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# MODERATING EFFECTS OF EXTROVERSION AND NEUROTICISM ON SLEEP DEPRIVATION AND CYBERLOAFING

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## Abstract

*Cyberloafing is the voluntary acts of individuals using their companies' Internet access for non-work related purposes during working hours. This study examines the impact of sleep deprivation on cyberloafing as measured objectively by time spent by individuals on non-work-related-computing. More specifically, we investigated the effect of individuals' bed time and wake time after sleep onset (WASO) on time spent on cyberloafing. In general, individuals' bed time and WASO significantly predict the time spent on cyberloafing. We also examined the moderating effect of extroversion on the relationship between time-to-bed and time spent on cyberloafing (supported); and the moderating effect of neuroticism on the relationship between WASO and time spent on cyberloafing (not supported). Implications of our findings are discussed.*

*Keywords: Bed Time, WASO, Extroversion, Neuroticism, Cyberloafing.*

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<sup>1</sup> Both the authors contributed equally to the paper.

# 1 INTRODUCTION

Research on cyberloafing was initiated by Lim and her colleagues (e.g., Lim 2002, Lim & Teo 2005). Cyberloafing refers to the voluntary acts of individuals using their companies' Internet access for non-work related purposes during working hours. They conceptualized cyberloafing as a form of production deviance. That is, cyberloafing is a counterproductive behaviour which negatively impact an individual's work performance (Blanchard & Henle 2008). Two dimensions of cyberloafing have been identified: (1) minor versus serious and (2) interpersonal versus organizational (Lim 2002). Examples include activities such as sending and receiving a personal email, checking headlines at CNN.com, online shopping at ebay, and browsing adult-oriented (sexually explicit) websites.

Available statistics consistently suggest that cyberloafing is widely prevalent in organizations. According to a survey conducted by an Internet monitoring company, approximately 61% of employees in US engaged in cyberloafing of some form and spent about 24% of their working hours on cyberloafing activities (WebSense.com 2005; WebSense.com 2006). A recent study conducted by <sup>2</sup>Entensys Corporation in April-June 2009 with 41,200 employees in 1,600 enterprises revealed that 20% of employees visited social networking sites, blogs and personal sites daily. In addition, 26% of employees visited non-work related websites such as entertainment, games and messengers. Furthermore, these activities cost their employers a lot in terms of traffic expenses, channel bandwidth and general network performance. Thus, these statistics suggest that cyberloafing is a pressing issue for organizations as it depletes employees' energy and time and detracts them from work.

While few scholars have attempted to study the dark side of the Internet, existing studies examining the causes of cyberloafing, to date, remain largely unguided by theory (an exception is Lim 2002) and provide little insights as to why this phenomenon occurs. As individuals' usage of Internet for non work related purposes during office hours entails substantial costs to the companies, it is crucial to provide a more comprehensive understanding of what causes individuals to engage in cyberloafing.

In the present study, we utilized the theoretical frameworks offered by sleep deprivation and personality literature to explain why individuals engaged in misuse of Internet access, specifically in the form of cyberloafing, and the mechanisms through which this behaviour is facilitated. The effect of sleep deprivation on work performance has attracted researchers for several years (Barnes & Hollenbeck 2009). However, despite the evidence on importance of sleep in the fields of physiology, ergonomics, and experimental psychology, only recently have researchers in the fields of management begun to consider the importance of sleep to organizationally relevant variables such as workplace injuries, job satisfaction, workload management, etc (e.g., Barnes & Hollenbeck 2009; Barnes & Van Dyne 2009; Scott & Judge 2006; Sonnentag et al. 2008).

In line with these few studies, our study represents an initial effort to link sleep deprivation and cyberloafing. We predict that when individuals are sleep deprived, they feel tired and are likely to be less focussed in their attention. Thus, when assigned a task, they are more likely to be distracted, and engaged in cyberloafing. More specifically, we predict that individuals' bed time and WASO (the amount of time an individual is awake after sleep onset until arising time) will be positively associated with time spent on cyberloafing. In addition, we also examine the moderating effect of extroversion on the relationship between time-to-bed and time spent on cyberloafing; and the moderating effect of neuroticism on the relationship between WASO and time spent on cyberloafing. Toward this end, our specific research questions are:

**RQ1:** *What is the impact of individual's bed time and wake time after sleep onset on the time spent on cyberloafing?*

**RQ2:** *How do extroversion and neuroticism moderate the above relationships?*

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<sup>2</sup> [www.entensys.com/library/Usage\\_of\\_Internet\\_at\\_Work.pdf](http://www.entensys.com/library/Usage_of_Internet_at_Work.pdf)

To date, previous research rely on self-reported measures of cyberloafing activities. These measures are subject to measurement errors and variability due to unknown factors (Spector 1994). To overcome this, our research objectively measure cyberloafing using a client-side system (PC) monitoring software called as 'System Surveillance Pro' (SSPro). We believe that this approach extends previous literature on cyberloafing in significant ways.

## **2 THEORITICAL BACKGROUND AND HYPOTHESES**

### **2.1 Impact of Sleep Deprivation on Cyberloafing**

Sleep, different from coma or anaesthesia, is a recurring period in human activity that is defined as a state of immobility with greatly reduced responsiveness (Siegel 2005). Sleep is regarded as a reorganization of neutral activity than a cessation of activity (Hobson 2005). Shortage of sleep lead to a state of diminished capacity called as sleep deprivation (Barnes & Hollenbeck 2009). Van Dongen and colleagues found that sleep deprivation occurs when individuals restrict their sleep to six hours per night for two weeks (Van Dongen et al. 2003). In line with this, Cladwell and colleagues found that diminished state occurs due to continuously staying awake for thirty-seven hours (Cladwell et al. 2004).

Sleep habits vary from one individual to another and the quality of an individual's sleep is affected by the abnormalities or the irregularities in their bed-time and wake-time components (Monk et al. 1994). While bed-time components (e.g., timing of breakfast/lunch/dinner, consumption of caffeine/alcohol) relate to the events of day preceding the sleep, wake-time components (e.g., time of going to bed, final wake time) relate to the sleep period just completed (Monk et al. 1994). As well, disturbances during the sleep also affect one's sleep quality (Tsoi & Tay 1986). These disturbances vary from being minor (e.g., usage of restroom in the middle of sleep) to major (e.g., physical complaints or physical discomfort). Such disturbances lead to insomnia, early morning awakenings and waking up at the night after the sleep onset, hence causing sleep deprivation (Monk et al. 1994).

Earlier research on sleep deprivation found that loss or shortage of sleep significantly affects work performance of individuals, their cognitive thinking, decision making and problem solving capability (e.g., Dang-Vu et al. 2007; Harrison & Horne 2000; Lieberman et al. 2002). Research also indicates that sleep deprivation negatively influences mood and interpersonal behaviour (Pilcher & Huffcutt, 1996), leading to irritability, impatience, lack of regard for social conventions, and inappropriate interpersonal behaviours (Horne, 1993). This is because sleep has a restorative effect on the brain which is important in cognitive processes involved in work performance, innovative thinking, decision making and problem solving (Barnes & Hollenbeck 2009). Hence, we predict that sleep deprived individuals will lack focus and attentional regulation and thus, when given a task, will be more distracted and hence, will engage in cyberloafing. More specifically, we predict that individuals' bed time and WASO will be positively associated with time spent on cyberloafing. This is because research indicates that individuals with later bed time and longer WASO will be sleep deprived (Monk et al. 1994). Hence we propose,

*H1: Individuals with late bed time are likely to spend more time on cyberloafing.*

*H2: Individuals who experience longer WASO are likely to spend more time on cyberloafing.*

### **2.2 Moderating effect of Extroversion and Neuroticism**

We predict that (1) extroversion will moderate the relationship between individuals' bed time and time spent on cyberloafing; and (2) neuroticism will moderate the relationship between individuals' WASO and time spent on cyberloafing. The rationale for our prediction is based on theoretical arguments and empirical evidences provided by sleep deprivation research.

Research on sleep deprivation (and other related topics like fatigue, sleep disorders, sleep disturbances and sleep patterns) have identified two personality traits namely, Extroversion and Neuroticism which

affect individual's sleep patterns (e.g., Clift 1975; Mala et al. 2009; Monk et al. 1994; Tsoi & Tay 1984). While 'Extraversion' refers to a tendency towards cheerfulness, sociability, and high activity, 'Neuroticism' reflects the tendency to experience distressing emotions such as fear, guilt, and frustration. Table 1 summarizes the salient characteristics associated in Extroversion and Neuroticism.

Personality Trait	Salient Characteristics
Extroversion	Social, Energetic, 'Life of the party', Gratification seeking, Assertive, Active, Bold, Adventurous
Neuroticism	Emotionally reactive, Anger, Anxiety, Depression, Vulnerability, Self-conscious

Table 1. Salient Characteristics of Extroversion and Neuroticism.

Monk et al. (1994) reported that extroverts had later bed times and neurotics experienced more awakenings during the night, had longer WASO and rated their sleep quality as poorer, their mood as worse, and their alertness as low. In an attempt to study the sleep problems and personality differences, Tsoi and Tay (1984) found that there are no significant differences between the good sleepers (those without sleep problems) and bad sleepers (those with sleep problems) for extroversion but poor sleepers had high levels of neuroticism. These findings are consistent with previous studies conducted by Clift in 1975. More recently, a study by Mala and her colleagues (Mala et al. 2009) on third year medical students as samples, showed that extroversion significantly correlated with sleep timing and neuroticism was associated with sleep disturbance.

Based on the above evidence, we predict that individuals who score high on extroversion and neuroticism will be sleep deprived. Hence, when they are sleep deprived, they lack focus and attentional regulation. Thus, when given a task, these sleep deprived extroverts and neurotics will spend more time on cyberloafing compared to those who score low on extroversion and neuroticism. Accordingly we propose that:

*H3: The relationship between individuals' bed time and the time spent on cyberloafing is moderated by extroversion, such that the relationship is stronger for individuals who score high on extroversion and weaker for individuals who score low on extroversion.*

*H4: The relationship between individuals' WASO and the time spent on cyberloafing is moderated by neuroticism, such that the relationship is stronger for individuals who score high on neuroticism and weaker for individuals who score low on neuroticism.*

The proposed research model is depicted in the figure 1.

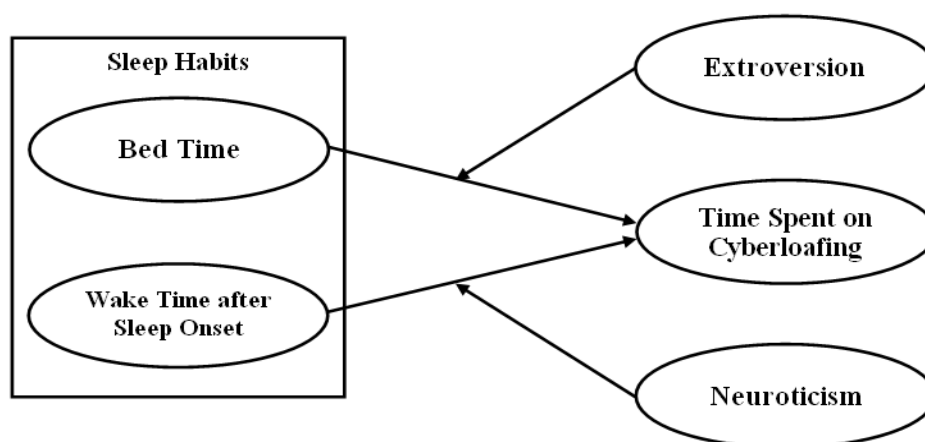


Figure 1. Research Model.

### 3 RESEARCH METHOD

Data were collected using a survey and laboratory experimental design. Participants were 99 undergraduate students enrolled in a management course at a Singapore University. These students earned credit for participating in the study. The study consisted of two parts. In the first part of the study, participants completed a survey which captured their personality and demographic variables.

A week after this, participants reported for the second part of the study in an experimental laboratory. Each laboratory session consisted of 15-17 participants. When they arrived in the laboratory, the research assistants took down their student identity number and assigned them to specific computer. Participants were told that in this part of the study, they were required to watch a video lecture of a professor who has applied for a visiting position with the Department of management. Each participant was provided with a headset so that they can watch the video in the privacy of the cubicle where the computer is placed (see appendix A).

‘SSPro’ was installed on each computer. SSPro captured, (1) the websites visited by the user, (2) the instant messages exchanged, and (3) the screenshots of the desktop at a periodic interval of 1 minute during the experiment. SSPro had a capability of automatically storing the captured data to the local disk. We saved the log files (see appendix B) that listed the activities the participants engaged in.

#### 3.1 Measures

**Time Spent on Cyberloafing.** This was measured by analysing the log files. The log files contained the URL of the website visited by the participants and the corresponding timestamps. Time spent on cyberloafing was computed by examining the timestamps which indicated the time that participant spent on Internet.

**Bed Time and WASO.** Both bed time and WASO were measured using a single item measure adopted from ‘The Pittsburgh Sleep Diary Measure’ (Monk et al. 1994). Participants were asked to report the time they went to bed and the minutes awake when they woke up in the middle of the night after initially falling asleep.

**Extroversion.** Extroversion was measured with 8 items from the Big-Five Inventory developed by Benet-Martinez & John (1998). Items were anchored on a 5-point Likert scale ranging from (1) Strongly Disagree to (5) Strongly Agree.

**Neuroticism.** Neuroticism was measured with 8 items from the Big-Five Inventory developed by Benet-Martinez and John (1998). Items were anchored on a 5-point Likert scale ranging from (1) Strongly Disagree to (5) Strongly Agree.

#### 3.2 Control Variables

We examined the following additional variables that we felt would affect participants’ time spent on cyberloafing.

**Gender.** Previous studies showed that gender was related to both cyberloafing and time spent in cyberloafing. Lim and Chen (in press) found that men were more likely to cyberloaf than women. The study also reported that men spent more time cyberloafing than women. Results of their study also revealed that there were significant gender differences in the perceived impact of cyberloafing on work. Women felt that cyberloafing had a negative impact on their work whereas men reported that cyberloafing had a positive impact on their work. Thus, we controlled for gender in our study.

**Comfort.** As the experimental task was in English, few participants generally may not be comfortable listening to English or understand the professor’s oral expression which may prime them to spend their time on cyberloafing. Hence, we controlled for the participants’ comfort level with English.

**Interest.** As the video lecture was on leadership, it is more likely that participants may have varying interest on its contents. Thus, we controlled for interest level as participants with high levels of interest may be less likely to cyberloaf.

**Satisfaction.** It is more likely that participants may or may not be satisfied with the study. There is also a possibility that participants may feel enthusiastic or rather unpleasant watching the video. This may affect their cyberloafing behaviour and ultimately their time spent on cyberloafing. Hence, we controlled for participants' satisfaction level with the study.

**Stress.** There is a possibility that participants may get stressed as they were tasked to listen to a 45 minutes video lecture on the professor's teaching effectiveness without any break. As this task may affect the participants' cyberloafing behaviour, we controlled for the participants' stress level with the study.

## 4 DATA ANALYSIS

### 4.1 Descriptive Statistics, Correlations and Reliabilities

Fifty percent of our participants were women. The average age of the participants was 21.15 (SD = 1.33 years) and there were no significant differences in terms of age and background on the amount of time spent on cyberloafing. Table 2 presents the descriptive statistics, correlations and reliabilities.

	Mean	SD	1	2	3	4	5
<b>Time Spent on Cyberloafing</b>	3.55	9.92	-				
<b>Bed Time</b>	25.05	1.55	0.08	-			
<b>WASO</b>	2.76	12.93	0.36**	-0.15	-		
<b>Extroversion</b>	3.09	0.63	0.82	-0.07	-0.25*	(0.83)	
<b>Neuroticism</b>	2.93	0.68	0.71	0.15	0.07	-0.30**	(0.84)
Reliabilities for extroversion and neuroticism are shown in parentheses along the diagonal.							
N = 99 * p < 0.05 **p < 0.01 ***p < 0.001							

Table 2. Descriptive Statistics, Correlations and Reliabilities.

### 4.2 Hypothesis Testing

We used hierarchical regression analysis to test the hypotheses. We adopted the method recommended by Aiken and West (1991) for examining interactions in regression methods where we first centered or linearly rescaled each of the two variables by subtracting the mean from each person's score for each variable to reduce the effect of multicollinearity between the interacting term and the related main effect. A summary of our results are presented in Table 3.

Hypothesis 1 predicts that individuals' bed time is positively associated with time spent on cyberloafing and hypothesis 2 predicts that individuals' WASO is positively associated with time spent on cyberloafing. Results of hierarchical regression analyses suggest that individuals' bed time and WASO are significantly related to time spent on cyberloafing. Thus, hypothesis 1 and 2 were both supported. Results of hierarchical regression analyses supported our prediction in hypothesis 3 suggesting that individual's bed time do interact significantly with extroversion in predicting time spent on cyberloafing. However, hypothesis 4 was not supported. While significant, the direction of the interaction pattern was contrary to our initial prediction in that the relationship between individual's WASO and time spent on cyberloafing was in a negative direction and weaker for individuals whose neuroticism is high than for those whose neuroticism is low.

Variables	$\beta^a$			Hypothesis Test
	Step 1	Step 2	Step 3	
<b>Controls</b>				
Gender <sup>b</sup>	0.26**	0.24*	0.19*	
Comfort	-0.08	-0.01	-0.03	
Interest	-0.17	-0.13	-0.14	
Satisfy	-0.04	-0.06	-0.09	
Stress	-0.04	-0.06	-0.10	
<b>Main Effects</b>				
Bed Time		0.19*	0.29**	Supported
WASO		0.41***	0.59***	Supported
Extroversion		0.18*	0.18*	
Neuroticism		0.03	0.40	
<b>Interaction Effects</b>				
Bed Time*Extroversion			0.19*	Supported
WASO*Neuroticism			-0.26*	Not Supported
R <sup>2</sup>	0.10	0.27	0.33	
$\Delta R^2$	0.10*	0.17***	0.06*	
<sup>a</sup> The betas reported is based on standardized coefficients. <sup>b</sup> Coded as 1 = male, 0 = female. N = 99    *p < 0.05    **p < 0.01    ***p < 0.001				

Table 3. Results of Hierarchical Regression Analyses for Time Spent on Cyberloafing.

To determine if the patterns characterizing the significant interactions conform to the directions as proposed in the research hypotheses, we graphed the interaction effects for extroversion and neuroticism. This procedure was recommended by Cohen and Cohen (1983) for all interaction cases. The graphs are shown in figures 2 and 3.

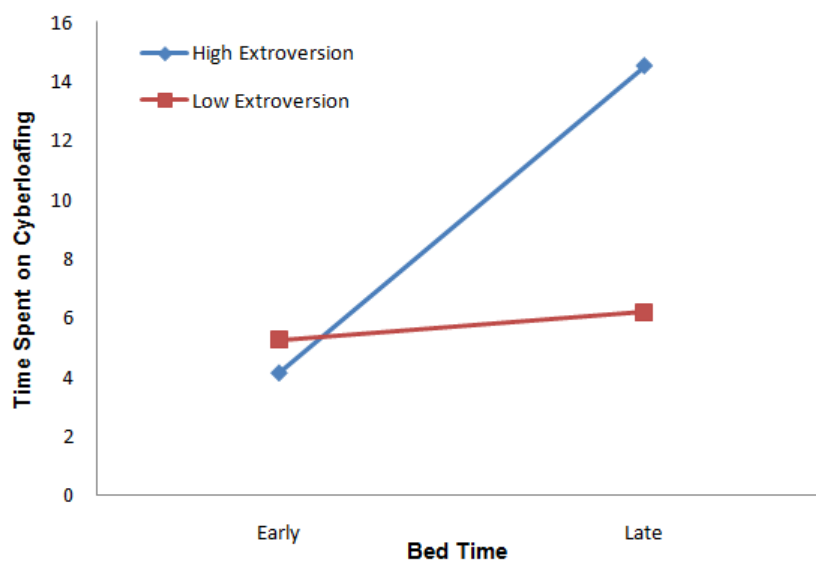


Figure 2. The Interaction between Bed Time and Extroversion.



Figure 2 suggest that the interaction effect support our hypothesis that individuals whose bed time was later rather than early spent more time on cyberloafing—but this difference decreases when extroversion is low. This suggests that the relationship between time to bed and time spent on cyberloafing is stronger for high extroverts compared to low extroverts. Though expected this finding is interesting and will be discussed in greater detail in the next section.

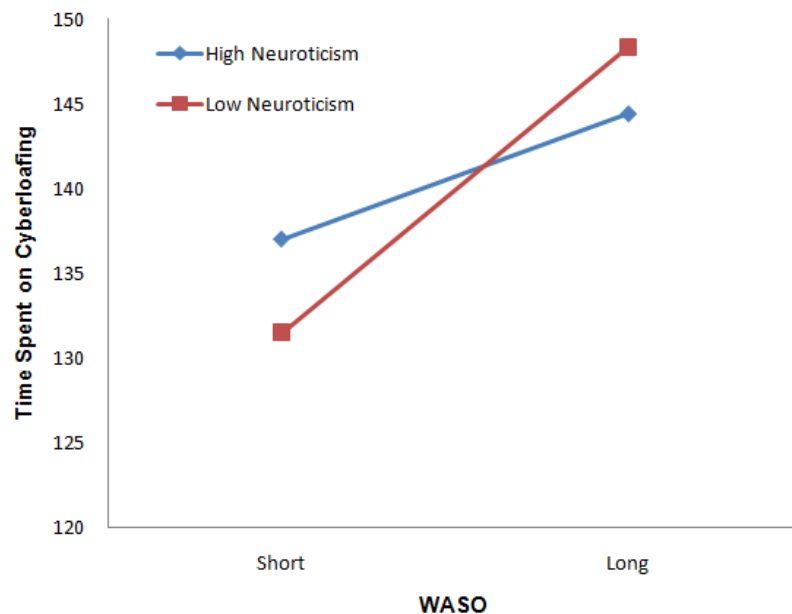


Figure 3. *The Interaction between WASO and Neuroticism.*

Figure 3, however, suggests that the direction of interaction effect for neuroticism and WASO was the reverse of what we initially predicted. Individuals whose neuroticism was low tend to spend more time on cyberloafing compared to those whose neuroticism is high; the difference becomes lesser however, when WASO is short. While unexpected, this finding is exciting and will be discussed in greater detail in the next section.

### 4.3 Discussion

Our study examined the use of Internet by individuals for non-work related purposes from the combined perspectives offered by sleep deprivation and personality. Our findings suggest that sleep deprived individuals lack focus and attentional regulation and thus, when given a task, spent their time on cyberloafing.

Based on our findings, individual's bed time and their WASO significantly predicted the time spent on cyberloafing. In particular, individual with later bed time and longer WASO spent more time on cyberloafing. This could be that sleep deprivation negatively influenced individuals' focus and attentional regulation on given task. These negative effects which are disturbingly powerful impaired functioning, affected performance, and prompted individuals to engage in cyberloafing. Indeed, previous research found that sleep deprivation affected work performance (Pilcher & Huffcutt 1996) and marred individual's innovative thinking and decision making process (Harrison & Horne 1999; Harrison & Horne 2000).

The relationship between individuals' bed time and time spent on cyberloafing was contingent on extroversion. As hypothesized, the relationship between individuals' bed time and time spent on cyberloafing was stronger for individuals who scored high on extroversion than for individuals who scored low on extroversion. This could be that the individuals who sleep late and score high on extroversion are more sleep deprived, less focused in their attention, and more likely to seek excitement. Hence, rather than focusing on the task, sleep deprived extroverts travelled the Internet

and engaged in non work related activities. Indeed, several researches (e.g., Amichai-Hamburger et al. 2002) found that of Big-Five, extroversion is strongly associated with online use and Internet interaction.

Turning now to the direction of interaction between individual's WASO and neuroticism on time spent on cyberloafing, we offer two possible explanations by drawing arguments from processing efficiency theory (Eysenck & Calvo 1992) and cognitive model of neuroticism (Wallace and Newman 1997; Wallace and Newman 1998) that may account for this somewhat unexpected pattern of interaction. First, according to processing efficiency theory, anxiety causes worry which has two main effects: (1) a reduction in the storage and processing capacity of the working memory system available for a concurrent task; and (2) an increment in on-task effort and activities designed to improve performance. The theory suggests that anxious neurotics often have lower performance, but not always. Though neurotics are less efficient, they compensate by expending additional efforts (Gray et al. 2005). In our case, it is more likely the anxious neurotics would have felt that their feedback on teaching effectiveness of the professor would be evaluated. To perform well, they would have compensated expending additional efforts by compromising their time spent on cyberloafing. This suggests that highly neurotic individuals outperform their less neurotic counterparts in a busy work environment or if they are expending a high level of effort (Smillie et al. 2006).

Second, according to the cognitive model of neuroticism, optimal functioning requires ongoing regulation of negative thoughts. As highly neurotic individuals are susceptible to the automatic orienting of attention (an instance where attention and cognitive resources are redirected from an ongoing process to distractor stimuli or cognitions), regulation of such cognitions are unsuccessful or disrupted (termed 'dysregulation'). Dysregulation of such negative cognitions influences affect and behaviour that may translate into a tendency for work performance (Smillie et al. 2006). In our case, it is more likely that the highly neurotic individuals would have felt the video lecture as a task that would require attention and cognitive resources. Hence, dysregulation of such cognitions would have influenced their performance, thereby preventing them from cyberloafing.

Thus, results of our study provide preliminary evidence suggesting that individuals do cyberloaf when they are sleep deprived.

## **5 CONCLUSION**

### **5.1 Theoretical and Practical Implications**

By addressing the research questions set forth at the beginning of the paper, this study makes several important contributions to theory. First, the present study seeks to extend the existing production deviance literature by examining a new form of individual misbehaviour at workplace, i.e., cyberloafing within the framework offered by sleep deprivation and personality. Specifically, we examined the role of personality (extroversion and neuroticism) in moderating the relationship between, (1) individuals' bed time and time spent on cyberloafing; and (2) individuals' WASO and time spent on cyberloafing. In line with this, our study confirmed that highly neurotic individuals outperform their stable counterparts in a busy work environment or if they are expending a high level of effort (Smillie et al. 2006).

Second, extant studies in the literature related to the Internet have largely examined the possible benefits that it offers. Our study is one among the few studies (e.g., Lim 2002) that look into negative aspects or dark side of the Internet. A third related contribution is that while most of the researches on cyberloafing have been generally descriptive (Blanchard & Henle 2008), our study is in line with the few studies (e.g., Lim 2002) that are theoretically strong and empirically validated. Fourth, while substantial research on cyberloafing used behavioural theories (e.g., Woon and Pee 2004; Lee et al. 2005; Pee et al. 2008) in predicting and explaining cyberloafing behaviours, we have examined cyberloafing from the combined perspectives offered by sleep deprivation and personality. Although sleep deprivation is a heavily researched topic in the area of human performance (Barnes &

Hollenbeck 2009), it has been overlooked in management and information systems literature. Thus, our study attempted to fill this void by testing whether the existing schools of thoughts from the reference disciplines holds for cyberloafing behaviours. Lastly, while significant research focussed on measuring cyberloafing activities using self-reported measures that are criticized for its variability due to unrelated factors and measurement errors; we took a first move to measure cyberloafing objectively.

From a practical standpoint, this study makes two important contributions. First, by providing empirical evidence that sleep deprivation can trigger cyberloafing this study highlights to managers that long periods of sleep deprivation can trigger serious production deviance. Second, our study indentified two important sleep characteristics (Bed Time and WASO) as the significant predictors of cyberloafing, highlighting the fact that managers need to consider them while assessing the behaviour and work performance of the individuals.

## 5.2 Limitations and Future Research

Findings of this study should be viewed within the context of its limitations. A major limitation of our study is that we examined only two of the Big-Five factors of personality (extroversion and neuroticism) on sleep deprivation and time spent on cyberloafing relationship. Future attempts on this topic can look into the effects of other three personality factors (agreeableness, conscientiousness, openness to experience) on the above relationship.

Second limitation pertains to the contextual realism which is a characteristic feature of laboratory experiments. Though we are confident about the precision in measurement of behaviour, our findings lack context realism. Future attempts to examine this topic can use field experiments (by manipulating behavioural variables) whose context realism is moderately high when compared to laboratory experiments.

Third, though the dependent variable was measured objectively, we have used the subjective self-reported measures for the independent and moderating variables. While steps were taken to mitigate common-method bias by obtaining responses on the variables at two different points in time, we do acknowledge that this design is not totally fool-proof. Thus to rule out the potential problem of inflated observed relationships among the variables, future attempts to examine this topic can supplement the self-reported data with other sources of data collection such as bed partner's or roommate's or friend's report. Else, more advanced devices like 'Actigraphs' could be used to measure the sleep patterns. This will help to lend collaboration and confidence to findings of the present study.

A fourth limitation pertains to the findings on the unexpected pattern of interaction between neuroticism and WASO. This result is at variance with the findings on the previous studies on neuroticism which suggest that neuroticism is negatively associated with production deviance. Our finding however, is noteworthy and informative in that it highlights the possibility that high neurotic people to perform well on the assigned task compensate expending additional efforts by compromising their time spent on cyberloafing.

## References

- Aiken, L. S. and West, S. G. (1991). Multiple regression: Testing and interpreting interactions. Thousand Oaks, CA: Sage.
- Amichai-Hamburger, Y., Wainapel, G., and Fox, S. (2002). "On the Internet no one knows I am an introvert:" Extroversion, neuroticism, and Internet interaction. *CyberPsychology and Behavior*, 5 (2), 125-128.
- Barnes, C. M. and Hollenbeck, J. R. (2009). Sleep deprivation and teams: Burning the midnight oil or playing with fire? *Academy of Management Review*, 34, 56-66.
- Benet-Martínez, V. and John, O. P. (1998). Los Cinco Grades across cultures and ethnic groups: Multitrait-multimethod analyses of the Big Five in Spanish and English. *Journal of Personality and Social Psychology*, 75, 729-750.

- Blanchard, A.L. and Henle, C.A. (2008). Correlates of different forms of cyberloafing: the role of norms and external locus of control. *Computers in Human Behaviour*, 24, 1067-1084.
- Clift, A.D. (1975). *Sleep disturbance and hypnotic drug dependence*. Excerpta Medica. Amsterdam.
- Eysenck, M. W. and Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition & Emotion*, 6, 409-434.
- Gray, J.R., Burgess, G.C., Schaefer, A., Yarkoni, T., Larsen, R.J., and Braver, T.S. (2005). Affective personality differences in neural processing efficiency confirmed using fMRI. *Cognitive, Affective, & Behavioural Neuroscience*, 5, 182-190.
- Harrison, Y. and Horne, J. A. (1999). One night of sleep loss impairs innovative thinking and flexible decision making. *Organizational Behavior and Human Decision Processes*, 78: 128-145.
- Harrison, Y. and Horne, J. A. (2000). The impact of sleep deprivation on decision making: A review. *Journal of Experimental Psychology-Applied*, 6: 236-249.
- Hobson, J. A. (2005). Sleep is of the brain, by the brain and for the brain. *Nature*, 437: 1254-1256.
- Horne, J. A. (1993). Human sleep, sleep loss and behaviour-Implications for the prefrontal cortex and psychiatric disorder. *British Journal of Psychiatry*, 162: 413-419.
- Lee, O.K.D., Lim, K.H. and Wong, W.M. (2005). "Why Employees Do Non-Work-Related Computing: An Exploratory Investigation through Multiple Theoretical Perspectives." In the proceedings of the 38th Annual Hawaii International Conference on System Sciences (HICSS'05). Track 7 - Volume 07, pp. 185.
- Lim, V.K.G. (2002). The IT way of loafing on the job: cyberloafing, neutralizing and organizational justice. *Journal of Organizational Behaviour*, 23, 675-694.
- Lim, V.K.G. and Teo, T.S.H. (2005). Prevalence, perceived seriousness, justification and regulation of cyberloafing in Singapore -an exploratory study. *Information and Management*, 42, 1081-1093.
- Lim, V.K.G. and Chen, D.J.Q. (in press). Cyberloafing at the workplace: gain or drain on work?. *Behaviour & Information Technology*.
- Mala, B.R., Soares, M.J., Gomes, A., Marques, M., Pereira, A.T., Valente, J., Azevedo, M.H., and Macedo, A. (2009). Personality traits and sleep patterns/problems in medical students. *European Psychiatry*, 24, Supplement 1. p1226.
- Monk, T. H., Reynolds, C. F., Kupfer, D. J., Buysse, D. J., Coble, P. A., Hayes, A. J., Machen, M. A., Petrie, S. R. and Ritenout, A. M. (1994). The Pittsburgh Sleep Diary. *Journal of Sleep Research*, 1994, 3: 111-120.
- Pee, L.G., Woon, I.M.Y., and Kankanhalli, A. (2008), Explaining Non-Work-Related Computing in the Workplace: A Comparison of Alternative Models, *Information and Management*, 45(2), 120-130.
- Pilcher, J. J. and Huffcutt, A. I. (1996). Effects of sleep deprivation on performance: A meta-analysis. *Sleep*, 19: 318-326.
- Siegel, J. M. (2005). Clues to the functions of mammalian sleep. *Nature*, 437: 1264-1271.
- Smillie, L.D., Yeo, G.B., Furnham, A.F., and Jackson, C.J. (2006). Benefits of All Work and No Play: The Relationship between Neuroticism and Performance as a Function of Resource Allocation. *Journal of Applied Psychology*, 91 (1), 139-155.
- Spector, P. E. (1994). Using self-report questionnaires in OB research: a comment on the use of a controversial method. *Journal of Organizational Behavior*, 15, 385-392.
- Wallace, J. F. and Newman, J. P. (1997). Neuroticism and the attentional mediation of dysregulatory psychopathology. *Cognitive Therapy and Research*, 21, 135-156.
- Wallace, J. F. and Newman, J. P. (1998). Neuroticism and the facilitation of the automatic orienting of attention. *Personality and Individual Differences*, 24, 253-266.
- Woon, I. and Pee, L. (2004). Behavioral factors affecting internet abuse in the workplace-an empirical investigation", *Proceedings of the Third Annual Workshop on HCI Research in MIS*, Washington.

## Appendix

### A. Briefing Instructions

Professor AHKB of the Department of Management, Institute of Technology & Science, India has applied for a one-year (April 2010 - March 2011) visiting position with the Department of Management and Organization, University of Singapore, Singapore. In his application, Professor AHKB has proposed to design and teach a course on 'Leadership in Organizations'. The school has shortlisted Professor AHKB as one of the potential candidates for the visiting appointment from the pool of twelve applicants. The school would like seek students' feedback on his teaching effectiveness. In line with this, please watch his video lecture on 'Leadership' and provide your feedback.

**Note:** Click the video file named 'Leadership\_AHKB' provided on your desktop and listen carefully to it. The video lecture is about 45 minutes long. Use the headset provided.

### B. Sample Log File

Log Type: Website Activity

Date: 2/11/2010

Machine	User	URL	Timestamp
EXPLAB116	mktv9	<a href="file:///H:/KGL/Main%20Experiment/Feb10/13.html">file:///H:/KGL/Main Experiment/Feb10/13.html</a>	2/11/2010 12:47:30
EXPLAB116	mktv9	<a href="http://sg.msn.com/iat/us_sg.aspx">http://sg.msn.com/iat/us_sg.aspx</a>	2/11/2010 14:41:35
EXPLAB116	mktv9	<a href="http://community.livejournal.com/sgflea/">http://community.livejournal.com/sgflea/</a>	2/11/2010 14:41:57
EXPLAB116	mktv9	<a href="http://chic-obsession.livejournal.com/6787.html">http://chic-obsession.livejournal.com/6787.html</a>	2/11/2010 14:42:31
EXPLAB116	mktv9	<a href="http://toolbar.live.com/signin.htm">http://toolbar.live.com/signin.htm</a>	2/11/2010 14:42:37
EXPLAB116	mktv9	<a href="http://chic-obsession.livejournal.com/6787.html">http://chic-obsession.livejournal.com/6787.html</a>	2/11/2010 14:42:40
EXPLAB116	mktv9	<a href="http://sg.msn.com/iat/us_sg.aspx">http://sg.msn.com/iat/us_sg.aspx</a>	2/11/2010 14:42:47
EXPLAB116	mktv9	<a href="http://chic-obsession.livejournal.com/6787.html">http://chic-obsession.livejournal.com/6787.html</a>	2/11/2010 14:42:50
EXPLAB116	mktv9	<a href="http://community.livejournal.com/sgflea/92679624.html#cutid1">http://community.livejournal.com/sgflea/92679624.html#cutid1</a>	2/11/2010 14:43:24
EXPLAB116	mktv9	<a href="http://community.livejournal.com/sgflea/92674674.html#cutid1">http://community.livejournal.com/sgflea/92674674.html#cutid1</a>	2/11/2010 14:44:48
EXPLAB116	mktv9	<a href="http://community.livejournal.com/sgflea/?skip=50">http://community.livejournal.com/sgflea/?skip=50</a>	2/11/2010 14:46:32
EXPLAB116	mktv9	<a href="http://lynnine.livejournal.com/">http://lynnine.livejournal.com/</a>	2/11/2010 14:47:11
EXPLAB116	mktv9	<a href="http://community.livejournal.com/sgflea/?skip=100">http://community.livejournal.com/sgflea/?skip=100</a>	2/11/2010 14:47:45
EXPLAB116	mktv9	<a href="http://community.livejournal.com/sgflea/?skip=150">http://community.livejournal.com/sgflea/?skip=150</a>	2/11/2010 14:48:52
EXPLAB116	mktv9	<a href="http://euphoria-ress.livejournal.com/">http://euphoria-ress.livejournal.com/</a>	2/11/2010 14:49:24
EXPLAB116	mktv9	<a href="http://community.livejournal.com/sgflea/92641078.html#cutid1">http://community.livejournal.com/sgflea/92641078.html#cutid1</a>	2/11/2010 14:49:39
EXPLAB116	mktv9	<a href="http://community.livejournal.com/sgflea/">http://community.livejournal.com/sgflea/</a>	2/11/2010 14:50:28
EXPLAB116	mktv9	<a href="http://toolbar.live.com/signin.htm">http://toolbar.live.com/signin.htm</a>	2/11/2010 14:51:04
EXPLAB116	mktv9	<a href="http://missvrea.livejournal.com/">http://missvrea.livejournal.com/</a>	2/11/2010 14:51:07
EXPLAB116	mktv9	<a href="http://mytintedkiss.livejournal.com/12817.html">http://mytintedkiss.livejournal.com/12817.html</a>	2/11/2010 14:53:02