation (NSF) estimated that one third of Americans are losing sleep due to financial and economic distress. The trend towards less sleep is rising rapidly, as the number of Americans who sleep fewer than six hours per night has increased from 13% to 20% (NSF, 2009). This lack of sleep comes at a cost, affecting important work-relevant outcomes such as decision making capability (Harrison & Horne, 2000) and worker health and well-being (NIOSH, 2004). As a result, some companies are beginning to adopt policies that help workers sleep more through promotion of workplace napping or advocating self-help books with sleep tips (Brown, 2004).

I believe that sleep deprivation has an impact on employee deviance. More specifically, in the current research I integrate theoretical perspectives from psychology and organizational behavior with neuropsychological evidence to argue that increased sleep deprivation would lead to increased workplace deviance behavior. I utilize a cognitive resource perspective (e.g., Baumeister, Heatherton, & Tice, 1994) to explain neuropsychological evidence linking sleep with self-regulation and aggressive and

impulsive behaviors (Durmer & Dinges, 2005; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Killgore, Killgore, Day, Li, Kamimori, & Balkin, 2007). Specifically, I argue that sleep-deprived individuals will experience cognitive resource depletion and thus, impairments in key self-regulatory abilities related to modulation of thoughts and emotions (see Figure 1). Borrowing from recent conceptualizations, I define self-regulation as the exertion of control “to override a proponent response, with the assumption that replacing one response with another is done to attain goals and conform to standards” (Vohs, Baumeister, Schmeichel, Twenge, Nelson, & Tice, 2008, p. 884). Therefore, the first purpose of this dissertation is to investigate the link between sleep deprivation and workplace deviance behavior.

FIGURE 1: A cognitive resource depletion model of sleep deprivation and workplace deviance.



The second purpose of this research is to utilize the cognitive resource framework to identify the regulatory variables underlying the link between sleep deprivation and workplace deviance. Specifically, lack of sleep will impair cognitive resources which are necessary in the self-regulation of behavior, negative emotions, and moral reasoning. Accordingly, I argue that the three critical factors underlying the sleep-deviance

relationship are self control, state hostility, and moral reasoning. Self-control was defined as “the ability to override or change one’s inner responses, as well as to interrupt undesired behavioral tendencies (such as impulses) and refrain from acting on them” (Tangney, Baumeister, & Boone, 2004, p. 274). State hostility is a negative emotional state that has been linked to acts of deviance in the workplace (e.g., Judge et al., 2006). Moral reasoning is the ability to make decisions by integrating and applying information regarding accepted social prescriptions and norms.

The remainder of this paper unfolds as follows. First, I discuss workplace deviance, highlighting what is known about its measurement and correlates. Next, I discuss sleep deprivation in organizational research, arguing that a cognitive resource depletion model of sleep deprivation can extend current theoretical models of workplace deviance. Third, I discuss the mediating role of cognitive self-regulatory mechanisms suggested by this model.

## CHAPTER 2

### LITERATURE REVIEW

#### Workplace Deviance

The terms *workplace deviance* and *counterproductive work behaviors* have been used somewhat interchangeably in the literature to refer to a group of behaviors that detract from the goals of the organization (Rotundo & Sackett, 2002). More specifically, workplace deviance refers to behaviors that are (a) voluntary, (b) violate significant organizational norms, and (c) threaten the well-being of the organization and/or its members (Bennett & Robinson, 2000; Robinson & Bennett, 1995).

Building on the work of Hollinger (1986), Robinson and Bennett (1995) developed a typology of deviant behaviors that occur in the workplace. Their study indicated that deviant behaviors fall along two dimensions, the first referring to the target of the behavior (organization or interpersonal) and the second indicating the severity of the behavior. The first dimension has become the focus of more recent work by Bennett and Robinson (2000), who found that workplace deviance consisted of interpersonal deviance, which encompasses personally aggressive behaviors (e.g., making fun of others); and organizational deviance, which encompasses behaviors intended to be detrimental to the organization (e.g., theft). Similar dimensions have been suggested by other researchers (e.g., Sackett & DeVore, 2002; Stewart, Bing, Davison, Woehr, & McIntyre, 2009). The second dimension, severity, has been recognized as more of a quantitative distinction than a qualitative one; whether deviance behaviors are serious or minor does not alter their classification as interpersonal or organizational (Bennett &

Robinson, 2000). As such, researchers most commonly focus on the target dimension, which can vary along a continuum of severity.

While meta-analyses on deviance (Berry, Ones, & Sackett, 2007) and workplace aggression (Hershcovis et al., 2007) suggest that organizational and interpersonal deviance may be viewed as distinct, the current study focuses on overall deviance for four reasons. First, organizational and interpersonal deviance have similar relationships with many correlates (Berry et al., 2007; Hershcovis et al., 2007). Second, almost all of the correlates (with the exception of demographic variables) investigated meta-analytically explained significant variance in both dimensions. Third, the relationship between the two dimensions is strong (e.g.,  $r_c = .86$  in Bennett & Robinson, 2000;  $r_c = .96$  in Lee & Allen, 2002;  $\rho = .62$  in Berry et al., 2007). Fourth, there is little evidence that would theoretically justify the prediction of differential relationships in the current research. Thus, in line with Lee and Allen (2002) and Judge et al. (2006), I do not distinguish conceptually between interpersonal and organizational deviance in my arguments. Thus, I operationalize workplace deviance to include behaviors that are personally aggressive, such as making fun of others, making hurtful or racist remarks, acting rudely or cursing towards others, publically embarrassing someone at work, as well as behaviors harmful to the organization, such as theft, working slowly, withholding effort, substance abuse, and absenteeism.

Workers commit deviant acts because they are motivated to violate and/or, lack motivation to conform to, normative expectations in the workplace (Bennett & Robinson, 2000; Greenberg, 1990, 2002; Stewart et al., 2009). Theories of workplace behavior

suggest that factors that affect performance can be classified into distal and proximal antecedents, based on their relative conceptual distance from actual behavior (Campbell, McCloy, Oppler, & Sager, 1993; Kanfer, 1990; Kanfer & Ackerman, 1989). Distal factors, such as individual differences and contextual variables, are thought to only affect behavior through their effects on proximal state-like factors such as knowledge, skills, and/or motivation. As such, whereas distal factors such as personality characteristics and perceptions of inequity might predispose individuals towards deviance, the enactment of deviant behavior is likely to be driven by mediating psychological states and cognitions.

However, the role of more proximal factors is only beginning to be understood. Deviant acts can be spontaneous reactions to negative affect or emotions, or they can be the result of deliberate cognitive judgments (Bies & Tripp, 1998; Judge et al., 2006; Martinko, Gundlach, & Douglas, 2002; Robinson & Bennett, 1997). Further, Robinson and Bennett (1997) argued that two fundamental motives, expressive and instrumental, underlie the relationships between affect, cognition, and deviant behavior. Affect-related explanations for deviance typically evoke expressive motives, or a need to vent, release, or express outrage, anger, or frustration (Robinson & Bennett, 1997). Many studies have found that negative emotional states are related to interpersonal aggression (see Baron, 1993, for a review). Further, negative emotions are thought to increase incivility in the workplace (Andersson & Pearson, 1999). Negative emotional states such as anger and hostility have been linked to other forms of workplace deviance (Fox, Spector, & Miles, 2001; Judge et al., 2006; Lee & Allen, 2002; Spector & Fox, 2002). Certain emotions appear to impair individuals' abilities to make socially appropriate decisions. For

example, a recent review of emotions and morality found that “moral” emotions such as guilt, shame, and empathy are associated with motivating or interfering with moral thinking and moral behavior (Eisenberg, 2000).

Deviant behavior can also be motivated through deliberate cognitive processing. This is sometimes described as instrumental motivation, which represents a purposeful attempt to “reconcile the disparity by repairing the situation, restoring equity, or improving the current situation” (Robinson & Bennett, 1997). As such, deviance can be the result of a deliberate decision to restore equity through revenge or retaliation (e.g., Bies & Tripp, 1998; Martinko et al., 2002; Robinson & Bennett, 1997). Accordingly, justice perceptions and many other cognitive perceptions of the work context have been found to be distal causes of deviant behavior (e.g., Bennett & Robinson, 2003; Berry et al., 2007; Colquitt, Conlon, Wesson, Porter, & Ng, 2001; Fox et al., 2001; Hershcovis et al., 2007; Judge et al., 2006; Lee & Allen, 2002). Much of this research makes the implicit assumption that perceived unfairness causes individuals to make a volitional decision to rectify a disparity, whereby they may undertake cognitive sensemaking processes in order to determine their behavior as a response to perceived mistreatment (Olson-Buchanan & Boswell, 2008).

Thus, decisions and judgments can be thought of as more proximal mediators of the effects of more distal factors. Trevino (1986) noted that cognitions such as moral reasoning processes interact with situational and individual difference factors to influence immoral behavior at work. Indeed, research suggests that more proximal cognitive factors could be related to decisions and intentions to act in a deviant manner. For example,

intelligence might affect deviance through its effects on moral reasoning capabilities and decision-making (Dilchert, Ones, Davis, & Rostow, 2007). Unusual or demanding moral decisions require deliberate cognitive processes (Reynolds, 2006). Dilchert and colleagues (2007) postulated that deviant behavior could be related to the ability to resolve complex moral dilemmas or to evaluate the potential future consequences of their actions. Indeed, research shows that moral reasoning is related to an individual's propensity to perform counterproductive acts at work (Greenberg, 2002).

An individual's ability to self-regulate – or to control or inhibit – their negative emotions, thoughts, and behaviors is likely to have a proximal impact on the extent to which that individual acts in a normatively inappropriate manner. Although studies have found that trait self-regulatory ability (i.e., self-control) has an impact on deviance at work (e.g., Marcus & Schuler, 2004), an emerging body of research suggests that self-regulatory capacity is a limited, fluctuating resource, and can be depleted by various factors that induce fatigue (Muraven & Baumeister, 2000; Muraven, Tice, & Baumeister, 1998), such as sleep deprivation.

## CHAPTER 3

### MODEL AND HYPOTHESES

#### Sleep Deprivation

Sleep is a homeostatic process that has a restorative affect on the brain whereby the amount of previous sleep impairs or increases the subsequent alertness of an individual, such that too little sleep is detrimental (Saper, Scammell, & Lu, 2005; Weinger & Ancoli-Israel, 2002). Sleep schedule disruption can result in either total or partial sleep deprivation, which is defined as a state of reduced capacity induced by a deficiency of sleep (Barnes & Hollenbeck, 2009). Total sleep deprivation is the result of at least one night of no sleep, but also can refer to multiple consecutive nights without sleep. These conditions are likely to occur for some shiftworkers and medical professionals who often work consecutive shifts with no sleep. Partial sleep deprivation is the result of interrupted or shortened sleep, which amounts to less than 6 hours of sleep in a 24-hour period (Pilcher & Huffcutt, 1996). This type of sleep deprivation occurs across occupations, and can be work-related, due to job stress, scheduling, or high workload, or can be the result of sleep-related disorders, stimulating medications, or lifestyle factors such as a new baby (Weinger & Ancoli-Israel, 2002).

Sleep deprivation is widely known to have deleterious effects on human functioning. In fact, when measures of mood, cognition, and motor functioning are collapsed together, evidence indicates that the mean level of functioning for sleep-deprived individuals is around the 9<sup>th</sup> percentile of non-sleep-deprived individuals (Pilcher & Huffcutt, 1996). Although both total and partial sleep deprivation have been

found to impair cognitive processing, mood, and motor skills, Pilcher and Huffcutt, in their meta-analysis, found that the effects of partial and total sleep deprivation are comparable. Given that both partial and total sleep deprivation conditions are likely to occur across occupations and that their effects are comparable, the current research focuses on both partial and total sleep deprivation.

From a neurocognitive perspective, the effects of sleep deprivation on human functioning occur as a result of decreased brain functioning, particularly in the prefrontal cortex region of the brain (Durmer & Dinges, 2005; Harrison & Horne, 2000). This region of the brain is a critical set of neocortical structures that are part of a network of “attention control” areas in the brain (Durmer & Dinges, 2005), and is implicated in the ability to make judgments and decisions, control emotions, and to inhibit behaviors (Damasio, 1994; Miller, 2000). Because the prefrontal cortex appears to have an important role in effortful, planned, and reasoned action, it is often referred to as having “executive” or “supervisory” control over the self-regulation of behavior (Baumeister & Vohs, 2003; Jennings, Monk, & Van der Molen, 2003). Indeed, the effects of damage to the prefrontal cortex are most pronounced for tasks that require cognitive control (Miller, 2000). Impairment or damage to the prefrontal cortex has been found to be related to increased negative emotions and poor emotion regulation (Davidson, Putnam, & Larson, 2000), impaired reasoning ability (Killgore et al., 2007), and antisocial behaviors such as deceitfulness, aggression, and violence (Anderson, Bechara, Damasio, Tranel, & Damasio, 1999; Grafman, 1996; Raine, Lencz, Bihrlé, LaCasse, & Colletti, 2000). As such, an emerging area of research involves the exploration of the link between the

prefrontal cortex and anti-social and deviant behavior (Treviño, Weaver, & Reynolds, 2006).

Neuropsychological and brain imaging studies indicate that even one night of sleep deprivation is enough to result in impairment of the prefrontal cortex region (Drummond, Brown, Gillin, Stricker, Wong, & Buxton, 2000; Drummond, Brown, Stricker, Buxton, Wong, & Gillin, 1999; Horne, 2000; Thomas et al., 2000) through reduced metabolic activity (Dahl & Lewin, 2002; Pilcher & Huffcutt, 1996). The prefrontal cortex loses its ability to process and utilize glucose, which is critical to its functioning (Thomas et al., 2000). The impairments typically seen in sleep-deprived individuals are consistent with the prefrontal cortical impairment hypothesis and are often relatively severe (Pilcher & Huffcutt, 1996). Also, the ability to self-regulate behavior appears to decrease, as a lack of adherence to social norms and the display of interpersonally inappropriate behaviors such as aggression are often reported in sleep-deprived individuals (Horne, 1993; Kahn-Greene, Lipizzi, Conrad, Kamimori, & Killgore, 2006). For example, Kahn-Greene and colleagues (2006) found that after 55 hours of wakefulness, participants responded to frustrating scenarios with higher levels of aggression and decreased willingness to behave in a socially facilitative manner.

Sleep deprivation also results in increased negative mood and emotions. Pilcher and Huffcutt (1996) found that the effects of sleep deprivation were more strongly related to mood than to cognitive or motor impairment. In particular, studies indicate that sleep deprived individuals tend to exhibit fatigue, irritability, hostility, anger, and rage (Harrison & Horne, 2000; Pilcher & Huffcutt, 1996). Further, sleep loss can heighten the

experience of negative emotional reactions to unpleasant events, and decrease the experience of positive emotions in response to pleasant ones (Zohar, Tzischinsky, Epstein, & Lavie, 2005).

Finally, sleep deprivation has been found to lead to decrements in cognitive processing, and as a result, reduced decision quality in amoral (Harrison & Horne, 1999, 2000) and moral decisions (Greene et al., 2001; Killgore et al., 2007). Further, when deprived of sleep, individuals make more impulsive decisions (Reynolds & Schiffbauer, 2004), and are more likely to focus on short term gains rather than considering long-term consequences (Harrison & Horne, 1998, 2000; Killgore, Thomas, & Nancy, 2006). Harrison and Horne (1998) found that sleep-deprived subjects were less concerned with negative consequences when faced with high rewards during a complex strategy task. More recently, Killgore and colleagues (2007) found that 53 hours of total sleep deprivation resulted in decrements in the prefrontal cortex, which lead to a reduced ability to integrate complex emotional and cognitive information when confronted with moral dilemmas. As a result, participants who were sleep-deprived made less appropriate decisions on moral reasoning tasks.

Taken together, the evidence indicates that sleep deprivation increases aggressive interpersonal and antisocial behavioral tendencies, which will likely lead to higher rates of violence, interpersonal aggression, theft, sabotage, and other acts of deviance. Thus, I hypothesize that:

*Hypothesis 1. Sleep deprivation will increase the incidence of workplace deviance behaviors.*

## Cognitive Resource Depletion and Self-Regulation

Given the above arguments, the effects of sleep deprivation on deviant behavior are likely due to factors that have been identified in the extant psychological literature that investigates the executive function of the self, which is analogous to the cognitive mechanisms performed by the prefrontal cortex (Baumeister & Vohs, 2003). Much of the literature utilizes a cognitive resource framework to describe an individual's ability to control their behavior (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister & Vohs, 2003; Kahneman, 1973; Muraven & Baumeister, 2000; Zohar, Tzischinski, & Epstein, 2003). This perspective suggests that cognitive energy is finite, and can be thought of as a consumable pool of resources that enable people to activate information processing structures and to monitor behaviors (Kahneman, 1973). Evidence suggests that this pool of cognitive energy is used in many different acts of self-regulation and executive control, rather than functioning narrowly for one specific purpose (Schmeichel, Vohs, & Baumeister, 2003). Cognitive energy can be depleted by a wide range of circumstances that evoke self-control (Muraven et al., 1998; Vohs et al., 2008), emotion control (Muraven et al., 1998; Tice, Bratslavsky, & Baumeister, 2001) and information processing, reasoning, and logic (Schmeichel et al., 2003).

This suggests that individuals have a limited capacity for self-regulation (Muraven et al., 1998). Self-regulation refers to the cognitive processes that enable control of thoughts, emotions, and behaviors (Bandura, 1999; Carver & Scheier, 1981, 1998; Kanfer, 1990; Karoly, 1993; Muraven & Baumeister, 2000). Self-regulation represents an individual's ability to inhibit behaviors and impulses that otherwise might

impede goal attainment or violate social norms (Baumeister et al., 1994; Muraven & Baumeister, 2000). While some view self-regulation as a facilitator of goal-directed behavior (e.g., Kanfer, 1990; Kanfer & Ackerman, 1989; Porath & Bateman, 2006), I draw from social psychological research and view self-regulation as a process that constrains and inhibits socially or personally inappropriate behaviors (e.g., Muraven & Baumeister, 2000; Muraven et al., 1998). For example, self-regulation inhibits impulses to act aggressively, display inappropriate emotions, or to engage in criminal behaviors (DeWall, Baumeister, Stillman, & Gailliot, 2007; Gross, 1998; Gross & Levenson, 1997; Marcus & Schuler, 2004).

Empirical research indicates that self-regulatory operations are interrelated because they draw on the same cognitive resource pool (Muraven & Baumeister, 2000; Muraven et al., 1998). The modulation of emotions, cognitions and behaviors appear to be intertwined, such that exertion in one domain results in impairment in the other (Richards & Gross, 2000; Schmeichel et al., 2003; Tice & Bratslavsky, 2000; Tice et al., 2001; Vohs et al., 2008). Resource models suggest that when cognitive resources are limited, an individual's capacity to engage in self-regulation is depleted. As noted by Kanfer and Ackerman (1989), "the beneficial consequences of self-regulation can only be obtained when there are significant cognitive resources for engaging in self-regulatory activity itself."

Self-regulation can be considered from a trait perspective, as individuals appear to have relatively stable levels of self-control and ability to manage their emotions, thoughts, and behaviors; or from a state perspective, as regulatory abilities fluctuate as a

function of cognitive resource availability at any given time (DeWall et al., 2007; Gailliot, Schmeichel, & Baumeister, 2006). Evidence suggests that whereas individuals have a relatively stable level of self-regulatory capacity, they also likely to experience depletion in their ability to self-regulate when cognitive processing is occupied by complex tasks or decisions, under conditions of stress, or when previous regulatory efforts have recently taken place (DeWall et al., 2007; Gailliot et al., 2006; Muraven et al., 1998). To integrate the trait and state perspectives, Murhaven and Baumeister (2000) suggested that self-regulation is analogous to a “muscle” in the sense that some individuals have higher levels of self-regulatory strength and thus larger pools of cognitive energy from which to draw, but that this strength is expended in the process of self-regulation.

Circumstances that limit the availability of cognitive resources are likely to result in state self-regulation failures. In this sense, the neurocognitive evidence of a relationship between sleep deprivation and the executive functioning of the prefrontal cortex (e.g., Durmer & Dinges, 2005) converges with the social psychological evidence supporting cognitive resource models (e.g., Muraven & Baumeister, 2000). This convergence suggests that cognitive resource availability is directly linked to the functioning of the prefrontal cortex and that resource depletion is really a metaphor for prefrontal cortical impairment (Gailliot et al., 2007). Therefore, sleep deprivation impairs the prefrontal cortex, and reduces the cognitive resources available for self-regulation.

In support, research has shown that self-regulation failures such as increases in deviant acts tend to occur late in the day, when people are fatigued from making

decisions (Baumeister & Vohs, 2003). In a study investigating the effects of sleep from a cognitive resource perspective, Zohar and colleagues (2005) found that the intensity of medical residents' emotional responses to events requiring self-regulation was influenced by sleep loss. Additionally, research supports the proposition that lack of sleep impairs the replenishment of cognitive resources that are available for self-regulation (Sonnentag, Binnewies, & Mojza, 2008), and processes that require executive attention (Jennings et al., 2003). In the next section, I derive specific hypotheses for three mechanisms – behavioral (self-control), emotional (state hostility), and cognitive (moral reasoning) – through which self-regulatory failures occur as the result of sleep deprivation, leading to workplace deviance behavior. These three categories of self-regulatory mechanisms are selected to be representative of the range of self-regulatory processes, which include the modulation of thought, attention, affect, and behavior (Gailliot et al., 2007; Karoly, 1993).

*Self-control.* In the broad sense, self-regulatory capacity and self-control are used interchangeably to refer to the same concept (Karoly, 1993), which describes the cognitive resources necessary to enable the exertion of control over behaviors (Baumeister et al., 1994; Muraven & Baumeister, 2000). Self-control is often conceptualized as an individual difference (e.g., Gibbs, Giever, & Martin, 1998; Gottfredson & Hirschi, 1990; Marcus & Schuler, 2004; Sarchione, Cuttler, Muchinsky, & Nelson-Gray, 1998). Trait self-control appears to facilitate the inhibition of aggression and many other forms of workplace deviance (Bordia, Restubog, & Tang, 2008; Douglas & Martinko, 2001; Marcus & Schuler, 2004; Sarchione et al., 1998). However, in other

studies, self-control has typically been assessed by measuring behavioral outcomes that demonstrate the degree to which individuals are able to resist temptation on tasks that require willpower or restraint (e.g., Gailliot et al., 2007; Muraven & Baumeister, 2000; Muraven et al., 1998). Given evidence that self-control fluctuates within individuals across time (DeWall et al., 2007; Gailliot et al., 2006), I utilize a state conceptualization of self-control to refer to an individual's level of self-control at a given point in time.

Sleep deprivation is likely to lead to depletion of self-control. From a neurocognitive perspective, the prefrontal cortex experiences impaired functioning from lack of sleep due to reductions in glucose metabolism (Dahl & Lewin, 2002; Pilcher & Huffcutt, 1996). Recent social psychological evidence indicates that a baseline level of bloodstream glucose is necessary for self-control (Gailliot et al., 2007; Masicampo & Baumeister, 2008). Gailliot and colleagues (2007) conducted nine studies using experimental tests that required various forms of cognitive self-control such as thought suppression, emotion regulation, and attention control in addition to several interpersonal measures of behavioral self control such as helping others, stifling prejudice during an interracial interaction, or coping with thoughts of death. Their findings support the idea that self-control could be related to glucose metabolism in the brain. First, they found that self-control reduced levels of glucose in the bloodstream, which impaired performance on a subsequent behavioral self-control task. Second, they found that consumption of glucose restored participants' ability to exert self-control.

In another study, Masicampo and Baumeister (2008) found that when one group of participants were given lemonade with sugar (i.e., glucose) and another group of

participants were given lemonade sweetened with a placebo (i.e., Splenda), the group given glucose performed better on a subsequent decision task that required effortful cognitive processing. These researchers concluded that the same resource responsible for self-control was utilized by the effortful decision-making task, and that this resource must rely on glucose to function effectively. Taken together, these studies indicate that the prefrontal cortex requires glucose to exert executive control over behavior. Thus, given the evidence that sleep deprivation reduces the ability of the prefrontal cortex to process glucose, combined with the evidence that sleep-deprivation results in disinhibition and lack of self-control (e.g., Harrison & Horne, 2000). I hypothesize:

*Hypothesis 2: Sleep deprivation will reduce self-control.*

In terms of workplace deviance, empirical evidence indicates that high self-control allows individuals to suppress or inhibit interpersonal aggression or potentially destructive impulses (DeWall et al., 2007; Tangney et al., 2004). DeWall and colleagues (2007) found that state self-control and trait self-control interact such that individuals with low trait levels who also have depleted state levels are most likely to express intentions to behave aggressively as a response to provocation. Self-control helps individuals react appropriately to stressful circumstances that could invoke retaliation. For example, Finkel and Campbell (2001) found that low self-control was negatively related to the ability to react constructively, rather than destructively, to destructive behaviors from others. In addition, low levels of self-control are linked to substance abuse, poor interpersonal relationships, and criminal behavior (Tangney et al., 2004). The general theory of crime (Gottfredson & Hirschi, 1990) suggests that low trait self-control

is the primary determinant of criminal behavior. Indeed, studies in criminology indicate a robust relationship between low self-control and criminal, aggressive or deviant behaviors (Avakame, 1998; Cherek, Moeller, Dougherty, & Rhoades, 1997; Cochran, Wood, Sellers, Wilkerson, & Chamlin, 1998; Gibbs et al., 1998; Longshore, 1998; Longshore & Turner, 1998). Further, self-control has been linked with cheating. Mead, Baumeister, Gino, Schweitzer, and Ariely (2009) conducted an experimental study and found that when participants performed a task requiring the exertion (and thus depletion) of self-control and were given the opportunity to cheat on a subsequent task (i.e., grading their own answers for payment), they were more likely to succumb to temptation and cheat than participants who did not have depleted self-control.

These findings appear to generalize to the workplace. People with high self-control are less aggressive towards others at work (Latham & Perlow, 1996) and are less likely to perform counterproductive or deviant work behaviors (Bordia et al., 2008; Douglas & Martinko, 2001; Marcus & Schuler, 2004; Sarchione et al., 1998). Given evidence supporting the relationship between self-control and deviant outcomes, I hypothesize:

*Hypothesis 3a: Self-control will decrease workplace deviance.*

As I have argued, sleep deprivation will lead to increased workplace deviance. This will occur because sleep deprivation will deplete cognitive resources which will result in decreased state self-control. Because I also argue that state self-control will be positively related to workplace deviance, I hypothesize:

*Hypothesis 3b: Self-control will partially mediate the relationship between sleep deprivation and workplace deviance.*

*Hostility.* The regulation of moods and emotions is a basic function of self-regulatory systems and represents a complex cognitive process by which individuals modulate the emotions they experience, when they experience them, and how they experience and express them (Gross, 1998). According to Gross, individuals may engage in regulatory strategies at different times in the emotion generation process. An emotional event begins with an evaluation of internal and external cues, and one of two broad classes of regulation strategies may be employed either before the emotion is elicited or during the actual emotional response. The first, antecedent focused, is characterized by anticipating cues which are potentially emotion-evoking before they occur. Cognitively reappraising a situation as a challenge rather than a hindrance to decrease its emotional relevance would constitute an antecedent focused strategy. Individuals can also regulate their emotions *during* the actual experience of emotion. Another strategic time to regulate emotion can also occur during emotion expression. Response focused emotion regulation uses strategies that affect ongoing experience and expression of emotion, and is commonly referred to as suppression (Gross, 1998; Gross & Levenson, 1997). Although both types of emotion regulation strategies effectively inhibit the expression of emotions, only antecedent-focused regulation inhibits the actual experience of the emotion (Gross, 1998). Because the current study is concerned with the internal mechanisms that drive workplace deviance, I focus on the ability of people to regulate their own emotional experiences.

The range of human emotional experience can be considered on a continuum, where emotions are discrete momentary feelings that are usually associated with a specific event, moods are more enduring and diffuse, and dispositional affect is a stable, relatively invariant trait (e.g., Brief & Weiss, 2002). In the current study, I am concerned with negative emotions such as anger, hostility, and irritability (Watson, Clark, & Tellegen, 1988) because discrete emotions tend to result from events occurring in the workplace, and are typically considered to be more intense which makes them likely to directly impact behavioral outcomes (Weiss & Cropanzano, 1996).

As noted earlier, empirical evidence indicates a strong relationship between sleep deprivation and subsequent feelings and expression of fatigue, irritability, hostility, anger, and even rage (Harrison & Horne, 2000; Lavidor, Weller, & Babkoff, 2003; Pilcher, Ginter, & Sadowsky, 1997; Pilcher & Huffcutt, 1996; Samkoff & Jacques, 1991; Sonnentag et al., 2008; Totterdell, Reynolds, Parkinson, & Briner, 1994; Zohar et al., 2005). For example, Zohar and colleagues (2005) found that medical residents who experienced sleep loss had more intense emotional reactions to disruptive or unforeseen stressors. Also, following sleep loss, adolescents often report lowered control over their moods, such that they might be more likely to cry when saddened or more likely to experience anger when frustrated (Dahl & Lewin, 2002).

Given that the ability to regulate emotions involves the prefrontal cortex (Davidson et al., 2000; Urry et al., 2006), the neurological impairment resulting from lack of sleep is likely to result in a decreased ability to suppress or control emotional states. Moreover, because emotion regulation requires self-regulatory resources, and depletion

of these resources has been shown to undermine emotion regulation (Baumeister et al., 1998; Finkel & Campbell, 2001; Gailliot et al., 2006; Muraven et al., 1998), negative emotions experienced following sleep deprivation will be difficult to suppress and will more likely be expressed (Scott & Judge, 2006; Sonnentag et al., 2008). For instance, Zohar and colleagues (2003) found that negative emotions are more likely to be experienced following a goal-disruptive event only when cognitive resources are limited. Thus, due to lack of ability to regulate and control the experience of negative emotions, sleep-deprived individuals will have a heightened propensity to experience negative emotions, leading to the following hypothesis:

*Hypothesis 4: Sleep deprivation will increase hostility.*

When negative emotions are experienced, two processes are enacted that may lead to deviance. First, the experience of negative emotion causes individuals to devote short-term priority to emotion regulation, often leading to a failure to achieve other self-regulatory goals such as behavioral self-control (Tice & Bratslavsky, 2000; Tice et al., 2001; Vohs & Heatherton, 2000). People prioritize regulating negative emotions over other regulatory processes because they are motivated to feel better (Tice & Bratslavsky, 2000; Tice et al., 2001). For example, Tice and colleagues (2001) found that when students were induced to believe that their bad mood would not change as a result of impulsive, self-gratifying behaviors, the students stopped performing such behaviors. However, when the students believed that impulsive behaviors would help increase their mood (as people normally do), they engaged in them freely. Thus, negative emotions are likely to lead individuals to commit impulsive, potentially deviant behaviors that they

expect will relieve their negative feelings. Indeed, research suggests that individuals engage in deviant behaviors at work in order to retaliate against a negative organizational event or perceived unfairness (e.g., Bies & Tripp, 1998; Martinko et al., 2002; Robinson & Bennett, 1997).

Second, because the energy required to control emotions is drawn from the same pool of cognitive resources used in the self-regulation of behavior (Tice & Bratslavsky, 2000; Tice et al., 2001; Vohs et al., 2008), expending these resources to regulate negative emotions will lead other attempts at self-regulation to suffer. Studies indicate that negative emotions result in difficulty controlling violent tendencies (Zillmann, 1993) and impulses (Marlatt, 1985). In addition, individuals with low levels of self-control are more likely to respond to anger-evoking situations with outwardly aggressive behaviors (Tangney et al., 2004). Combined with the evidence that workplace deviance is driven to a large extent by negative emotions such as hostility and anger (Fox et al., 2001; Judge et al., 2006; Lee & Allen, 2002), I hypothesize:

*Hypothesis 5a: Hostility will increase the incidence of workplace deviance.*

As I have argued, sleep deprivation will be positively related to workplace deviance. Sleep-deprived individuals will have reduced cognitive resources which will result in decreased ability to regulate hostility. Because I also argue that state hostility will be positively related to workplace deviance, I hypothesize:

*Hypothesis 5b: Hostility will partially mediate the relationship between sleep deprivation and workplace deviance.*

*Moral reasoning.* Sleep deprivation could also lead to workplace deviance behaviors through the impairment of moral reasoning. I define moral reasoning as the ability to make moral judgments by integrating and applying moral and ethical information. By the terms moral and ethical, I refer to qualities that are dictated by accepted social prescriptions and norms. As such, moral reasoning can involve decisions about behaviors such as lying, cheating, or stealing (cf. Reynolds & Ceranic, 2007; Treviño et al., 2006). Moral reasoning is the cognitive process that helps an individual determine right from wrong (Reynolds & Ceranic, 2007).

According to cognitive moral development theory, individuals move through developmental stages during which their moral reasoning abilities become more sophisticated over time (Kohlberg, 1969). This theory postulates a direct relationship between cognitive capacity and moral reasoning, as individuals are only able to make sophisticated moral judgments as their cognitive capacity improves with age (Treviño et al., 2006). Empirical studies have found that moral reasoning is affected by a number of factors including individual differences such as locus of control (Treviño & Youngblood, 1990), ego strength (Treviño, 1986), empathy, and cynicism (Detert, Treviño, & Sweitzer, 2008). Also, contextual features of the work environment and social influence have been shown to affect moral reasoning (Peterson, 2002; Treviño et al., 2006; Treviño & Youngblood, 1990).

Researchers have proposed several reasons why the ability to make moral judgments requires cognitive processing capacity (Dilchert et al., 2007; Kohlberg, 1969). First, moral reasoning requires the ability to recognize the norms and rules that govern

society (Gottfredson & Hirschi, 1990; Wilson & Hernstein, 1985). Second, ethical decisions require the ability to consider the potential long-term consequences of judgments, which is difficult for individuals with low cognitive resources (Lubinski, 2000). Third, the failure to fully process and consider all of the morally-relevant information available is related to immoral decisions (Treviño et al., 2006), and the use of heuristics, rationalizations, and cognitive biases have been shown to have deleterious effects on moral reasoning (Detert et al., 2008; Messick & Bazerman, 1996). Researchers have proposed that executives make immoral decisions because they succumb to cognitive biases such as failing to fully consider the consequences or utilizing heuristic information when making moral judgments (Messick & Bazerman, 1996).

Because sleep deprivation has adverse effects on information processing capability (Harrison & Horne, 2000) and cognitive resource availability, moral reasoning should be impaired. Indeed, limitations in working memory and conscious processing ability can limit the brain's ability to attend to information (Kahneman, 1973; Kanfer & Ackerman, 1989). When cognitive resources are depleted, individuals will likely take cognitive shortcuts and make quick and automatic judgments when making decisions (Masicampo & Baumeister, 2008). Research has shown that sleep-deprived individuals are more likely to make quick impulsive judgments (Reynolds & Schiffbauer, 2004) and are less likely to attend to long-term consequences of their behaviors, instead focusing on immediate short-term benefits (Harrison & Horne, 1998, 2000).

Moral judgments and decisions often require deliberate cognitive processing which occurs in the prefrontal cortex (Reynolds, 2006). Functional magnetic resonance

imaging techniques (fMRI) suggest the importance of the prefrontal cortex in moral reasoning (Greene et al., 2001). Accordingly, sleep-deprived individuals have been found to exhibit impaired moral reasoning (Killgore et al., 2007). Given that sleep deprivation will result in poor information processing and impulsive decisions, I hypothesize:

*Hypothesis 6: Sleep deprivation will reduce moral reasoning.*

Although many workplace deviant behaviors have a moral component, they are not necessarily immoral (Bennett & Robinson, 2000; Robinson & Bennett, 1995, 1997). However, given that deviant acts are outside the range of acceptable social behavior, the majority of workplace deviance behaviors such as theft, aggression, or sabotage involves some degree of moral reasoning.

Indeed, moral reasoning has been linked to workplace deviance. Greenberg (2002) found that an employee's stage of moral development was related to their decisions to steal from an organization when they were underpaid. Also, Reynolds and Ceranic (2007) found that moral judgment was negatively related to deviant behavior, in the form of cheating. Cognitive resource availability has been linked to moral behavior in the sense that individuals with high levels of self-regulatory ability are better able to resist impulses and maintain determination to follow their moral convictions (Eisenberg, 2000; Treviño, 1986). Given their finding that cognitive ability is negatively related to workplace deviance, Dilchert and colleagues (2007), argue that moral reasoning mediates this relationship in the sense that individuals with lower cognitive ability have less capacity for making complex moral judgments. Given that poor moral judgment results in

deviant behaviors and that the ability to process complex moral information is impaired by sleep deprivation, I hypothesize:

*Hypothesis 7a: Moral reasoning will reduce workplace deviance.*

Sleep deprivation is hypothesized to have a positive relationship with workplace deviance. The reduced cognitive resources available to sleep-deprived individuals will decrease moral reasoning. Because I also expect that moral reasoning will be negatively related to workplace deviance, I hypothesize:

*Hypothesis 7b: Moral reasoning will partially mediate the relationship between sleep deprivation and workplace deviance.*

## CHAPTER 4: RESEARCH METHODOLOGY

### STUDY ONE

#### Sample

Sample 1 consisted of 171 nurses from a major medical center in the Southwestern United States. Eighty-two percent of the sample was female and seventy-five percent were white. Forty-two percent were between 21-30 years of age.

#### Recruitment

Recruitment took place under the supervision of the head of nursing research, who presented an overview of the study to the clinical leaders of each unit. Subsequently, the study authors contacted each clinical leader to arrange for a time for a brief presentation of the study. Clinical leaders then informed the nursing staff of the study, and that they would receive a payment of \$20 for their participation in the surveys, and that if they wished to participate, they should arrive to work 10 minutes earlier than usual. The response rate was 90%.

#### Procedure

During the study, a researcher was present in the morning and in the evening to distribute surveys. Nurses only participated on one day. Nurses received Survey 1 (*sleep deprivation, self-control, and hostility*) at the beginning of their shift. After a period of 12 hours (or one work-shift), the same nurses received Survey 2 (*workplace deviance and control variables*). These surveys were linked together using a self-issued identification number (issued at the time of taking Survey 1) in order to maximize confidentiality.

#### Measures

*Sleep deprivation.* The nurses were asked to indicate the number of hours that they slept on the night before the survey. Specifically, the respondents were instructed to indicate the exact hours during which they were asleep using a series of check-boxes for each hour of the day. As discussed in the introduction, we used the definition of partial sleep deprivation suggested by Durmer and Dinges (2005) in their review of the neurocognitive consequences of sleep loss. As such, I considered an individual to be sleep deprived if they had slept 6 hours or less in the night previous to the survey.

*Self-control.* State self-control was assessed using the State Depletion Scale (Twenge, Muraven, & Tice, 2004). This 25-item scale assesses perceptions of the momentary availability of self-regulatory resources, and has been used to measure state self control depletion (Gailliot et al., 2006). Items were scored using a 5-point scale from 1 = *very slightly or not at all* to 5 = *very much*. Sample items include “I feel like my willpower is gone”, and “my mental energy is running low” ( $\alpha = .96$ ). Items were coded such that high scores indicated higher levels of self-control.

*Hostility.* State hostility was assessed using the hostility subscale of the Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clark, 1994). Participants were asked to indicate the extent to which they had experienced a particular emotion in the past hour using a 5-point scale from 1 = *very slightly or not at all* to 5 = *very much*. The six items for hostility included “angry,” “hostile,” “irritable,” “scornful,” “disgusted,” and “loathing” ( $\alpha = .87$ ).

*Moral reasoning.* Moral reasoning was assessed using a measure of unethical decision making developed by Detert and colleagues (2008). This measure consists of

eight ethically-charged scenarios. Before the instructions, the survey contained the disclaimer that “Remember, there are no incorrect answers. Please answer using ‘truthful responses’ rather than those that you might believe to be more desirable. All answers were kept completely confidential and will only be accessed by the researcher.” The instructions were “to read each scenario and evaluate how likely it is that you would engage in the behavior described” using a 7-point scale ranging from 0 (*not at all likely*) to 6 (*highly likely*). All scenarios were slightly modified to apply to nursing (rather than students). A sample scenario is “You work as a nurse for a large hospital at the University of Arizona. You're alone in the office making copies and realize you're out of copy paper at home. You therefore slip a ream of paper into your bag” ( $\alpha = .79$ ).

*Workplace deviance.* Workplace deviance was assessed using 17 items from Bennett and Robinson’s (2000) measure. Two items were eliminated from the original 19 item scale because they were inapplicable in my sample (i.e., “Dragged out work to get overtime” and “Falsified a receipt to get reimbursed for more money than you spent on business expenses”). Participants were asked to indicate “how often they had engaged in the behavior today” using a 5-point scale from 1 = *never* to 5 = *often*. Sample items include “Worked on a personal matter instead of work for your employer,” “Said something hurtful to someone at work,” “Came in late to work without permission,” “Intentionally worked slower than you could have worked,” and “Acted rudely towards someone at work” ( $\alpha = .86$ ).

*Control variables.* I controlled for four variables related to sleep deprivation. Because I am concerned with the effects of acute sleep deprivation (rather than chronic

sleep deprivation), I measured *sleep debt*, or the number of hours that they slept on the two nights preceding the survey. Research shows that chronic sleep loss can have adverse effects on human functioning over and above the effects of acute sleep deprivation (e.g., Cohen et al., 2010). I also assessed the number of hours since waking (*hour awoke*) on the day of the survey to control for the effects of wakefulness. In order to control for individual differences in *sleep requirement*, I assessed the average number of hours each participant believed that he or she needed in a night to feel rested. Also, *chronic insomnia* (i.e., trouble falling asleep and trouble staying asleep) was assessed in order to control for effects of acclimation to sleep loss. I also controlled for two variables that are related to workplace deviance. *Trait negative affect* was assessed using the PANAS-X (Watson & Clark, 1994) because of its potential relation with deviance (Lee & Allen, 2002). I also controlled for *gender*, because research shows that men are more likely to commit acts of deviance at work than are women (Berry et al., 2007).

## CHAPTER 5: RESEARCH METHODOLOGY

### STUDY 2

#### Overview

I collected a second sample from a group of laboratory participants for several reasons. First, the data enabled me to manipulate sleep deprivation. Second, this type of design enabled a test of the effects of total sleep deprivation rather than partial sleep deprivation. Third, a lab study allows for more appropriate causal inference because of the use of random assignment and the manipulation of the independent variable. Thus, replication in the lab presents a strong case for the elimination of spurious variables and reverse-causality as explanations for the findings using Sample 1 and better tests the internal validity of our hypothesized model. Finally, I was able to examine behavioral measures of many of the variables of interest.

#### Sample and Procedure

Sample 2 consisted of 75 junior and senior business students at a large university in the Southwestern United States. The average age of participants was 21.5 (s.d. = 4.42), and forty-eight percent were female. Participants were recruited for the study using an online sign-up system in the business college. The online system administered a survey screening potential participants for cigarette use and physical and psychological problems that might increase their risk of suffering ill-effects from sleep deprivation (e.g., sleep disorders, heart problems, anemia, epilepsy, brain damage, clinically-diagnosed psychological disorders). Once participants with health problems were screened out (33 were eliminated), the remaining non-smoking participants were randomly assigned to

condition. Upon assignment, participants were notified of the opportunity to sign up for study times offered for their particular condition.

Breakfast was served to all participants at 8:30am on the day of the study. No caffeine or high sugar foods were served. At 9:00am, participants completed the *self-control* task (described below), and a questionnaire assessing their current level of *hostility*. Participants also completed the manipulation check for (no) sleep deprivation in addition to a brief sleep questionnaire, which assessed the quality and amount of sleep over the 2 nights preceding the study.

After finishing the survey, participants in both conditions were informed that the next phase of the study involved the completion of three tasks, described in more detail below. First, participants drafted email responses to fictitious undergraduate students who were interested in applying to the Eller College at University of Arizona. Second, participants completed an 11-item measure of mathematical reasoning and grammatical ability. Third, participants completed an “in-basket” exercise designed to simulate decisions that an executive would make on a regular basis. Each task assessed behaviors associated with workplace deviance, including interpersonally deviant acts such as aggression and rudeness, and organizational deviant acts such as theft and cheating.

#### Manipulation

I adapted the manipulation from Harrison and Horne (1999), using a between-subjects design. Participants in both conditions (Sleep Deprivation [SD] or No Sleep Deprivation [NSD]) underwent the experiment in groups of 6-10. All participants received course credit for their participation. Also, all participants were paid for their

performance on one of the tasks ( $M = \$8.50$ ,  $s.d.$ ,  $\$1.64$ ). Participants in the sleep deprivation condition were paid an additional \$60 for their participation, conferred at the end of the study during debriefing.

In the SD condition, participants were instructed to arrange for a friend or family member to come to pick them up upon completion of the study. Before the day of the study, all SD participants received an email with instructions to prepare for the study by: (a) not taking naps the day of the study, (b) not bringing their own food or beverages to the lab, (c) not drinking alcohol the night before the study, (d) to get normal sleep two nights before the study and (e) to wake at no later than 9:00 am the day of the study to ensure at least 24 hours of sleep deprivation. The SD participants entered the lab at 10:00 pm on Day 1, and completed all measures and tasks between 9:00 am and 12:00 pm on Day 2. During SD, participants were confined to a lounge with board games, TV, books, magazines, and snacks available.

The control group (NSD) was instructed in an email sent before the study to (a) get normal sleep – no less than 7 hours – for three nights before the study (b) not bring their own food or beverages to the lab, (c) not drink alcohol the night before the study, (d) not eat any food or drink any caffeinated beverage before arriving in the lab and (e) not use any stimulants such as nicotine on the morning of the study. The NSD participants entered the lab at 8:30am on the day of the study. At this point, all participants (SD and NSD) underwent the procedure described above, beginning with breakfast served at 8:30 am.

## Measures

*Self-control.* I used the method described by (Vohs et al., 2008) for behaviorally measuring state self-control. Participants were taken to individual rooms and asked to perform simple but tedious arithmetic problems for “as long as they felt like”. They were instructed to indicate that they could stop once they had “quit, finished, or given up” on the problems. The more time that participants spent on the problems, the higher their state self-control (Vohs & Heatherton, 2000)<sup>1</sup>.

*Hostility.* State hostility was assessed using the hostility subscale of the Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clark, 1994). Participants were asked to indicate the extent to which they had experienced a particular emotion in the past hour using a 5-point scale from 1 = *very slightly or not at all* to 5 = *very much*. The six items for hostility included “angry,” “hostile,” “irritable,” “scornful,” “disgusted,” and “loathing” ( $\alpha = .82$ ).

*Moral reasoning.* Moral reasoning was assessed using a measure of unethical decision making developed by Detert and colleagues (2008). This measure consists of eight ethically-charged scenarios. Before the instructions, the survey contained the disclaimer that “Remember, there are no incorrect answers. Please answer using ‘truthful responses’ rather than those that you might believe to be more desirable. All answers will be kept completely confidential and will only be accessed by the researcher.” The instructions were “to read each scenario and evaluate how likely it is that you would engage in the behavior described” using a 7-point scale ranging from 0 (*not at all likely*) to 6 (*highly likely*). A sample scenario is “You work as a research assistant at the

University of Arizona. You're alone in the office making copies and realize you're out of copy paper at home. You therefore slip a ream of paper into your bag" ( $\alpha = .78$ ).

*Interpersonal deviance.* Interpersonal deviance was assessed using an email task in which participants were seated at individual computer stations. The experimenter explained that the Eller College had developed an electronic mentoring program as a resource for prospective business-school applicants where they could contact upper-level business students with questions about the school and its programs. Participants were told they will be pilot testing this resource by accessing a temporary email account that contained two emails written by prospective students in the inbox. They were then instructed to respond to the emails however they deemed appropriate. Although participants were made to believe the emails were real, all participants responded to the same two fictitious emails, (a) "*Dear Eller Mentor, I am just curious about the classes they offer. I am planning on paying my own way thorough (sic) college and I am wondering if there are any classes that are a waste of my time and money there and if so why? Thanx—Raj*" and (b) "*Are the (business school's) students stuck up like it seems or are the some nice ones? Not to be rude, but I don't really care much about getting in there anyway and so I am not even sure why im (sic) here*" - jill).

Participants' responses were coded for interpersonal deviance. The lead researcher and a graduate assistant who were blind to condition rated participant responses using a coding system based on the Bennett and Robinson (2000) measure. Both coders were trained to rate interpersonal deviance using a behaviorally-anchored rating scale (BARS) ranging from 1 (low deviance) to 5 (high deviance). Using this scale,

coders used the construct definition: ridicule, making fun, saying hurtful things, ethnic, religious, or racial remarks, cursing, rudeness, or embarrassing remarks. The two coders coded a 20-email subset of the 150 total emails together in order to achieve consensus on the rating system through discussion. Once consensus had been reached, each coder next coded a separate subset of 20 emails in order to establish inter-rater reliability. This was sufficient (Cohen's  $\kappa = .82$ ; see Landis & Koch, 1977) so the remaining 110 emails were divided between the two coders. Because the scores on the emails were significantly correlated ( $r = .48, p < .01$ ), I created a composite variable by averaging the scores on the two emails for each participant.

*Theft.* Theft was assessed following Vohs and Schooler (2008). Eleven multiple-choice questions, written to closely resemble items that one would encounter on the Graduate Management Admissions Test quantitative section (e.g., If a cube has a surface area of 216, what is its volume?), and verbal section where instructions asked participants to identify errors in an underlined portion of a sentence provided and choose a replacement for that portion (e.g., Scarecrows are strange because they are not really scary, neither are they crows.) were administered to participants. Participants were informed that they had 25 minutes to complete the test and would receive \$1 for each problem that they solved correctly.

The experimenter informed the participants that the test was proprietary (owned by Educational Testing Services) and therefore it was not appropriate to keep a record of their scores, but that it was fine to use for practice purposes. As such, participants were informed that they needed to score their own work and pay themselves \$1 for each

correct answer from an envelope (which contained \$12), and to tear up and discard their answers before leaving the room. Once the participants completed their tests, the experimenter returned to the lab to count the money remaining in each envelope and assess how much money each participant had taken.

*Cheating.* Cheating was assessed using a set of in-basket exercises. The in-basket exercises consisted of a set of memos and emails, reproduced to simulate actual documents that a manager might encounter upon returning from a vacation. The participants received instructions to read each document, and subsequently to make decisions on how to most appropriately handle dilemmas such as scheduling conflicts and human resource issues. Each in-basket task consisted of a scenario description, 3 memos, and a set of questions. Participants will be instructed to work on the tasks for 30 minutes total, and to place their completed tasks in “in-box” trays (labeled “Exercise 1” and “Exercise 2” upon their completion. Participants were also informed that Exercise 1 was a practice exercise, and that they would receive \$5 for “A” grades (90% or better) on Exercise 2.

On the in-basket exercise, participants had the opportunity to cheat: A stack of graded tasks (with the top marked clearly as 100% correct) were placed within view. The experimenter announced that he will leave the room and return in 25 minutes at the end of the task. Participants worked in separate rooms, where there were two in-box trays to place completed exercises. In each tray, a small stack of completed “dummy” exercises, ostensibly left-over from earlier participants, were clearly within view. These completed “dummy” exercises were graded, and the top exercise in the Exercise 2 tray was marked

as 100% correct (the exercises in the Exercise 1 tray was marked 66%). Participants encountered a question on the second exercise that was impossible to complete:

“Managers often use severity analysis to determine the importance of particular issues, and the order in which they should be handled. Weighting each document by importance, calculate the severity index for each situation. For example, if the document is the most important (3) and will take 2.5 hours to complete, the severity index would be  $3 \times 2.5 = 7.5$ . Below, calculate the severity index for each document.” There were three questions of this type, each worth one point, and without a correct answer on each, participants were unable to earn the \$5. Because of the almost infinite range of possible values for each “severity index”, participants who filled in the blanks for the “severity indices” for each document with the “correct” arbitrary values contained in the dummy exercise cheated on the task. Cheating was assessed using a scale from 0 to 3, based on the number of copied answers.

CHAPTER 6  
STUDY 1 RESULTS

Table 1 provides the means, standard deviations, and correlations between the Study 1 variables.

TABLE 1: Means, Standard Deviations, and Correlations Among Study One Variables

Variable	Mean	s.d.	1.	2.	3.	4.
1. Sleep Deprivation	.42	.49	-			
2. Self-Control	2.18	.73	-.11	-		
3. State Hostility	1.36	.53	.25**	-.33**	-	
4. Moral Reasoning	2.71	1.07	-.02	-.29**	-.19*	-
5. Workplace Deviance	1.36	.37	.17*	-.20**	.44**	-.38**

$n = 171$

\* $p < .05$

\*\* $p < .01$

#### Tests of Hypotheses

Table 2 shows the results of the hierarchical regression analyses testing my hypotheses. In the first step, I entered the control variables, finding that sleep requirement, trait negative affect, and gender significantly affected workplace deviance.

Hypothesis 1 proposed that sleep deprivation would positively affect workplace deviance. As shown in Table 2, when I entered sleep deprivation in the second step of the hierarchical regression, it was significantly related to workplace deviance over and above the effects of the control variables ( $\beta = .16, p < .05$ ), supporting Hypothesis 1.

I proposed that the effects of sleep deprivation on workplace deviance would be mediated by self-control, hostility, and moral reasoning. I followed the procedures outlined by Baron and Kenny (1986) in order to test the hypotheses related to this proposition, entering the control variables shown in Table 2 as a first step in all analyses. According to Baron and Kenny, the first criterion requires that the independent variable is significantly related to the dependent variable which, as noted above, was supported.

Hypotheses 2, 4, and 6 were that sleep deprivation would significantly affect self-control, hostility, and moral reasoning. The second criterion for mediation requires that the effects of the independent variable on the mediating variables are significant. Regression analyses indicated that sleep deprivation significantly affected self-control ( $\beta = -.16, p < .05$ ) and hostility ( $\beta = .27, p < .01$ ), but not moral reasoning ( $\beta = -.06$  ns). Thus, Hypotheses 2 and 4 were supported, but Hypothesis 6 was not.

Hypotheses 3a, 5a, and 7a were that self-control, hostility, and moral reasoning would affect deviance. Regression analyses indicated that deviance was significantly affected by self-control ( $\beta = -.26, p < .01$ ), hostility ( $\beta = .38, p < .01$ ), and moral reasoning ( $\beta = -.30, p < .01$ ). Thus, Hypotheses 3a, 5a, and 7a were supported.

Finally, Hypotheses 3b, 4b, and 7b were that the effects of sleep deprivation on deviance would be mediated by self-control, hostility, and moral reasoning. Thus, to satisfy Baron and Kenny's third requirement, I examined whether the effects of sleep deprivation on workplace deviance were reduced significantly when self-control and hostility were entered simultaneously in the presence of sleep deprivation. Moral reasoning was not entered in the second step for any analysis because it was not related to

sleep deprivation. As shown in the third step in Table 2, self-control significantly affected workplace deviance ( $\beta = -.17, p < .05$ ), as did hostility ( $\beta = .33, p < .01$ ), and the effects of sleep deprivation on workplace deviance became non-significant in the presence of the two mediators ( $\beta = .04, ns$ ).

TABLE 2: Mediated Regression Results for Effect of Sleep Deprivation on Workplace Deviance in Study One

Variable	Workplace Deviance		
	Step 1	Step 2	Step 3
<i>Controls</i>			
Sleep Debt	.06	.08	.10
Hour Awoke	.12	.10	.05
Sleep Requirement	-.28**	-.25**	-.28**
Chronic Insomnia	-.13	-.16*	-.14
Trait Negative Affect	.31**	.33**	.12
Gender	-.19*	-.19*	-.18*
<i>Main effect</i>			
Sleep Deprivation		.16*	.04
<i>Mediators</i>			
Self-Control			-.17*
Hostility			.33**
Moral Reasoning			na <sup>a</sup>
Total R <sup>2</sup>	.18**	.20**	.31**
$\Delta R^2$	.18**	.02*	.12**

$n = 171$ . All coefficients are standardized regression coefficients.

<sup>a</sup>Moral reasoning was not entered in this step, as it was not related to sleep deprivation

\*  $p < .05$

\*\*  $p < .01$ .

To test the significance of the indirect effect of sleep deprivation through self-control and hostility, I used Preacher and Hayes' (2008) approach to examining multiple mediation models in regression. Preacher and Hayes developed this procedure as an extension of the Sobel test (Sobel, 1982) for testing indirect effects in models that include

more than one mediator. In such models, the researcher is concerned not only with the significance of the total indirect effect (through both mediators) on the dependent variable, but also with the significance of specific indirect effects. The advantage of this simultaneous approach is that one can test the extent to which each hypothesized mediator mediates the effect of the independent variable on the dependent variable in the presence of other mediators in the model. This reduces the likelihood of parameter bias due to omitted variables and enables one to compare the relative magnitudes of the indirect effects. As recommended by Preacher and Hayes (2008) and others (e.g., Shrout & Bolger, 2002; Williams & MacKinnon, 2008), I estimated the indirect effects using unstandardized coefficients from the full model (i.e., the third step in the regression model) and utilized bootstrapping procedures with 1000 resamples to place 95% confidence intervals (CIs) around the estimates of the indirect effects. An indirect effect is significant at  $p < .05$  when the 95% CI does not include zero (Shrout & Bolger, 2002). Results indicated that the indirect effect of sleep deprivation on workplace deviance was significant through self-control (coefficient = .02, 95% CI = .003, .051) and hostility (coefficient = .07, 95% CI = .019, .154). Finally, the total indirect effect was significant, with a coefficient of .09, and the 95% CI did not include zero (.035, .184), providing support for Hypotheses 3b and 4b but not for Hypothesis 7b.

CHAPTER 7  
STUDY 2 RESULTS

Table 3 provides the means, standard deviations, and correlations between the Study 2 variables.

TABLE 3: Means, Standard Deviations, and Correlations Among Study Two Variables

Variable	Mean	s.d.	1.	2.	3.	4.	5.	6.
1. Sleep Deprivation	.49	.50	-					
2. Self-Control	328.87	198.69	.54**	-				
3. Hostility	1.32	.41	.43**	.33**	-			
4. Moral Reasoning	3.75	1.11	.12	.17	-.18	-		
5. Theft	8.52	1.64	.28*	.39**	.41**	.01	-	
6. Interpersonal Deviance	2.35	.94	.27*	-.14	.32**	.35**	.16	-
7. Cheating	1.05	1.26	.23 <sup>†</sup>	-.20 <sup>†</sup>	.26*	.25*	.15	.16

$n = 75$ .

<sup>†</sup>  $p = .05$

\* $p < .05$

\*\* $p < .01$

#### Manipulation Check

In order to examine the effectiveness of the manipulation, participants completed a manipulation check for (no) sleep deprivation in addition to a brief sleep questionnaire, which assessed the quality and amount of sleep over the 2 nights preceding the study. 100 percent of the participants in the sleep deprivation condition reported 0 hours of sleep in the night preceding the study ( $M = 0.00$ ,  $s.d. = 0.00$ ), whereas 100 percent of the control subjects reported at least 7 hours (range = 7 to 10 hours,  $M = 8.00$ ,  $s.d. = .75$ ). There were

no significant differences between conditions in terms of sleep two nights before,  $F(1) = .01$ , *ns*, or three nights before,  $F(1) = .28$ , *ns*.

### Tests of Hypotheses

A counterbalanced pre-test was given to each participant in order to verify that there were no differences in terms of performance on the GRE used in the theft task, which was confirmed. The control group ( $M = 8.22$ ) and the sleep deprived group ( $M = 8.08$ ) did not perform significantly differently on the GRE test,  $F = .11$  (1), *ns*.

Hypothesis 1 proposed that sleep deprivation would positively affect workplace deviance. As shown in Table 4, when I entered sleep deprivation in the first step of my hierarchical regression, it significantly affected both theft ( $\beta = .28$ ,  $p < .05$ ), interpersonal deviance ( $\beta = .27$ ,  $p < .05$ ), and cheating ( $\beta = .23$ ,  $p = .05$ ) supporting Hypothesis 1.

I proposed that the effects of sleep deprivation on workplace deviance (theft, interpersonal deviance, and cheating) would be mediated by self-control, hostility, and moral reasoning. I followed the procedures used in Study 1 in order to test these hypotheses. As indicated by Hypothesis 1, sleep deprivation was significantly related to both theft, interpersonal deviance, and cheating.

Hypotheses 2, 4, and 6 were that sleep deprivation would significantly affect self-control, hostility, and moral reasoning, respectively. As shown in Table 3, sleep deprivation was significantly related to self-control ( $r = -.54$ ,  $p < .01$ ) and hostility ( $r = .43$ ,  $p < .01$ ), but not moral reasoning ( $r = .12$ , *ns*). Thus, Hypotheses 2 and 4 were supported, but not Hypothesis 6.

Hypotheses 3a, 5a, and 7a were that self-control, hostility, and moral reasoning respectively, would affect deviance. As shown in Table 3, self-control significantly affected theft ( $r = -.39, p < .01$ ), as did hostility ( $r = .41, p < .01$ ), but moral reasoning did not ( $r = .01, ns$ ). Also, hostility significantly affected interpersonal deviance ( $r = -.39, p < .01$ ), as did moral reasoning ( $r = -.35, p < .01$ ), but self-control did not ( $r = -.14, ns$ ). Finally, self-control significantly affected cheating ( $r = -.20, p = .05$ ), as did hostility ( $r = .26, p < .05$ ), and moral reasoning ( $r = -.26, p < .05$ ). Thus, Hypotheses 3a, 5a, and 7a were partially supported for theft and interpersonal deviance, and were fully supported for cheating.

Hypotheses 3b, 5b, and 7b were that self-control, hostility, and moral reasoning respectively, would mediate the effect of sleep deprivation on deviance. I tested the fully mediated regression model for each dependent variable as shown in the second steps in Table 4. Moral reasoning was not entered in the second step for any analysis because it was not related to sleep deprivation. Self-control significantly affected theft ( $\beta = -.29, p < .05$ ), as did hostility ( $\beta = .32, p < .01$ ), and the effects of sleep deprivation on theft became non-significant in the presence of the two mediators ( $\beta = -.02, ns$ ). Self-control did not significantly affect interpersonal deviance ( $\beta = -.14, ns$ ), but hostility did ( $\beta = .32, p < .01$ ), and the relationship between sleep deprivation and interpersonal deviance became non-significant in the presence of hostility ( $\beta = .16, ns$ ). Self-control did not significantly affect cheating ( $\beta = -.09, ns$ ), nor did hostility ( $\beta = .19, ns$ ).

TABLE 4: Mediated Regression Results for Effect of Sleep Deprivation on Workplace Deviance in Study Two

Variable	Theft		Interpersonal Deviance		Cheating	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
<i>Main effect</i>						
Sleep Deprivation	.28*	-.02	.27*	.16	.23 <sup>†</sup>	.09
<i>Mediators</i>						
Self-Control		-.29*		na <sup>a</sup>		-.09
Hostility		.32**		.25*		.19
Moral Reasoning		na <sup>b</sup>		na <sup>b</sup>		na <sup>b</sup>
Total R <sup>2</sup>	.08*	.24**	.07*	.13*	.05 <sup>†</sup>	.09 <sup>†</sup>
Δ R <sup>2</sup>		.16**		.05*		.04

$n = 75$ . All coefficients are standardized regression coefficients.

<sup>a</sup>Self-control not entered in this step because it did not significantly affect interpersonal deviance.

<sup>b</sup>Moral reasoning not entered in this step because sleep deprivation did not significantly affect it.

<sup>†</sup>  $p = .05$

\* $p < .05$

\*\* $p < .01$

To test the significance of the indirect effect of sleep deprivation through self-control and hostility, I again used the Preacher and Hayes' (2008) methodology. Results indicated that the indirect effect of sleep deprivation on theft was significant through self-control (coefficient = .51, 95% CI = .092, 1.010) and hostility (coefficient = .45, 95% CI = .105, .891). Finally, the total indirect effect was significant, with a coefficient of .96, and the 95% CI did not include zero (.422, 1.615). For interpersonal deviance, the indirect effect of sleep deprivation was significant through hostility (coefficient = .21, 95% CI = .045, .405). In sum, for theft, Hypotheses 3b and 5b were supported, but Hypothesis 7b was not; for interpersonal deviance, Hypothesis 5b was supported, and

Hypotheses 3b and 7b were not; and for cheating, none of the mediation hypotheses were supported.

## CHAPTER 8

### DISCUSSION

I used data gathered in a field setting combined with a laboratory study to build and test theory about the effects of sleep deprivation on workplace deviance. The results from the two studies converge to show partial support for the idea that the effects of sleep deprivation, when viewed from a cognitive resource depletion perspective, can lead to decreased self-control and increased hostility, which ultimately makes individuals more likely to commit workplace deviance. Specifically, in the field study, I found that the effect of sleep deprivation on deviance in nurses was mediated by the effects of self-control and hostility. In the lab study, I found that the effect of sleep deprivation on theft was also mediated by the effects of self-control and hostility; and that the effect of sleep deprivation on interpersonal deviance was mediated by hostility.

#### Theoretical Implications

Many studies have shown that sleep deprivation has negative effects on mood, cognition, and motor function, but my study is the first to directly address how it affects individuals' tendencies to behave in compliance with norms and standards at work. The fact that no research has linked sleep deprivation to workplace deviance is not surprising however, as neurocognitive research has only recently uncovered a link between sleep deprivation and moral decision-making (Killgore et al., 2007). As such, my study extends neurocognitive research to the organizational arena and is the first to show how sleep deprivation leads to undesirable anti-social behaviors such as deviance at work.

By bringing sleep deprivation research into the organizational arena, I hope to highlight possible relationships with other work-related behaviors and processes. According to the cognitive resource perspective, sleep loss reduces employees' ability to perform emotional labor effectively, which could have serious implications for customer service. More specifically, customer service employees may become more annoyed and have more trouble hiding their negative emotions when dealing with an irate customer. Sleep loss could also have serious implications for employees working in organizations where safety is an issue. While the link between safety motivation and safety performance and accidents and injuries is well documented (see Christian, Bradley, Wallace, & Burke, 2009), no research has examined the role of sleep deprivation as a distal antecedent of occupational accidents through its effects on motivation. My results would suggest that employees may be more likely to engage in dangerous behaviors that lead to accidents, injuries, and even death. As noted by Barnes (in press), sleep deprivation, through its effects on the prefrontal cortex, can affect employees throughout the organization, particularly if their job requires innovative thinking, attention management, risk analysis, and memory.

Regarding deviance, research has tended to examine the role of more distal antecedents, without focusing on the underlying motivational mechanisms. As noted by Bennett and Robinson (2003), research concerned with antecedents to deviance has primarily focused on the effects of (a) experiences at work, (b) personality, and (c) social context. My study moves this research forward by uncovering a more proximal determinant of deviance and examines the "black box" through which distal factors such

as sleep deprivation might result in deviant behavior. My findings suggest that deviance is motivated by failures in self-regulation that can be induced by cognitive depletion. Given that cognitive energy can be depleted by a wide range of circumstances that evoke self-control (Muraven et al., 1998; Vohs et al., 2008), emotion control (Muraven et al., 1998; Tice et al., 2001) and information processing, reasoning, and logic (Schmeichel et al., 2003), my study provides researchers with a new lens for investigating the effects of individual and situational factors on deviance. For example, the effects of stress and exhaustion on deviance (Chen & Spector, 1992; Fox et al., 2001) are likely due to failures in self-regulation. That lens may also help to understand other outcomes that are closely related to deviance, such as ethics. Although unethical behavior is not necessarily deviant (ethics are more generally accepted moral principles in society rather than in the workplace *per se* (Treviño et al., 2006)), cognitive depletion may exhibit similar effects. That is, when individuals' self-regulatory capacity is depleted, individuals may be more likely to engage in behavior that society would consider egregious.

My findings also illustrate the role of self-control and hostility as manifestations of cognitive resource depletion resulting from sleep deprivation. Although past research has investigated the role of trait self-control in deviance (Bordia et al., 2008; Marcus & Schuler, 2004), we know little about the way that restraint and willpower can be eroded and ultimately lead to deviance at work. Researchers have also examined the effects of hostility on deviance (Judge et al., 2006). However, my study expands on those results by placing hostility within a larger self-regulatory framework.

Also, I extend recently-surfacing evidence regarding the physiological bases of self-regulation (DeWall et al., 2007; Gailliot et al., 2007) and answer the call to develop models integrating evidence from neuroscience with organizational behavior (Becker & Cropanzano, 2009); in particular, research linking the brain with anti-social, unethical, and deviant behavior (Reynolds, 2006; Treviño et al., 2006). As such, my arguments illustrate how research based in neuroscience can contribute to the development and testing of theories in organizational research.

#### Managerial Implications.

Based on my results, I offer a number of suggestions for managers interested in reducing workplace deviance. As noted by Barnes (in press), these include strategies for limiting sleep deprivation itself and/or mitigating the effects of sleep deprivation. Managers can limit sleep deprivation using prevention tactics such as sleep awareness training (e.g., insomnia reduction strategies, sleep hygiene counseling) or by attempting to design jobs in such a way that reduces long hours and stressful conditions (e.g., scheduling, restricting overtime, reducing shift rotation). However, managers should be aware of the role of organizational culture in creating conditions that result in sleep deprivation. For example, organizations that promote cultures of workaholism and require employees to work late hours that likely impinge on their sleep habits are also likely to experience higher levels of deviance.

However, sleep deprivation is unavoidable in some situations, especially for military personnel, health-care professionals, or for international businessmen and women who are forced to adjust to geographic time-zone differences. In such situations,

maintaining a sense of “depletion awareness” is crucial for managers. By monitoring employees’ current levels of functioning, managers can stay aware of potentially high-risk employees and can make informed decisions on the timing of potentially negative events at work. For example, employees might be more likely to retaliate to a perceived injustice when they have been sleep-deprived and may be less receptive to things such as negative feedback. Managers can also attempt to keep depleted employees out of tempting situations. For example, having a tired employee work within view of management rather than performing inventory in the stockroom. Finally, as suggested by Barnes (in press), restorative techniques such as scheduling frequent breaks or providing caffeine may increase individuals’ resilience to the cognitive effects of sleep deprivation.

In sum, I suggest that managers can limit deviance in their organization by taking the following specific actions: (1) introduce sleep awareness programs, (2) design jobs to limit sleep deprivation, (3) attend to the culture of their organization, attempting to engender norms that include healthy sleep, (4) monitor employee depletion and (5) take restoration-oriented approaches.

#### Limitations and Future Directions

I would like to note that, despite the significance of my results across the two studies, there are a few limitations. First, although I attempted to simulate workplace deviance in the laboratory, I am cautious in generalizing the effects I found using a student sample to workplace contexts. In order to attain a reasonable level of external validity, I took steps to ensure that the student participants (a) were members of the business school in which the study was conducted, (b) were instructed that the email task

that they performed was for the benefit of the organization (i.e., helping to recruit new students), and (c) that the GRE simulation task and the reward for the in-basket task – my measures of theft and cheating – were being funded by the organization. However, they were not employees. In an actual organization, total sleep deprivation may have more of an effect on deviance because there are larger benefits (i.e., more than a few dollars) to be gained or it may have less of an effect because there is much larger risk (i.e., more than being chastised by an experimenter). I would argue that the reduced self-regulatory capacity would increase the effect size in an actual organization, but clearly the issue would benefit from future field research.

Second, my field sample focused on the healthcare industry. In other organizations, effects may be much different. However, I would argue that my effect sizes are actually an *underestimate* of the population effect size. Nurses work in relatively strong situations, where supervision is relatively constant and norms for conduct are strong. There is less room for deviant behavior and such behavior has clear, negative implications for employees. In other occupations there are more opportunities to act deviantly and the consequences are less severe. For example, city sanitation workers often work night shifts where they are away from supervision and have complete autonomy in terms of their own behavior. Any deviant behavior is likely to go unnoticed and unpunished, given that everyone, including customers, is unaware of what they are doing.

Another limitation was that my sample sizes did not meet my targets. For example, I originally planned to collect data from 250 nurses in the field study and 80

students in the lab study. In the field, this was not possible, as the number of units interested in participating in the study only provided for 171 responses. In the lab, because I had to eliminate the data collected from one participant for a rule violation (e.g., drinking alcohol before the study), two for misunderstanding directions, four for expressed suspicion during the study, and five for experimenter error (i.e., incorrect answer key distribution in GRE task), I was only able to utilize 75 responses. As such, my actual  $n$  deviated from my target  $n$  for both studies. However, had I have collected additional data, the results likely would not have changed substantively; for example, the relation between sleep deprivation and moral reasoning was virtually zero.

Another limitation was that I was unable to include control variables such as job performance, conscientiousness, trait self-control, and organizational justice in my analyses in the field study. Unfortunately the inclusion of variables that required supervisor ratings (organizational citizenship behavior, job performance) was beyond the scope of the methodology. In addition, future research is needed to determine whether trait self-control may have been a spurious cause of the relations between sleep deprivation and deviance. For example, it is possible that individuals who have lower self-control are more likely to be sleep deprived because they are less likely to exercise the control needed to retire early to bed. Thus, people with low self-control may sleep less, rather than the alternative, that people who sleep less have low self control as a result. Also, although I did measure justice perceptions and conscientiousness, their inclusion in the regression equations decreased power to the point of making significant effects undetectable, likely due to too few degrees of freedom. The inclusion of justice

might be an important direction for future research, as Greenberg (1993) has illustrated that inequity can result in deviance, particularly theft. It is possible that sleep deprivation resulted in perceived inequity in addition to reducing self-control, as I found in the current research.

Also, a number of my hypotheses were not supported. I hypothesized that moral reasoning would explain the relation between sleep deprivation and deviance. However, in both the lab and the field study, the relation between sleep-deprivation and workplace deviance was not mediated by a decrease in moral reasoning. In fact, although moral reasoning was related to most measures of deviance in the field and lab, sleep deprivation did not affect moral reasoning in either study. The absence of a relation between sleep and moral reasoning may have been due to the fact that the measure I used for moral reasoning (see Detert et al., 2008) is best suited as a measure of trait moral reasoning that would not fluctuate significantly within-person. This measure required participants to indicate the likelihood that they would act in a particular way when presented with a simple ethical dilemma (e.g., take a ream of paper from the copyroom at work when they need it at home). Because the dilemma was relatively simple, I believe that even sleep-deprived participants were able to reasonably assess their likelihood using heuristics (e.g., what have I done in the past?) to solve the dilemma. An interesting avenue for future studies would be to use a more complex moral reasoning measure such as a coded free-response survey questionnaire requesting a participants' reasoning as to *why* they would or would not act in an ethically appropriate or inappropriate manner given a particular scenario.

Alternatively, moral reasoning may have simply not been affected by sleep deprivation. Other cognitive constructs, such as consequential thinking, may have been more relevant. Future research could examine whether sleep deprivation has stronger effects on an individual's ability to assess the consequences of their actions, which could lead to deviance. Another possible cognitive mediator involves the "multiple-selves phenomenon", or the distinction between what individuals want to do and what they think they should do (Bazerman, Tenbrunsel, & Wade-Benzoni, 1998). It is possible that individuals who are sleep-deprived are less able to negotiate between their preferences for what is ethically correct and what will lead to the most personal satisfaction. Future research should consider the want/should distinction as another cognitive mediator of the relation between sleep deprivation and deviance.

Additionally, in the lab study the effect of sleep deprivation on cheating was not mediated by any of the hypothesized variables. Although the pattern of results suggested that the conditions for mediation might have been met for hostility had the sample size been increased and the effect sizes remained stable (see Table 4), financial constraints associated with increasing the sample size limited my ability to continue to collect additional data. Also, the fact that the hypothesized variables had a relatively weak effect on cheating may be indicative of the fact that cheating is the least representative of the three dependent variables in terms of their correspondence with the workplace deviance construct. Indeed, Bennett and Robinson (2000) do not explicitly include cheating as a deviant act at work, even though there is conceptual alignment in a student context.

Also, self-control did not mediate the effect of sleep deprivation on interpersonal deviance in the lab. As indicated in Table 3, self-control was not significantly related to interpersonal deviance ( $r = -.14$ ), although the effect was in the hypothesized direction. Thus, it seems likely that self-control is more associated with resisting temptation for monetary gain (e.g., theft) than for resisting the urge to act rudely in the context of an interpersonal interaction. As such, future studies could investigate the possibility that self-control could have stronger effects on organizational deviance than interpersonal deviance.

Finally, as evidenced in my results, self-control and hostility are related and, based on my conceptual arguments, self-control may affect hostility. However, this issue was not the primary focus of my manuscript and was difficult to test given they were measured concurrently.

## Conclusion

In summary, my study underscores a need for organizational researchers to attend to the depletion of cognitive resources as an important determinant of work-relevant behavior. As noted by Kanfer and Ackerman (1989), “the beneficial consequences of self-regulation can only be obtained when there are significant cognitive resources for engaging in self-regulatory activity itself” (p. 663). My findings indicate that sleep deprivation can diminish the beneficial consequences of self-regulation in terms of reducing deviant behavior.

APPENDIX A-1  
SURVEY 1 (FIELD STUDY)

**\*\*ALL INFORMATION WILL BE KEPT CONFIDENTIAL – ONLY THE RESEARCHER WILL  
HAVE ACCESS TO IDENTIFYING INFORMATION\*\***

ID# (4 numerical digits)\_\_\_\_\_

Today's date\_\_\_\_\_

**Sleep deprivation**

1. As accurately as you recall, please mark the blocks of time in which you have slept in the past 3 days.

	LAST NIGHT / THIS MORNING	DAY BEFORE	2 DAYS BEFORE
7:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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12:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. As accurately as you recall, please write the total hours of sleep that you had on each of these days.

Last Night/This Morning \_\_\_\_\_

Day Before \_\_\_\_\_

2 Days Before \_\_\_\_\_

3. Compared to an average night, my sleep was (1 = worse, 2= same as, 3 = better)

Last Night/This Morning \_\_\_\_\_

Day Before \_\_\_\_\_

2 Days Before \_\_\_\_\_

**State Hostility**

Please indicate the extent to which you have felt the following emotions TODAY

		1	2	3	4	5
		Very slightly or not at all	A little	Moderately	Quite a bit	Very much
1.	Angry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Hostile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Scornful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Disgusted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Loathing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Self Control**

Indicate how much each of the following statements reflects how you feel TODAY.

		1	2	3	4	5
		Not True				Very True
7.	I feel mentally exhausted.	<input type="checkbox"/>				
8.	Right now, it would take a lot of effort for me to concentrate on something.	<input type="checkbox"/>				
9.	I need something pleasant to make me feel better.	<input type="checkbox"/>				
10.	I feel motivated.	<input type="checkbox"/>				
11.	If I were given a difficult task right now, I would give up easily.	<input type="checkbox"/>				
12.	I feel drained.	<input type="checkbox"/>				
13.	I have lots of energy.	<input type="checkbox"/>				
14.	I feel worn out.	<input type="checkbox"/>				
15.	If I were tempted by something right now, it would be difficult to resist.	<input type="checkbox"/>				
16.	I would want to quit any difficult task I was given.	<input type="checkbox"/>				
17.	I feel calm and rational.	<input type="checkbox"/>				
18.	I can't absorb any information.	<input type="checkbox"/>				
19.	I feel lazy.	<input type="checkbox"/>				
20.	Right now I would find it difficult to plan ahead.	<input type="checkbox"/>				
21.	I feel sharp and focused.	<input type="checkbox"/>				
22.	I want to give up.	<input type="checkbox"/>				
23.	This would be a good time for me to make an important decision.	<input type="checkbox"/>				
24.	I feel like my willpower is gone.	<input type="checkbox"/>				
25.	My mind feels unfocused right now.	<input type="checkbox"/>				
26.	I feel ready to concentrate.	<input type="checkbox"/>				
27.	My mental energy is running low.	<input type="checkbox"/>				
28.	A new challenge would appeal to me right now.	<input type="checkbox"/>				
29.	I wish I could just relax for a while.	<input type="checkbox"/>				
30.	I am having a hard time controlling my urges.	<input type="checkbox"/>				
31.	I feel discouraged.	<input type="checkbox"/>				



APPENDIX A-2  
SURVEY 2 (FIELD STUDY)

**\*\*ALL INFORMATION WILL BE KEPT CONFIDENTIAL – ONLY THE  
RESEARCHER WILL HAVE ACCESS TO IDENTIFYING INFORMATION\*\***

**Workplace Deviance**

Indicate how often you engaged in the following behaviors today.

		1	2	3	4	5
	Never					Often
1.	Made fun of someone at work	<input type="checkbox"/>				
2.	Said something hurtful to someone at work	<input type="checkbox"/>				
3.	Made an ethnic, religious, or racial remark at work	<input type="checkbox"/>				
4.	Cursed at someone at work	<input type="checkbox"/>				
5.	Played a mean prank on someone at work	<input type="checkbox"/>				
6.	Acted rudely toward someone at work	<input type="checkbox"/>				
7.	Publicly embarrassed someone at work	<input type="checkbox"/>				
8.	Taken property from work without permission	<input type="checkbox"/>				
9.	Spent too much time fantasizing or daydreaming instead of working	<input type="checkbox"/>				
10.	Taken an additional or longer break than is acceptable at your workplace	<input type="checkbox"/>				
11.	Come in late to work without permission	<input type="checkbox"/>				
12.	Littered your work environment	<input type="checkbox"/>				
13.	Neglected to follow your supervisor's instructions	<input type="checkbox"/>				
14.	Intentionally worked slower than you could have worked	<input type="checkbox"/>				
15.	Discussed confidential information with an unauthorized person	<input type="checkbox"/>				
16.	Used an illegal drug or consumed alcohol on the job	<input type="checkbox"/>				
17.	Put little effort into your work	<input type="checkbox"/>				

**Control variable (Trait Affect)**

**This scale consists of a number of words that describe different feelings and emotions. Indicate the extent to which you **GENERALLY** feel this way, that is, how you feel **ON AVERAGE**, using this scale:**

		1	2	3	4	5
		Very slightly or not at all	A little	Moderately	Quite a bit	Very much
18.	Interested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Distressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.	Excited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.	Upset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22.	Strong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.	Guilty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24.	Scared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25.	Hostile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26.	Enthusiastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27.	Proud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28.	Irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29.	Alert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30.	Ashamed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31.	Inspired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32.	Nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33.	Determined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34.	Attentive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35.	Jittery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36.	Active	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37.	Afraid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Controls and demographics**

38. Gender

- a. Female
- b. Male

39. Age

- a. 18-20
- b. 21-30
- c. 31-40
- d. 41-50
- e. 51-60
- f. 60+

40. Ethnicity

- a. African-American
- b. Asian / Asian American
- c. Caucasian
- d. Hispanic / Latino
- e. Other

41. Please rate your level of physical sickness / illness since you went to bed last night

- a. Not sick / ill at all
- b. Feeling a little bit sick / ill
- c. Feeling moderately sick / ill
- d. Feeling very sick / ill
- e. Feeling extremely sick / ill

42. How often do you have trouble *falling* asleep in an average week?

- a. Never
- b. 1 night
- c. 2-3 nights
- d. 4-5 nights
- e. 6-7 nights

43. How often do you have trouble *staying* asleep in an average week?

- a. Never
- b. 1 night
- c. 2-3 nights
- d. 4-5 nights
- e. 6-7 nights

44. How would you characterize the quality of any sleep that you had last night?

- a. Extremely poor
- b. Poor
- c. Neither poor nor good
- d. Good
- e. Very good

45. On average, how many hours of sleep do you think you need on a nightly basis?

- a. Less than 5 hours
- b. 5-6 hours
- c. 7 hours
- d. 8 hours
- e. More than 8 hours

46. How many alcoholic beverages did you consume last night?

- a. None
- b. 1
- c. 2-3
- d. 4-5
- e. 6 or more

47. How many caffeinated beverages (cup of coffee/tea/12 oz. soda) have you consumed today?

- a. None
- b. 1
- c. 2
- d. 3
- e. 4
- f. 5 or more

48. How many cigarettes or other nicotine supplements have you consumed today?

- a. None
- b. 1-2
- c. 3-4
- d. 5-6
- e. 7-8
- f. 9 or more

49. Are you currently taking any medications (prescription and over-the-counter)?

- a. Yes
  - i. If Yes, please list\_\_\_\_\_
- b. No
- c. Not sure

50. How many children below the age of 4 do you have living in your home?

- a. None
- b. 1
- c. 2
- d. 3
- e. 4 or more

51. Undergraduate GPA

- a. <2.4
- b. 2.5-2.9
- c. 3.0-3.4
- d. 3.5-4.0

52. Nursing school GPA

- a. <2.4
- b. 2.5-2.9
- c. 3.0-3.4
- d. 3.5-4.0
- e. Not applicable

53. Please estimate your approximate SAT or ACT score

SAT \_\_\_\_\_

ACT \_\_\_\_\_

54. What was the name of the unit in which you performed your duties during this shift?

- a. Unit name 1
- b. Unit name 2
- c. Unit name 3
- d. Unit name 4

55. Who was your supervising manager during this shift?

\_\_\_\_\_

56. Who was the clinical leader during this shift?

\_\_\_\_\_

57. Who was the charge nurse during this shift?

\_\_\_\_\_

58. How many hours have you worked (including breaks) in the past 12 hours?

\_\_\_\_\_

59. How many hours have you worked (including breaks) in the past 24 hours?

\_\_\_\_\_

60. How many hours have you worked (including breaks) in the past 36 hours?

\_\_\_\_\_

61. How many hours have you worked (including breaks) in the past 48 hours?

\_\_\_\_\_

62. What is your ID#? (please print)\_\_\_\_\_

63. What is today's date? \_\_/\_\_/\_\_\_\_\_

**\*\*ALL INFORMATION WILL BE KEPT CONFIDENTIAL – ONLY THE RESEARCHER WILL HAVE ACCESS TO IDENTIFYING INFORMATION\*\***

APPENDIX B-1  
LAB STUDY SURVEY

**Sleep deprivation (Manipulation check)**

1. As accurately as you recall, please mark the blocks of time in which you have slept in the past 3 days.

	LAST NIGHT / THIS MORNING	DAY BEFORE	2 DAYS BEFORE
7:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11:00 PM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. As accurately as you recall, please write the total hours of sleep that you had on each of these days.

Last Night/This Morning \_\_\_\_\_

Day Before \_\_\_\_\_

2 Days Before \_\_\_\_\_

**3. Compared to an average night, my sleep was (1 = worse, 2= same as, 3 = better)**

**Last Night/This Morning**\_\_\_\_\_

**Day Before** \_\_\_\_\_

**2 Days Before** \_\_\_\_\_

**State Hostility**

Please indicate the extent to which you have felt the following emotions TODAY

		1	2	3	4	5
		Very slightly or not at all	A little	Moderately	Quite a bit	Very much
1.	Angry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Hostile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Scornful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Disgusted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Loathing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Self Control (Twenge)**

Indicate how much each of the following statements reflects how you feel TODAY.

		1	2	3	4	5
		Never				Often
7.	I feel mentally exhausted.	<input type="checkbox"/>				
8.	Right now, it would take a lot of effort for me to concentrate on something.	<input type="checkbox"/>				
9.	I need something pleasant to make me feel better.	<input type="checkbox"/>				
10.	I feel motivated.	<input type="checkbox"/>				
11.	If I were given a difficult task right now, I would give up easily.	<input type="checkbox"/>				
12.	I feel drained.	<input type="checkbox"/>				
13.	I have lots of energy.	<input type="checkbox"/>				
14.	I feel worn out.	<input type="checkbox"/>				
15.	If I were tempted by something right now, it would be difficult to resist.	<input type="checkbox"/>				
16.	I would want to quit any difficult task I was given.	<input type="checkbox"/>				
17.	I feel calm and rational.	<input type="checkbox"/>				
18.	I can't absorb any information.	<input type="checkbox"/>				
19.	I feel lazy.	<input type="checkbox"/>				
20.	Right now I would find it difficult to plan ahead.	<input type="checkbox"/>				
21.	I feel sharp and focused.	<input type="checkbox"/>				
22.	I want to give up.	<input type="checkbox"/>				
23.	This would be a good time for me to make an important decision.	<input type="checkbox"/>				
24.	I feel like my willpower is gone.	<input type="checkbox"/>				
25.	My mind feels unfocused right now.	<input type="checkbox"/>				
26.	I feel ready to concentrate.	<input type="checkbox"/>				
27.	My mental energy is running low.	<input type="checkbox"/>				
28.	A new challenge would appeal to me right now.	<input type="checkbox"/>				
29.	I wish I could just relax for a while.	<input type="checkbox"/>				
30.	I am having a hard time controlling my urges.	<input type="checkbox"/>				
31.	I feel discouraged.	<input type="checkbox"/>				



## Control variable (Trait NA / PA)

		1	2	3	4	5
		Very slightly or not at all	A little	Moderately	Quite a bit	Very much
40.	Interested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41.	Distressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42.	Excited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43.	Upset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44.	Strong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45.	Guilty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46.	Scared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47.	Hostile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48.	Enthusiastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49.	Proud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50.	Irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51.	Alert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52.	Ashamed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53.	Inspired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54.	Nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55.	Determined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56.	Attentive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57.	Jittery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58.	Active	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59.	Afraid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Controls and demographics (assessed upon arrival)**

60. Gender
- Female
  - Male
61. Age
- 18-20
  - 21-30
  - 31-40
  - 41-50
  - 51-60
  - 60+
62. Ethnicity
- African-American
  - Asian / Asian American
  - Caucasian
  - Hispanic / Latino
  - Other
63. Please rate your level of physical sickness / illness since you went to bed last night
- Not sick / ill at all
  - Feeling a little bit sick / ill
  - Feeling moderately sick / ill
  - Feeling very sick / ill
  - Feeling extremely sick / ill
64. How often do you have trouble *falling* asleep in an average week?
- Never
  - 1 night
  - 2-3 nights
  - 4-5 nights
  - 6-7 nights
65. How often do you have trouble *staying* asleep in an average week?
- Never
  - 1 night
  - 2-3 nights
  - 4-5 nights
  - 6-7 nights
66. How many alcoholic beverages did you consume last night?

- a. None
- b. 1
- c. 2-3
- d. 4-5
- e. 6 or more

67. How many caffeinated beverages (cup of coffee/tea/12 oz. soda) have you consumed today?

- a. None
- b. 1
- c. 2
- d. 3
- e. 4
- f. 5 or more

68. How many cigarettes or other nicotine supplements have you consumed today?

- a. None
- b. 1-2
- c. 3-4
- d. 5-6
- e. 7-8
- f. 9 or more

69. Are you currently taking any medications (prescription and over-the-counter) that could impact your quality of sleep?

- a. Yes
  - i. If Yes, please list \_\_\_\_\_
- b. No
- c. Not sure

70. Undergraduate GPA

- a. <2.4
- b. 2.5-2.9
- c. 3.0-3.4
- d. 3.5-4.0

71. Please estimate your approximate SAT or ACT score

SAT \_\_\_\_\_

ACT \_\_\_\_\_

APPENDIX B-2  
LAB STUDY MATERIALS

Task 1: In-basket exercise.

*Cover page.*

# In-Basket Exercise 1

Name \_\_\_\_\_

% Correct \_\_\_\_\_

\$ Received \_\_\_\_\_

*Scenario.*

You are to read the situation described below and the three numbered in-basket items that follow. Then respond to the 3 multiple-choice questions that follow the in-basket materials.

### **Scenario and Background**

Assume that you are Casey Jones, a District Sales Supervisor in the Sales Division of a major pharmaceutical company.

You supervise a staff of three Sales representatives, each of whom leads a professional team that includes two assistant representatives. Your immediate supervisor is the District Manager of the Sales Division, Terry Gibson. The Sales Division also includes two other Supervisors and their staffs.

Your Sales Representatives and their assignments are:

Scott Bailey, Sales Area One  
Jesse Taylor, Sales Area Two  
Shawn Richard, Sales Area Three

Scott is your most experienced and competent employee. Jesse was transferred to you from another Sales District about one year ago. And Shawn is your newest employee who is very competent, but still is working on being an effective team leader.

It is Monday morning, April 12, and you have just returned from a one week vacation. The numbered items that follow represent the contents of your in-basket. These include memos, letters, and other information that came in while you were on vacation. Your plan for the morning is to review and take action on your in-basket items. In about an hour, you will go to the first of several meetings that will consume the remainder of the day.

---

**Interoffice Memo #1**

Date: Tuesday, April 6<sup>th</sup>

From: Scott Bailey  
District Sales Representative, Area One

To: Casey Jones  
District Sales Supervisor  
Northeastern District

Subject: New Hires Training Program

Before you left, you approved the idea I had for the new training program and told me to proceed to order the new assimilation computers. However, the computer company, Technologies Expanding, assured me that they would arrive in time for our new hires to begin training. As you are aware, the training begins in one week, but I have not received the new computers yet. The customer service representative told me that the company has been having difficulties getting their orders out and could not guarantee that the computers would be in on time.

There is another company that can supply our computers, but the cost would be an additional \$8,000. I recommend that we order from the other company, and begin training on the old computers while we wait for the new computers. Although the new hires will not work on specific training for two weeks, we can at least start them on the product information part of the course.

---

**Interoffice Memo #2**

Date: Thursday, April 8<sup>th</sup>

From: Terry Gibson  
District Division Manager

To: Casey Jones  
District Sales Supervisor  
Northeastern District

Subject: New Company Policy

Beginning, May 1<sup>st</sup>, there will be a new policy, which requires all Sales Representatives to have their clients fill out and sign the Form 2030. This form is for our inventory purposes. We had discussed using this form a couple of months ago and at the time found it to be quite tedious. But as our business is expanding and we are moving to other parts of the country, we need a more efficient way to keep track of what we are selling.

Our next inventory will be on May 30<sup>th</sup>. These forms must be filled out no later May 15<sup>th</sup> so we can have the information to have a successful inventory. I know this is short notice, but it shouldn't take long to go through your records of what your representatives have sold in the last six months. If you have any further questions or need any assistance you can contact my Administrative Assistant, Aaron Daigle, (x3632), who is collecting all the information.

---

**Interoffice Memo #3**

Date: Monday, April 5<sup>th</sup>

From: Jody Rogers  
Assistant District Sales Representative, Area Four

To: Casey Jones  
District Sales Supervisor  
Northeastern Division

Subject: Area Team Four

I am requesting an assignment to a different Area Team. I have been working on Shawn Richard's team for the past six months. I realize that Shawn is a new employee and has only been in his position for seven months, but he does not handle leadership in a professional manner.

He is not organized, and I feel that Dale Stevens and I are the ones who are compensating for him. He does not delegate responsibility and cannot manage the travel schedule, the appointments, or the distribution lists. I have tried to help him get organized while Dale helps with the arrangements, but our efforts have not helped. He cannot seem to manage his time effectively, which leaves his assistants, Dale and I, to keep our area serviced.

How am I ever going to move up professionally and to show my talents if my work is suffering due to Shawn's inability to manage his team?

---

### In-Basket Questions

1. (1 pt.) Which of the following is the most appropriate action to take in response to the issue of the training schedule in Item #1?
  - A. Allow Scott to proceed with the training on the old computers and then interrupt training when the new computers arrive.
  - B. Delay the training till the new computers arrive.
  - C. Let the students finish the course with the old computers without the interruption of the new computers, and the next group of students will begin training with the new computers.
  - D. Cancel the training altogether until the issue with the computers has been resolved.
  
2. (1 pt.) Which of the following actions will have the best resolution to the problem with Technologies Expanding?
  - A. Cancel the order with Technologies Expanding and proceed with the new order.
  - B. Contact the president of Technologies Expanding and demand a discount because the company did not meet your expectations.
  - C. Cancel the order and have the old computers updated.
  - D. Call the customer service representative manager to verify the accuracy of the information Scott received and discuss your situation and the options that are available to you.
  
3. (1 pt.) What would be the best action to take in response to Jody's complaint? (Item #3)
  - A. No action is required because Jody tends to exaggerate.
  - B. Tell Jody that it is important to be supportive of each other and you will enroll her in a teambuilding course.
  - C. Move Jody to Scott's team so she can help with the training.
  - D. Look into the matter and see if there is evidence of Shawn's behavior described by Jody, and also talk with Dale to gain further insight into the issue.

#### *Answer Key.*

1. C – The students will get the training they need to perform the duties of the job without the interruption of the installation of the new computers.
2. D – By calling the service manager you can get a better idea of exactly what the situation is and what options are available to you before you cancel the order.

3. D – You first need to determine if there is a valid complaint and if Shawn's behavior reflects Jody's complaint before you take any action.

In-basket exercise 2

*Cover page.*

# In-Basket Exercise 2

Name \_\_\_\_\_

% Correct \_\_\_\_\_

\$ Received \_\_\_\_\_

## Sample Scenario Summary

- You are **Chris Adams**, Patrol Agent in Charge of the Crystal Lake station. Today is your first day back after a two-week vacation. It is now 7:30 a.m. on Monday, September 10. At 8:15 you will be leaving to serve on a promotion board, which will be held at sector headquarters. You do not expect to return to the office until tomorrow morning. The promotion board also meets on Thursday the 13<sup>th</sup> at 8:15. You estimate that it will take about 30 minutes to review the documents in the in-basket, leaving 15 minutes to deal with the most critical one(s). You will have a few short breaks during the day when you can attend to other critical issues.
- The Crystal Lake Station is located in the Billingsley Sector in the southwestern United States. The Billingsley sector has seven stations and is responsible for monitoring 40 miles of international border. The Crystal Lake station has an authorized force of 53 INS employees.
- You report to **Lawrence Ayres**, who is the Chief Patrol Agent of Billingsley sector. Your major programs are coordinated through Assistant Chief Patrol Agent **Jesse Cook** at sector headquarters. Reporting to you are SBPA **Luis Quesada**, SBPA **Sam Markowitz**, SBPA **Sandra Larchmont**, and SBPA **Dennis Tyrol**.
- Your station has the lead responsibility in a multi-agency operation, Operation RATTRACK, which is part of a broader initiative, the Project SANDBLAST task force. You are a member of the Project SANDBLAST task force, which is meeting in Billingsley later this week.

**From the desk of Sam Markowitz**

**To** Chief Adams

**Date:** September 10

**Re:** Leak on Operation RATTRACK

# memo

CPA Cook called me last night from Sector Headquarters. She tried to reach you until about

11:00 p.m., but you had not yet returned from your trip. She had just received a telephone call from Dick Grady. He hosts the all-night talk show on KNWS-Talk Radio. Dick Grady invited her to appear to respond to his “digs” and then take questions from the public. CPA Cook said that Dick Grady appears to know much more about our plans for Operation RATTRACK than we have released to the public. Specifically, he asked CPA Cook to be prepared to comment on our strategy for this week’s joint operation with DEA. CPA Cook told Dick Grady that INS had no comment and asked him where he obtained this information. He told her that he could not reveal his sources. She asked me to pass this information on to you immediately and to ask you to handle it. I will be on location for the remainder of the day.

*Sam*

MEMORANDUM FOR CHRIS ADAMS  
PATROL AGENT IN CHARGE – CRYSTAL LAKE STATION

FROM: James Robie, Commander BORTAC

SUBJECT: Request for detail of Dennis Tyrol to BORTAC

We are very impressed with SBPA Dennis Tyrol's BORTAC skills and abilities. He successfully completed the Advanced Tactical Training Course and is the first in a long time to achieve a perfect score on the written examination. He also used novel techniques to navigate the obstacle course and set a course record. He is an exceptional member of the BORTAC unit and the Border Patrol.

Later this month, the BORTAC unit will again conduct the Advanced Tactical Training Course, which SBPA Tyrol completed in March. While I know he is kept very busy with his duties at the station, we would like him to serve as an assistant instructor for the next administration of the advanced course. While he was completing the course in March, he indicated strong interest in serving as a BORTAC instructor. The course is scheduled to begin September 24 and runs for two weeks until October 5

I know this is short notice, but we will need to know whether SBPA Tyrol can assist us with this course administration no later than noon on September 10.

Document 2

**Date:** 9/03 6:39 AM  
**Sender:** Camille Larson  
**To:** Chris Adams  
**Priority:** Normal  
**Subject:** Surplus Communications Equipment

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This is to confirm your enrollment in CPR training. You have elected the following session:

**Course Name:** CPR Certification Training

**Date:** Thursday, September 13

**Time:** 9:00 a.m. to noon

**Location:** Sector HQ, Room 507

It is mandatory that all agents in the Billingsley sector be certified in CPR. If you are unable to attend this session, please notify me immediately by phone or e-mail. We will be offering CPR training through the end of September on Tuesdays at 1:00 p.m. and Thursdays at 9:00 a.m.

Document 3

## IN-BASKET ITEMS

1. (1 pt) In Document 1, SBPA Markowitz informs you that a radio talk show intends to ask ACPA Cook about Operation RATTRACK. What is the **MOST** critical issue raised in this document?

- A) Dick Grady's invitation to ACPA Cook
- B) SBPA Markowitz's location for the remainder of the day
- C) CPA Cook's inability to reach you last night
- D) Dick Grady's knowledge about Operation RATTRACK**
- E) Dick Grady's refusal to divulge the source of his knowledge about Operation RATTRACK

2. (1 pt) Document 3 asks you to approve SBPA Tyrol's detail to BORTAC. Which factor below would carry the **MOST** weight in your decision?

- A) SBPA Tyrol's performance at the Crystal Lake Border Patrol station
- B) The impact of this detail on overall station workload and staffing**
- C) SBPA Tyrol's qualifications for detail
- D) The dollar cost or benefit of this detail to the station**
- E) The impact of this detail on SBPA Tyrol's career goals

3. (1 pt) Which of the following documents would you be **LEAST** likely to retain (put off until later) after you have dealt with the immediate situation?

- A) Document 1: Sam Markowitz's memo**
- B) Document 2: Chief Robie's memo
- C) Document 3: Camille Larson's e-mail message

4. (1 pt) Which of the following issues would you be **MOST** likely to retain (put off until later) after you have dealt with the immediate situation?

- A) Document 1: Sam Markowitz's memo
- B) Document 2: Chief Robie's memo
- C) Document 3: Camille Larson's e-mail message**

5. (1 pt) What is the best way to handle Document 3?

- A) Attend the CPR session at the scheduled time.
- B) Ask Dennis Tyrol to attend the session in your place.
- C) Call Camille Larson immediately and reschedule the session.
- D) Deal with the other situations first, and think about rescheduling at a later time.**

6. (3 pts) (**Cheating check**) Managers often use severity analysis to determine the importance of particular issues, and the order in which they should be handled. Weighting each document by importance, calculate the severity index for each situation. For example, if the document is the most important (3) and will take 2.5 hours to complete, the severity index would be  $3 \times 2.5 = 7.5$ . Below, calculate the severity index for each document.

Document 1 13.5

Document 2 6

Document 3 1.75

## REASONING TASKS

In the section below, solve each problem and indicate the best of the answer choices given. You may use any available space for scratchwork.

1. On 4 sales, Sally has received commissions of \$410, \$90, \$330, and \$522, and she has 1 additional sale pending. If Sally is to receive an average (arithmetic mean) of exactly \$400 on the 5 sales, then the 5<sup>th</sup> commission must be:

- (A) **\$648**
- (B) \$338
- (C) \$545
- (D) \$625
- (E) \$438

2. The square root of 1456 is between

- (A) 34 and 35
- (B) 35 and 36
- (C) **36 and 37**
- (D) 37 and 38
- (E) 38 and 39

3. What is the value of  $3x^2 + 1.4x - 2.5$  for  $x = 0.5$ ?

- (A) -1.75
- (B) -2.75
- (C) -1.98
- (D) **-1.05**
- (E) -0.75

3. What is the value of  $4x^2 + 2.4x - 1$  for  $x = 0.7$ ?

- (A) 2.75
- (B) 2.68
- (C) **1.68**
- (D) 1.75
- (E) 0.75

4. If a cube has a volume of 125, what is its total surface area?

- (A) 25
- (B) 150**
- (C) 100
- (D) 200
- (E) 75

5. A hiker walked for 4 days. On the first day, he hiked 3 mph. On the second day, he hiked 2 mph. On the third and fourth days, he averaged 1 mph. What was the average speed for all 4 days for the hiker?

- (A) 1.25 mph
- (B) 1.75 mph**
- (C) 1.5 mph
- (D) 2 mph
- (E) 1 mph

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In each of the following sentences, a part of the sentence is underlined. Below the sentences, you will find four ways of phrasing the underlined part. The first choice repeats the original, and the other four are different. Choose the best version.

1. The painter, known for his many powerful work of abstraction was also known to be quite the lothario.

- (A) work of abstraction was also
- (B) works of abstraction was also
- (C) works of abstraction was also,
- (D) works of abstraction, was also**

2. Sawhorses are not horses, neither are they saws.

- (A) not horses, neither are
- (B) not horses, nor are
- (C) neither horses, nor are**
- (D) not horses, nonetheless are

3. The crocodile has a nictitating membrane that resembles those of an alligators, which serves a protective function for underwater predation.

- (A) those of an alligators, which serves

- (B) that of an alligator's, serving
- (C) that of an alligator, which serves**
- (D) that of an alligator, which serve

4. There is an apparent connection of ice cream eating and swimming pool drownings, but it is likely to be an indirect one.

- (A) connection of ice cream eating and
- (B) connection between ice cream eating and**
- (C) ice cream eating connection between
- (D) connection to ice cream eating with

5. While the depressed value of the dollar can hurt American travelers abroad, it is potentially devastating for companies that deal in international trade, whose revenue depends on currency exchange rates.

- (A) it is potentially devastating for companies that deal in international trade, whose**
- (B) it can potentially devastate companies that deal in international trade, whose
- (C) they can potentially be devastating for companies that deal in international trade, for which
- (D) it is potentially devastating to companies dealing in international trade, for which

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